

THE TINBERGEN & HUETING APPROACH
IN THE ECONOMICS OF NATIONAL ACCOUNTS
AND ECOLOGICAL SURVIVAL

DRAFT

The Tinbergen & Hueting Approach in the Economics of National Accounts and Ecological Survival

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Colignatus is the preferred name of Thomas Cool in science.

I thank Roefie Hueting, Bart de Boer, Thea Sigmond and Henk van Tuinen for their comments over some years now. All errors remain mine.

Cover © 2020 Thomas H.A.M. Cool. Painting by Hans van den Doel (1937-2012) showing Jan Tinbergen, Pieter Hennipman, Amartya Sen, Roefie Hueting, Van den Doel himself and Jos de Beus. This painting has been donated by his widow Keesjaa Blok to Thomas Cool.

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Abstract

Tinbergen & Hueting (1991) ¹ provide an approach to the economics and national accounts of ecological survival that still is unsurpassed. The approach is:

- (1) rooted in the economic subject matter (scarcity)
- (2) rooted in fundamentals of ecology (collapse is observed when it is too late)
- (3) applicable within the statistical framework of national accounting and thus fully practical
- (4) demanding in economic and environmental expertise but concerning its result easy to understand by policy makers and the general public, for, with *standard national income* (NI) and *environmentally Sustainable National Income* (eSNI), then $e\Delta = NI - eSNI$ namely gives the distance to environmental sustainability.

The "Report of the United Nations Conference on the Human Environment, Stockholm 5-16 June 1972" (United Nations 1973) causes embarrassment: so much was known already so early, and actually so little has been achieved. The IUCN, UNEP and WWF (1980) "*World Conservation Strategy: living resource conservation for sustainable development*" argues "that for development to be sustainable, it should support conservation rather than hinder it". The Tinbergen & Hueting approach adopts this principle of conservation.

The approach is to make the measurement of national income conditional upon assumptions about preferences for environmental sustainability. The statistical measurement of environmentally sustainable national income (eSNI) requires that the vital environmental functions remain available for future generations. This approach puts physical boundaries upon economic welfare optimisation. For statistics it suffices to look at only one year, and not all future generations. The vital environmental functions are conserved, i.e. they should not be less at the end than at the beginning of the year of observation. While the prime result is the distance to environmental sustainability $e\Delta = NI - eSNI$, the method also provides for a rich biotope of indicators at the individual level of resource use.

Remarkably, academic economists inverted the conservation strategy. They interpreted the issue of sustainability as a problem of optimising welfare over an infinite horizon of generations, while neglecting the boundary condition, regarding the boundary as not very relevant if their models gave solutions anyway. They started discussing whether "sustainability" meant equal consumption over the generations, or equal welfare, or discounted forms, or integral value vs per capita, and so on. All this distracts from ecological survival.

In practical calculation, various "green GDPs / indicators" have been proposed such as MEW, ISEW, Ecological Footprint, Adjusted Net Savings / Genuine Savings and Genuine Progress Indicator, and lately there is an increased interest in happiness as a re-interpretation of economic utility and social welfare. With respect to both ecological survival and requirements of economic theory these alternatives however fail.

¹ <http://www.sni-hueting.info/EN/Publications/1991-Tinbergen-Hueting-GNP-and-market-prices.pdf> and in this book highlighted in Appendix 50.

David Pearce (1941-2005) apparently dominated the discussion and managed to get his view adopted by UNEP / Worldbank in the “Genuine Savings” indicator, nowadays “Adjusted Net Savings”, see Chapters 30 and 43. Pearce had a background in Cost-Benefit Analysis (CBA) that has a tradition of looking at substitutions and trade-offs. Pearce suggested that there would be trade-offs in the environmental issue and between the generations, and he regarded sustainability as relying upon such trade-offs. If a current generation destroyed resources then a next generation might be “compensated” by e.g. more man-made capital like human capital. In this manner he created a discussion about the distinction between “weak” (trade-offs) and “strong” (conservation) sustainability. He portrayed the issue as if the proper notion of sustainability within economics would be the “weak” one, while the original proposal of conservation was marginalised and no longer called “conservation” but “strong sustainability”. He stated that the Tinbergen and Hueting approach provided an “inverted” solution, while it was actually he himself who had inverted the IUCN, UNEP and WWF (1980) *World conservation strategy*. Potentially his wish to join in the abstraction of mathematical economics suggested to him that such boundary issues could also be neglected. His inversion was actually a category mistake, since boundary conditions for an optimisation problem would have no trade-offs for themselves.

Currently, statistical offices and economic advisory and planning agencies over the world are implementing UN SEEA systems for national accounting and derived indicators both for statistical observation and projections for the future. These satellite accounts put the environment outside of the realm of economics, and do not provide for an integration of decision making about scarce resources for alternative ends.

Policy discussions on ecological survival will be much served when researchers study in detail what Tinbergen & Hueting have wrought. When an economist hasn’t read Tinbergen & Hueting (1991) and now Hueting & De Boer (2019b),² then an advice on “economic growth” and ecological survival is at risk of being misguided – as indeed is shown in various cases.

Tinbergen (1903-1994) was one of the pioneers in the 1930s for what became the UN System of National Accounts (SNA) and thus was in a firm position on this issue. In 1990-1991 he accepted Hueting’s revolutionary diagnosis that *the very measurement* of national income was *conditional*, namely on assumptions on preferences. The main author of Tinbergen & Hueting (1991) is actually Hueting (born 1929). The two authors decided that Tinbergen would be the first author, based upon the international recognition that he had, as recipient – jointly with Ragnar Frisch (1895-1973) – of the Nobel Prize in economics 1969. By this gesture, Tinbergen expressed that he fully supported the findings by Hueting.

Tinbergen however also had a wider vision than Hueting, namely on the need of international co-operation. This volume contains a tentative Chapter 2 on *Tinbergen’s Theorem* holding that *World governance will become more involved*.

PM. Some caveats.^{3 4}

² <http://www.sni-hueting.info/>

³ Earlier drafts of this book in 2009 and 2015: <https://mpira.ub.uni-muenchen.de/63904/>

⁴ Parts of the texts in this book have also been used to provide for assistance for Hueting & De Boer (2019b) and re-edited by them. <http://www.sni-hueting.info/EN/NA-eSNI/index.html>

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Part 1. Introduction

1. Introduction

1.1 *The economics and national accounts of ecological survival*

In this book, ecological survival is not an issue of drama but of economics and governance. The warnings by ecologists, and what everyone can notice in the newsmedia if not the weather, are not considered here by themselves but are only an inspiration to consider economics, economic statistics and economic policy.

It is relatively easy to emphasize the drama. The world problems with overpopulation and exhaustion of the environment grow bigger by the decade and are drawing the attention of national governments, citizens and researchers alike. Extinction of species takes place at an accelerating rate. Extinction of the human species itself is apparently not at stake though some authors state that if bees are affected then food will become rather scarce. For this book, we regard all these tales as likely interesting but not our focus of attention. For us, the focus is: if there would be an issue of ecological survival, how would economics deal with it ?

Subsequently, we zoom in on the Tinbergen & Hueting (1991) approach – part of which article is quoted in Appendix 50. It is the approach in economics that measures environmental sustainability using the framework of national accounting. The standard measures of national income (NI) and “economic growth” are misleading and provide a wrong compass. There is an alternative: when economic policy is provided with a yardstick for environmental sustainability then we can determine which policies cause ecological disaster and which policies steer towards ecological survival. The Tinbergen & Hueting approach is targeted at *statistics*, or the past, but their notions of *income* and *growth* can also be applied for policy scenarios, thus also for *economic planning* and the future.

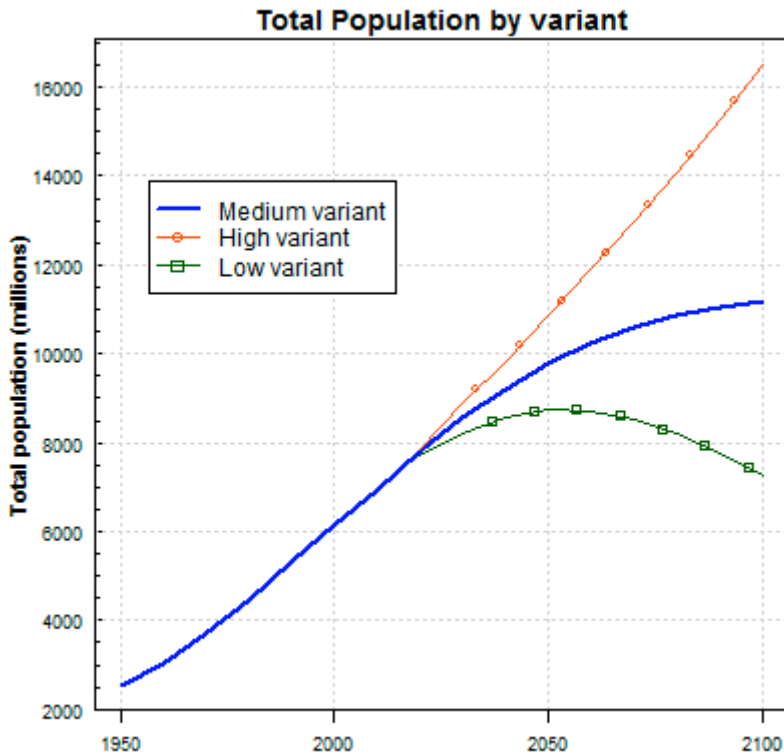
The purpose of the present book is to look at Tinbergen & Hueting's work from a metalevel, from didactics, history and with comparisons to other approaches. For details on the method itself the reader is referred to Hueting & De Boer (2019b).⁵

1.2 *A graph of world population development*

This book covers the period from 1965, when world population was around 3.3 billion, to 2019, with around 7.5 billion, with an increase of 4.2 billion over some 55 years, on average 0.78 bn / decade. **Figure 1** contains the data and projections by the UN Population Division. In 1986 Hueting developed the vertical demand curve for environmental sustainability, with subsequent development of its *methodology*. In 1991 there was the Tinbergen & Hueting (1991) paper. This book reports about the collective failure of economic science and its practice given the institutional setup for economic policy making. In 1990 I observed such collective failure with respect to unemployment, and in 1992 I came upon the solution approach that each democracy is advised to improve upon the checks and balances of the Trias Politica by setting up a fourth constitutional branch, namely an Economic Supreme Court, see the most recent discussion in Colignatus (2000a, 2011) (DRGTPE). The present book will look at the Tinbergen & Hueting approach with this in mind.

⁵ <http://www.sni-hueting.info>

Figure 1. World population (UN Population Division)⁶



1.3 The Tinbergen & Hueting approach

Tinbergen (1903-1994) has been one of the founding fathers of national accounting alongside Keynes, Hicks, Kuznets, Meade, Stone and others, see Den Bakker (1994). When Tinbergen read Hueting (1967, 1968) he contacted him, and at Tinbergen's advice, Kees Oomens (1917-2005) at CBS Statistics Netherlands appointed Hueting in 1969 specifically for the task to correct national income for the impact on the environment, see Section 21.4 and Chapter 22. Tinbergen had been thinking and writing about the environment too from quite early on – which he could discuss with his brother biologist Niko Tinbergen. Apparently after Tinbergen (1970) (in Dutch) he left further details to Hueting at CBS, who thus has been writing most explicitly on this. The World Bank invited Tinbergen and Hueting to write a joint paper for a collection for the Earth Summit Rio 1992. This became Tinbergen & Hueting (1991). The authors considered that Tinbergen would be second author but decided that it would be better for the reception of the analysis that Tinbergen, with his international recognition, would be first author. This book will refer mostly to Hueting's work and only on occasion to their joint paper. The importance of the paper however is that Tinbergen with his background in national accounting and econometric modelling fully endorses this approach and regards it as a natural extension for his own work and for economics as a whole. If

⁶ <https://population.un.org/wpp/Graphs/DemographicProfiles/>

ecological survival of humanity is at risk and requires a conservation strategy – “strong” sustainability, see Dietz and Neumayer (2007) – then their approach would merit support.

The Tinbergen & Hueting approach starts from welfare theory, focuses on environmental sustainability, and selects national income and “economic growth” as the main variables for policy makers. Production and income interact with the environment. When environmental functions (possible uses ⁷) become scarce, they get a price, as there are e.g. abatement costs. In standard national income (NI) these costs are regarded as income. In an alternative measure of national income we should subtract those costs (associated with a loss of welfare) due to the fact that we have lost the free use of those environmental functions. The approach then puts the standard measurement of national income and “economic growth” in contrast to an accompanying measure of “*environmentally Sustainable National Income*” (eSNI) and the distance $e\Delta = NI - eSNI$.

The development of the latter two notions are some of Hueting’s original contributions to economics. Though Hueting developed eSNI, the involvement by Tinbergen in eSNI is strong. Tinbergen agreed from the start with the paradigm of using national accounting. Tinbergen wrote a preface to Hueting’s thesis (1974, 1980). Tinbergen (1985:35) follows Hueting (1968) and (1974a) in his awareness of *counterproduction* – which Hueting now calls “asymmetric bookkeeping”, see Chapter 12 below. ⁸ The formula for nonrenewables is by Tinbergen (1990).

Tinbergen is important for this present book also because he originally helped as well in the determination and selection of the key goals in economic policy: balanced budget, stable prices, full employment, “economy growth”, a small surplus on the balance of payments to support development assistance, more equal distribution of income. Over the years governments have put different accents and weights on these aims. In The Netherlands “economic growth” was officially replaced with “sustainable economic growth” – but the notion of environmental sustainability seems to have gotten diluted. We will look at the relevance for policy making below again.

Hueting (1974a, 1980) clarified that the environment, due to scarcity, had become part of economics. The Pigovian “externalities” actually were internal. Tinbergen is one of the very few economists who understood what Hueting had established. Tinbergen’s preface to the English translation states:

“he has in my opinion quite rightly regarded environmental scarcity as something inside, not outside, economics.”

It follows that the term “economic activity” directly includes the environmental impact. For this reason, GDP measures *production* and not, as is often claimed, *economic activity*, since the latter involves the environment too.

⁷ The environmental functions (possible uses) of an environmental resource j (e.g. water), with level x_j (stock, state), are the possible uses i , for $i = 1, \dots, n_j$, having actual usage u_{ij} (flow). With p_{ij} the purity or availability, and $q_{ij}[x_j]$ the relevant optimal (e.g. fishing) or maximal (e.g. air quality) purity, for example $q_{ij} = 100\%$ (e.g. no pollution), then the remaining purity after usage is $p_{ij} = q_{ij} - u_{ij}$. Norms on resource levels and their availability give norms on their usage.

In the 1930s, there were still many people who regarded production as only pertaining of material goods, thus excluding services. In the development of the national accounts some authors preferred to use the more neutral term “economic activity” instead of “production”, thus avoiding the distractive discussion about services. While economics is about utility and welfare, this choice of terms was still rather adequate, since production and welfare at that time were highly correlated. Soon the correlation broke down though, and it became essential to distinguish *production* (GDP) from *economic activity*, targeted at utility and welfare.

Above quote shows that Tinbergen was aware of Huetting's result on this distinction, in particular concerning the environment, and a main theme of this book is that others remained in blindness. CBS Statistics Netherlands, on its website, still identifies GDP with “the size of the economy” and the growth of GDP with “economic growth”, which terminology thus runs counter to economic theory itself. See El Serafy (2014), reproduced in **Appendix 53**, with the protest that uninformed accountants have taken control of economic statistics, like madmen have taken control of the madhouse.

1.4 *Assessment versus claim*

For the *Tinbergen & Huetting approach* just identified, and its evaluation, it is relevant to distinguish between what the authors claim themselves and what we can assess as outsiders. The authors only collaborated. Above identification of the *Tinbergen & Huetting approach* is based upon content, and not upon some claim by the authors that this constitutes a *Tinbergen & Huetting approach* specifically. It are us outsiders who observe at a meta level how it all fits together within a larger framework. Tinbergen worked since the 1930s on national accounting and Huetting adopted its definitions, so that there arose a natural link with Tinbergen's views.

The authors collaborated but they might have different perspectives on why they collaborated. Chapter 22 revisits their personal views and our assessment. This book first discusses the approach and only later considers differences in views.

1.5 *Result in both economic theory and statistical practice*

The Tinbergen & Huetting approach has its legs in both economic theory and statistical practice. The two components are displayed in **Figure 2**, see the nutshell history in Section 11.1. National accounting has a major own practical origin apart from economics.

It is quite natural that science starts with mere observations without much clarity about the usefulness of such observations. This might be called “measurement without theory” but actually people may have some purpose (and even playfulness might be seen as such purpose). Ideas develop over time. Early astrologers traced the stars for not quite the same reasons as modern astronomers do today. Pieter de la Court (1618-1685) discussed Dutch economic interests, 1662. William Petty (1623-1687) started collecting economic data for tax purposes, 1662. Johan de Witt (1625-1672) used mortality data to analyse annuities, 1671. In such developments both theory and data are relevant and the same applies now here.

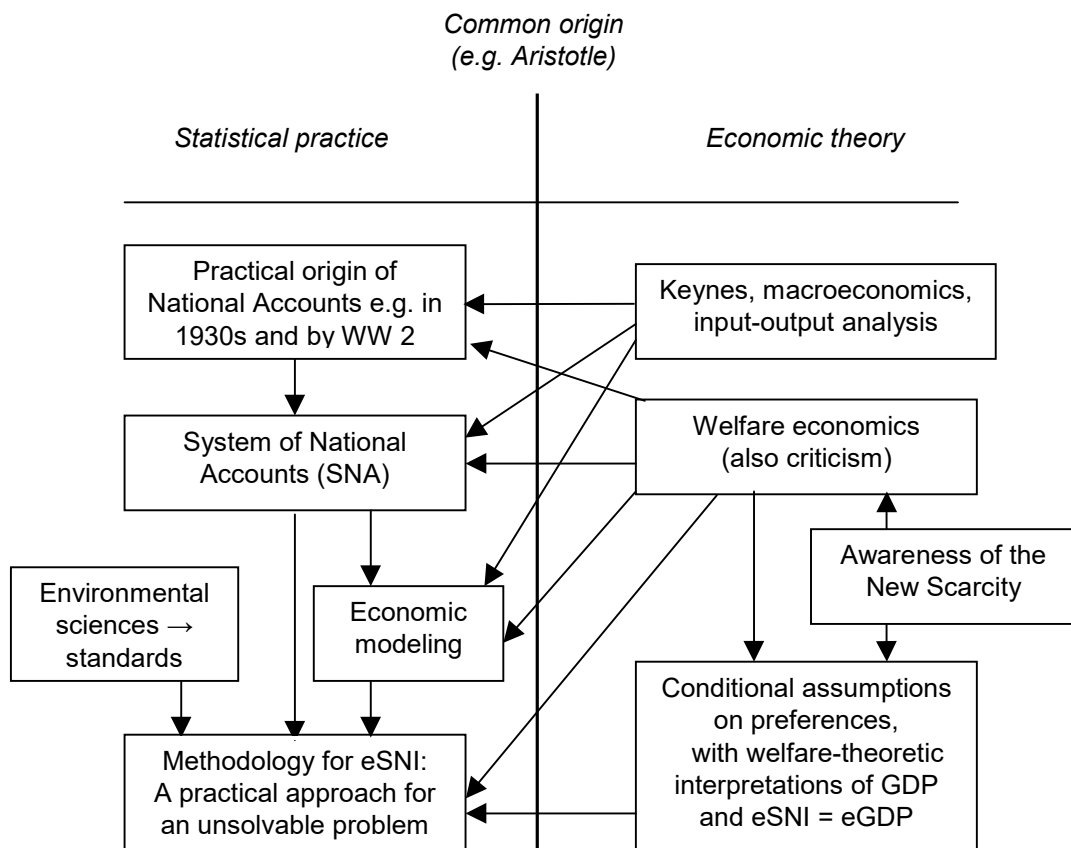
⁸ This is best explained with an example: when an oil spill pollutes a beach, then the costs of cleaning up are entered into NI but the damage (e.g. measured by those costs) is not subtracted.

The right leg in **Figure 2** is in welfare theory. From the beginning, welfare theory has been warning the public and policy makers that GDP can be a component of welfare but must not be mistaken for welfare itself. The theory on the new scarcity would assist users of statistics to better see the welfare-theoretic criticism on GDP, namely by the analysis on the conditionality of preferences about environmental sustainability, and by providing the second anchor of eSNI.

The left leg is the economic concept of national income, $eSNI = eGDP$, as relevant for statistical practice, as a practical approach for an unsolvable problem. The methodology of eSNI is a practical *accounting method*. Welfare theory only comes into play again for the interpretation of the calculated figure of eSNI. While welfare theory has the conditionality on *preferences*, practical calculation has the conditionality of the *notion of income* upon *accounting method*. Standard NI has the method mainly of descriptive statistics, and application for e.g. tax purposes, while eSNI has the method mainly in inferential statistics, with standards and model, and with application for environmental policy making.

National statistical offices can do little when policy makers and the public interpret production growth as an increase in welfare but the bureaus have an own responsibility for properly explaining the notion of *income*.

Figure 2. Economic theory and statistical practice

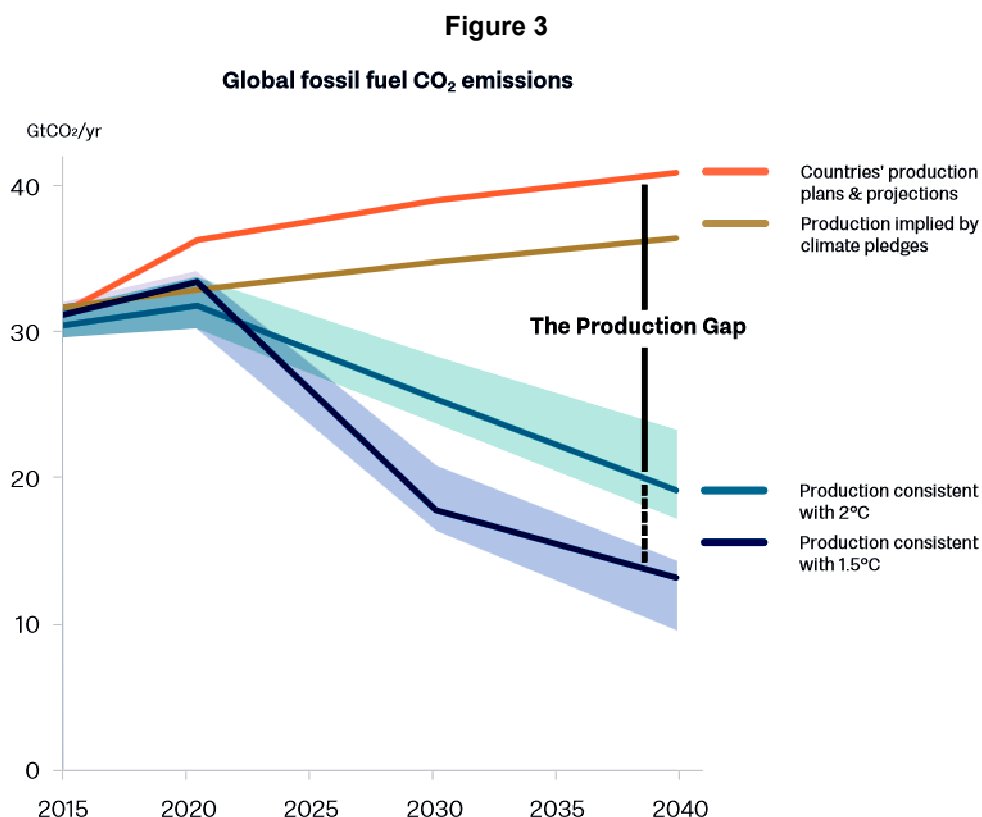


This analysis deals with *statistics* and not with a forecast. For example for 2018, world eSNI may be 50% of world NI, meaning that 50% of what now is *calculated* as *income* actually are expenditures above means. This assumes a current world population of 7.5 billion. This neglects a forecast of some 9 billion by 2045. Making room for an additional 1.5 billion people would require even more precaution.

1.6 Statistics and planning

The issue of environmental sustainability is essentially a challenge to planning. Above we observed that eSNI for the world in 2019 assumes a population of 7.5 billion while the actual challenge is the forecasted growth to 9 billion by 2045. Why does this book look at statistics of 1990 or 2015 while the problem is 2045 ?

Perhaps for a sense of urgency, consider Figure 3, which gives the “fossil fuel production gap – the difference between national production plans and low-carbon pathways (1.5°C and 2°C), as expressed in fossil fuel carbon dioxide (CO₂) emissions – widens between 2015 and 2040”, as estimated in November 2019.⁹ Countries have pledged a reduction to 35 but a reduction to 17 GtCO₂/yr is required to achieve the 1.5°C difference from pre-industrial times (numbers from reading the chart).



⁹ <http://productiongap.org/wp-content/uploads/2019/11/Production-Gap-Report-2019-Executive-Summary.pdf>

My own background is in economic planning, as I worked at the Dutch Central Planning Bureau (CPB) in 1982-1991. For me it is somewhat curious to look at statistics in such detail as we are doing in this book. Jan Tinbergen originally worked at CBS Statistics Netherlands, and there in 1935 made the first econometric model that later earned him his Nobel Prize in economics, before he moved on by creating CPB in 1945. Yet, Tinbergen moved on indeed.

The point is that Hueting developed the notion of eSNI in 1986, wrote the paper with Tinbergen in 1991, and retired from CBS Statistics Netherlands in 1994. Thus we might infer that Hueting had little consideration to move from CBS to CPB.

For policy making it is required to have sound statistics about the environmental situation. It is also useful to have a sound notion of income, and to be aware that GDP is a false compass for environmental considerations that needs correction by eGDP to determine the distance $e\Delta$.

All in all, it is acceptable to look at the situation in statistics. The Tinbergen & Hueting approach is a worthy cause to defend against conventional thinking within the world of statistics.

However, the real issue remains economic planning, see Colignatus (2005, 2011) (DRGTPE). The environmental standards as developed by Hueting & De Boer (2019b) would also be relevant for such planning towards 2045 and later.

1.7 Outline of this book

Part 1 gives an introduction and overview. Part 2 looks at national accounting and statistics, as done at a national statistical office. Part 3 reviews Hueting's contribution in both economic theory and statistical practice, and discusses the reception in particular at CBS Statistics Netherlands of the Tinbergen & Hueting approach. Part 4 compares with other approaches and looks at the reception outside of CBS. The final part contains some concluding statements.

Chapter 21 *"The Old Man and the eSNI"* belongs to political economy and contains a timeline and review about the reception of this theory including many misunderstandings over time. Hueting retired from CBS Statistics Netherlands in 1994 which is 25 years ago. Key years for the core of his work are 1968, 1974 and 1986. The review will help to put this into perspective. It is important to mention that the presentation of eSNI in this book has been checked by Hueting and been confirmed, which is important since there are so many misrepresentations.

Appendix 50 quotes from Tinbergen & Hueting (1991). Jan Tinbergen (1903-1994), as one of the founding fathers of SNA, here expressed his full support and active engagement with Hueting's solution for the measurement problem.

Appendix 52 is a memo by Hueting of 2001 about a motion in Dutch Parliament, reprinted with kind permission by Hueting. It links the history of our issue and the content of the argument e.g. on asymmetric bookkeeping.

Appendix 53 is an article by Salah el Serafy (1927-2016), reprinted by kind permission of his heirs, and originally published in the Newsletter of the Royal Economic Society (RES) in 2014.

1.8 Readership

Our readership consists of: (i) students of political economy, (ii) welfare economists more in general and not only those specialised on the environment,

(iii) economists and statisticians in national accounting (SNA, UNSD / UNSTAT, UN SEEA), (iv) their students at universities, and (v) the community of informed readers and policy makers around this.

The discussion requires a basic understanding of economics, though assumes that training in welfare economics likely has been deficient.

1.9 *On notation*

Variables in formulas are defined per Chapter and not uniform in the book.

NI is used for standard national income in the System of National Accounts (SNA), and normally stands for gross domestic product (GDP) but on occasion might also mean net national income (NNI).

Before 2007 the term “sustainable national income” (SNI) was used, but the notion of sustainability got so much burdened with other aspects that it became better to emphasise the relevance for the environment by using “eSNI”. Issues of welfare on work and leisure and such are of a different order of relevance than ecological survival of mankind w.r.t. climate change and other environmental challenges.

A lower case prefix “e” will stand for “environmentally sustainable”, like in eGDP and $e\Delta = NI - eSNI$. We might write eNI instead of eSNI but stick to using eSNI. Puristically, we might write eSGDP and eS Δ , comparable to eSNI. This appears to read awkwardly, and eGDP and e Δ are best. Our symbols originated as abbreviations but with such long acronyms we now switch to labels only.

Using NI for standard national income might suggest that eSNI would not be a figure for national income. It was an option to abbreviate “standard national income” as “sNI”, with NI an element in the set {sNI, eNI} and distance $e\Delta = sNI - eNI$. However, it doesn’t help that eSNI formerly was labeled as SNI.

Thus, comparing NI and eSNI doesn’t suggest that eSNI is no national income. We just compare two ways to calculate national income.

2. Tinbergen's theorem on world governance

2.1 Political Economy and Tinbergen's Theorem

Political Economy is the science of the management of the state. Tinbergen's Theorem is:

World governance will become more involved. (weak version)

World governance will develop eventually into what in important respects can be seen as a world government on major issues. (Pol. ec. version)

Eventually there will be a world government. (strong popular version)¹⁰

We already have world governance, with the UN, IMF, WB, WHO, ILO, IPCC and so on. The meaning of the theorem is that world governance increasingly will take on features of the state, at least for major issues. Tinbergen's Theorem cuts a complex issue rather short, especially since it all depends on what we call a "government" and on what time horizon we take. Nevertheless national economies are getting more and more globally integrated and interdependent, and the issue of global governance comes more and more to the fore.

Most economists tend to doubt this perspective of ever increasing co-ordination at the global level. The common idea is that international trade can be managed by "naturally" arising standards and bilateral or regional agreements. When there would be problems between nations then they may settle by treaties *ad hoc*. There would be no need for more deliberation and co-ordination at the higher and global level. Potentially the world develops into a multi-polar set-up with different regional economies like the EU, Northern America, ASEAN, and so on.

Also, there are abundant reasons to be wary of government meddling. The very topic of eSNI itself shows how weak and counterproductive governance has been, even within the world of science and statistics, in which strong standards on the quality of information and due process are supposed to exist. The calculation of eSNI costs only 0.25% or a quarter of a percentage of the budget of CBS Statistics Netherlands, or the Verbruggen (ed) (2000) study costed 500,000 euros in today's price, and it is remarkable that the amassed efforts of Dutch scientists or even the environmental movement were unable to organise this expenditure when the Dutch government stopped paying attention. When such direct interests already fail, why suppose that governance would do any better?

Tinbergen's theorem at least helps to organise a discussion about these developments. Economic theory might neglect the issue of global co-ordination but then might neglect that this is an issue on which clarity and advice would be much needed. Even when the world population would be at a low level of 4 billion then the rise of production would tend to cause an ever closer interconnectedness of societies, with the need for agreement on procedures, co-ordination and settling of disputes. The rise of education tends to cause a preference for the rule of law rather than an acquiescence into the law of the strong. Eventually international

¹⁰ Wikipedia is a portal and no source: https://en.wikipedia.org/wiki/World_government

trade will no longer be seen from the perspective of a single national government but becomes an issue of all nations and eventually also of all peoples on the globe. The rise of the world population to perhaps 9 billion increases the challenge.

2.2 *Ecological survival*

The issue of governance applies notably to ecological survival. The world problems with overpopulation and the environment grow bigger by the decade and are drawing the attention of governments, citizens and researchers alike.

Tinbergen's Theorem is wider than only the ecological issue though it is a clear instance for it. Tinbergen's support for Huetting's approach can also be understood from his perspective on global governance, see also the conclusion in Tinbergen & Huetting (1991), here Appendix 50.2.

Remarkably, while IVM did the study on eSNI, it also had a project called "glogov", with a summary book in 2012:¹¹

"The Global Governance Project (Glogov.org) is a joint research programme of twelve European research institutions that seeks to advance understanding of the new actors, institutions and mechanisms of global governance. While we address the phenomenon of global governance in general, most of our research projects focus on global environmental change and governance for sustainable development."¹²

The relation between national income (NI) and environmentally sustainable national income (eSNI) becomes more acute in the context of multiple nations on a course towards world governance. If there were only a single nation, say Spain in its current location, in an otherwise uninhabited world, then scarcities from nature would cause Spain to spread over the world, causing the idea that the conventional measure of national income would be sufficient. If there were nations covering the globe as now but without interference then the distinction between NI and eSNI would be relevant for each but there would be no concern across borders. However, in our world issues spill over across borders and there arises a common interest that all nations determine both NI and eSNI, see Section 7.15.

2.3 *More on the theorem*

Tinbergen's Theorem can be found in his writings but not specifically in those wordings. I have been intending for years to clarify it, and work out how it relates to Tinbergen's own wording, but have been much delayed. At least it is possible to mention it here. I include my *In Memoriam Jan Tinbergen* to indicate that we are encouraged to think into this direction, see Appendix 51.

¹¹ Not read: Frank Biermann and Philipp Pattberg, editors. Global Environmental Governance Reconsidered. Cambridge, Mass.: MIT Press, 2012.

¹² <http://www.glogov.org>

3. *Roefie Hueting: Defining a statistical figure with a model*

2001-08-24 ¹³

3.1 *Abstract*

Roefie Hueting (born in 1929) put environmental economics right on the map in Holland in 1974, with his thesis *“New scarcity and economic growth”* (Hueting (1974a, 1980)) written under promotor Jan Pen. ¹⁴ In a sense he did so even for the world map, but the English translation had to wait till 1980 and then there were also publications by others. ¹⁵ Hueting was head of the environmental department at CBS Statistics Netherlands since 1969, and he saw to it from the start that the environment did not remain a theoretical exercise but was described statistically and made accessible for policy making. The high quality of the Dutch environmental statistics is world famous amongst statisticians. Subsequently, in the late 1980s, Hueting enriched economic science with the concept of environmentally sustainable national income (eSNI). With Hueting we thus find theory and measurement linked and closely tuned.

3.2 *National accounts*

To understand Hueting’s work, we have to go back to the foundations of economic theory. The concept of ‘national income’ is founded in the theory of economic welfare. ¹⁶ The concepts of general welfare and the national accounts have been developed in the period 1930-1960 by Tinbergen, Hicks, Kuznets, Samuelson, Bergson, Meade and Stone. Attention is focused on the development of general welfare, while the importance of the production of goods and services is derived from this. For example, when more chairs are produced, then material production rises. However, welfare does not necessarily increase since there may be no need for more chairs.

While the main focus of interest is the measurement of general welfare, this becomes frustrated since the welfare function cannot be observed directly. It is for this reason that income is used as an approximation, as this can be derived mathematically from the tangent plane to the utility function. If one assumes that the market is optimal, then observed market prices can be used to deflate this income. This is, in a nutshell, the economic theory that forms the foundation for statistical practice.

In the period since 1960 the theory itself seems to move more to the background, and for many the national product becomes the yardstick for

¹³ Originally published in Dutch, as Thomas Cool (2001), “Roefie Hueting en het DNI”, *Economisch Statistische Berichten* August 24, p652- 653.

¹⁴ Addendum 2019: For completeness Hueting (1967, 1968) and Hueting (1970) can be included.

¹⁵ R. Hueting (1974a, 1980), “New scarcity and economic growth”, North-Holland, Amsterdam. Dutch title: “Nieuwe schaarste en economische groei”.

¹⁶ Addendum 2019: Historically, the National Accounts derived from practical purposes for government policy and the interpretation in welfare economics was in parallel and always critical.

economic success. That was the situation when Hueting started to consider the issue of the environment.

3.3 *Environmental functions*

Hueting's first contribution to economic science is the concept of 'environmental function'. A component such as water has different functions or applications, such as drinking, fishing or use in industrial processing. In this, a function is defined in relation to human needs. As one of few economists, Hueting delves in ecology, chemistry and physics, clarifies the various functions of the ecology, and subsequently identifies their economic meaning. Where environmental functions in the past were abundant and consequently did not have a price, nowadays they are scarce and do have a price. In the common calculation of national income, this increase in price is taken as an increase in value that causes a higher income. Here Hueting called attention to a major misunderstanding: these higher prices actually mean an increase in cost, so that real welfare decreases. Take for example an environmental disaster or the introduction of catalysts on cars. In these cases labour and tools are used to repair the damage. Hueting calls it asymmetric, when on the one hand these costs are entered into the accounts and cause an increase in national income, while on the other hand the environmental damage is not subtracted. This asymmetry still is current statistical practice.

3.4 *Demand and supply*

By scarcity, environmental functions get a price. But do they get the right price? Is the assumption of market optimality satisfied? As a first step to answering this question Hueting tries to specify the functions of demand and supply. His analysis has gone through a development here. In his thesis he was able to determine a supply function for [the use of] environmental functions based upon elimination costs of pollution and such. For a demand function, however, he had to refer to decisions by the government and 'social forces'. He made a sharp distinction between consumer preferences and what turns up of those in government decisions, but he did not have a solution for the tension between the two.

When governments all over the world, in the wake of the Brundtland report of 1987, decided to adopt 'sustainable development', Hueting concluded that this actually implied a 'vertical demand curve'.¹⁷ Seen from one perspective he only follows the governments, seen from another perspective he provides an economic foundation to the notion of 'sustainability'.¹⁸ Hueting pointed out that sustainability actually means that the freedom of future generations to use environmental functions becomes the center of focus – where the concept of freedom is wider than the concept of income, just like Amartya Sen recently did.¹⁹

¹⁷ This book Figure 7 on page 83.

¹⁸ Addendum 2019: The theoretical emphasis is on the other perspective. (i) The definition of eSNI is a conceptual notion independent from what governments actually say or do. (ii) The Brundtland "sustainable development" still is not "environmentally sustainable" yet.

¹⁹ A. Sen (1999), "Development as freedom", Knopf, New York

3.5 Two questions

Hueting answers two questions with this analysis. First, one might think that initial statistical errors would disappear when environmental functions become scarcer and the prices rise, and when the environment thus becomes a cost factor and is integrated into the economic system. According to Hueting the statistical error does not disappear all by itself. As the example of the car catalyst shows, there is still a problem with statistical accounting. Secondly, one might think that the error should disappear in a democracy in which expenditure should be close to the social optimum. However, when governments on the one hand state a choice for sustainability, but on the other hand don't implement this in practice, and when they hence do not apply the prices that are required for sustainability, then the appeal to 'democracy' is also an appeal to inconsistency. Inconsistency does not provide a basis for statistical measurement. Hueting refers to the 'prisoners' dilemma' and other arguments of government failure by which the consumer preferences are 'blocked' and cannot be expressed in market prices. With respect to the two questions just mentioned, it therefore is a misunderstanding, according to Hueting, to think 'that the information is all right'.

A correct statistical description requires another figure alongside conventional national income, namely the distance to [environmentally] sustainable national income. In Hueting's view, both numbers are fictitious, since he considers it impossible to know the true preferences. Publication of both figures seems to him the best solution for meeting the need for information. That need for information is clear from the discussion in society.

3.6 Revolution in statistics

Concerning the calculation of the distance of NI to eSNI, Hueting actually performs a small revolution in statistics. He namely uses a model as an integral part of observation, and in this model the hypotheses²⁰ with respect to the future play a key role. Many people regard statistics as only the observation and recording of phenomena in the past. For Hueting, however, theory leads to the insight that the use of a model cannot always be avoided.^{21 22}

Recently, eSNI according to Hueting's methodology has been calculated for Holland.²³ A discussion is in Verbruggen (ed) (2000). This calculation was carried out for 1990, which underlines that Hueting, as a statistician, is interested in the past, namely 1990, and not [some future date]. The model contains a development

²⁰ Addendum 2019: The original had "expectations" but "hypotheses" is better.

²¹ Addendum 2019: Hueting actually prefers to avoid a model as much as possible. A model adds to discussion of model content though with possibly little addition to accuracy. The Hueting e.a. (1992d) methodology avoids models in the same manner.

²² Addendum 2019: The revolution is actually larger than the use of a model per se. The basic revolution is that dealing with the risk on the environment requires *conditionality* for NI and eSNI.

²³ H. Verbruggen (ed) (2000), "Final report on calculations of a sustainable national income according to Hueting's methodology", Instituut voor Milieuvraagstukken, Vrije Universiteit Amsterdam, report O-00/10. [<http://www.sni-hueting.info/#IVM>] A discussion in Dutch is in H. Verbruggen, R. Gerlagh, M.W. Hofkes en R.B. Dellink (2001), "Duurzaam rekenen", ESB dossier "Vernieuwende statistieken", March 15.

path to the future,²⁴ with valuations by the generation of 1990 of the positions of future generations. It is striking that in this way hypotheses and preferences concerning the future are used to estimate a figure for the past. The approach as such is consistent, though.

The calculation incidently shows that Dutch eSNI is less than half Dutch NI, which would mean that the Dutch generation of 1990 lived in too grand a style and passed on too many costs onto future generations. These figures are likely to appeal more to one's imagination when more data points can be compared, with a monitoring of the distance between NI and eSNI. Calculation of eSNI incidently appears not all that expensive, for it is a calculation at a high aggregate level, that uses data that have already been collected for other purposes. Therefore, regular calculation appears to be possible in practice.

3.7 Conclusion

Hueting has the position of the statistician who sees it as his task to provide correct information. He is not only the theorist who goes back to Tinbergen and Hicks and he is not only the practitioner who introduces the required improvements in his field, but he is also the unwavering scientist who sticks to his role as supplier of information.²⁵

²⁴ Addendum 2019: This is an awkward formulation. In the current implementation, sustainability is imposed instantaneously without a transition path, and perhaps a transition might be better.

²⁵ A longer version of this paper is available as "The seminal contribution of Roefie Hueting to economic science: Theory and measurement of Sustainable National Income", see <http://thomascool.eu/Papers/Environment/HuetingsContribution.html>. [This book, below.] See also the 'Hueting Congres' book by E. van Ierland, J. van der Straaten en H. Vollebergh (eds) (2001), "Economic growth and valuation of the environment: a debate", E. Elgar, to appear by the end of September 2001.

4. Concept of eSNI and proof of concept for the Netherlands 1990-2015

4.1 Definitions

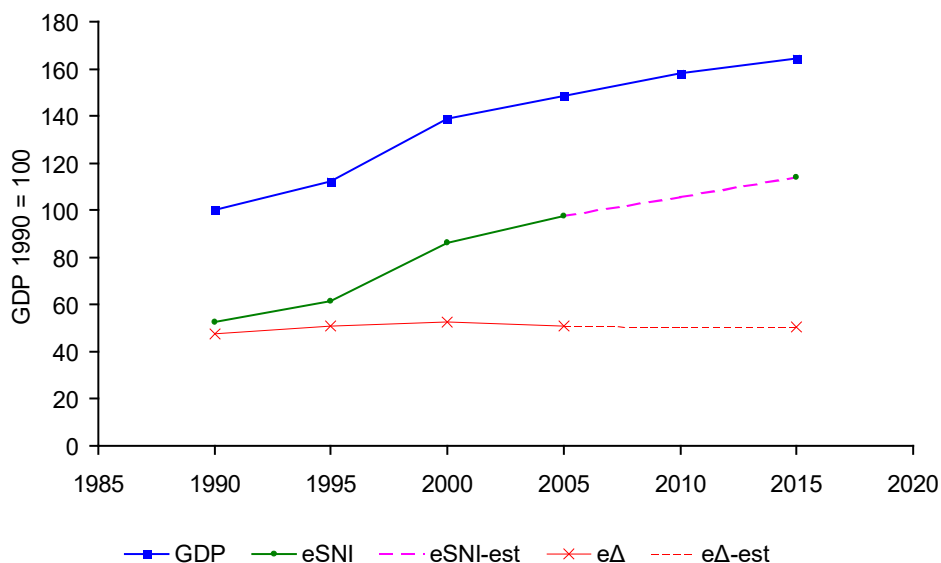
The United Nations developed the System of National Accounts (SNA). Eurostat developed the European System of National and Regional Accounts (ESA 2010), based upon the Council regulation EU (1996). The figure for *National Income* (NI) is important for government policy, for example for establishing tax bases or for monitoring budget deficits in the European Economic and Monetary Union (EMU). NI is a multi-purpose figure that perhaps cannot be praised enough. NI is also important for welfare economics, since production is one of the key contributors to economic welfare, e.g. with food production, medicine and so on.

Hueting defined *environmentally Sustainable National Income* (eSNI) as the maximally attainable level of production, using the technology of the year under review, whereby the vital environmental functions of the not-human-made physical surroundings remain available for future generations. This book looks at the economic aspects of the environment – certainly does not concern the use of NI for other purposes – and supports Hueting's argument that proper judgement requires that both NI and eSNI are looked at jointly, alongside each other.

4.2 Key graph of the empirical finding

The following graph summarises the empirical finding for the Netherlands 1990-2015, see **Figure 4** and the data in **Table 1**.

Figure 4. GDP and eSNI of the Netherlands in 1990-2015, 1990 = 100



- (1) Dutch GDP in 1990 is set at 100 and over 25 years it rose to 164.4 in 2015, or 2.0% per year on average. This is relatively low compared with the 1950-1970 period. It includes a rise in population.
- (2) In 1990, eGDP = eSNI was 53% of GDP, close to the Tinbergen & Hueting (1991) rough estimate of 50%. However, eSNI has been growing by 3.1% per year, and thus has been catching up with GDP to an estimated 69% in 2015. This growth was caused by a switch to the service sector, deliberate policies for environmental improvement, and the global financial crisis in 2007-2011.
- (3) The percentage is misleading though. The level distance $e\Delta = \text{GDP} - \text{eGDP}$ has increased from 47.4 to 50.4 percentage points of GDP 1990. The Dutch environmental pressure increased. The Dutch economy is still far removed from environmental sustainability. Economic processes are not only still damaging environmental functions (incl. depleting resources) in a manner that affects the survival conditions and the well-being of future generations, but they do so increasingly. What the Dutch people regard as “income” according to GDP actually are expenditures at the cost of future generations.
- (4) The inverse ratio is an *environmentally sustainable footprint* = eFootprint = GDP / eSNI, which is a “footprint” with a methodology from welfare economics. It has dropped from 1.9 in 1990 to 1.4 in 2015. Observe that this eFootprint is relative while the common footprint is absolute.
- (5) The figure of eSNI has a larger range of uncertainty, though there are no sensitivity analyses yet. These outcomes thus are only indicative.

Table 1. Data for Figure 4. Italics: rough estimate

	1990	1995	2000	2005	2010	2015	per year
GDP	100	112.2	138.8	148.3	157.9	164.4	2.0%
eGDP = eSNI	52.6	61.3	86.2	97.4		<i>114.0</i>	3.1%
Distance, $e\Delta$	47.4	50.9	52.6	50.9		<i>50.4</i>	0.2%
% eGDP / GDP	53%	55%	62%	66%		<i>69%</i>	1.1%
eFootprint	1.9	1.8	1.6	1.5		<i>1.4</i>	

Hueting & De Boer (2018, 2019a), $e\Delta \approx \text{NNI} - \text{eSNNI}$ (Section 31.3); eFootprint = 100 / %

It is encouraging for the Netherlands that the ratio between GDP and eSNI has been improving. The key information for policy making concerns the level distance. The distance $e\Delta$ between the two variables increased in absolute terms, and this is not encouraging.

Apart from the distance $e\Delta = \text{NI} - \text{eSNI}$, there is also information from the dynamic development over time, where the unyielding laws of growth come into play. Suppose that, with NI at 100 and eSNI at 50, NI grows by 5% to 105 and eSNI drops from 50 to 49: then it is obvious that such growth is unsustainable. Suppose that policy makers want a change so that the burden remains constant. Then target $\text{eSNI} = 105 - 50 = 55$, and thus eSNI must grow by 10%, thus twice as fast, which is quite an objective. In this way, eSNI provides information on the direction and speed of the sustainability of economic development.

In 2004, Dutch minister of Economic Affairs Laurens Jan Brinkhorst and Environment secretary Pieter van Geel wrote Dutch Parliament that RIVM (later

partly merged into MNP and PBL) would calculate eSNI at five year intervals.²⁶ After the publication of eSNI 2005 in 2008 this stopped and it is unclear why. In the current situation it would be better that eSNI and e Δ are calculated annually.

For the interpretation of above outcomes there is the caveat that each year of observation has different level of technology. When the physical damage remains the same then technology could reduce the costs to remove it. When the costs remain the same then the physical damage would actually be increasing. This property does not invalidate e Δ as an indicator for the distance to environmental sustainability, since it properly presents this distance at the given level of technology. It may still be advisable to supplement the data and graph with an indicator on the development of technology and the physical burden.

4.3 Comparison with the Stern Review (2006)

The Stern Review (2006) estimated that societies would have to invest 1% of GDP annually to avoid the worst effects of climate change. In 2008 professor Nicholas Stern raised to 2% because of faster than anticipated climate change. How do his outcomes compare with the 40% distance between NI and eSNI? The Stern Review concerns the transition path from NI to eSNI. If the distance of 40% is to be covered in 20 years, then this arithmetically becomes 2% per annum. Economically, the cost would be higher because investments in abatement would meet with diminishing returns and anyway no longer go into factories that produce consumer goods. eSNI is also wider than climate change. The Paris Agreement of 2015 to “keeping a global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius”²⁷ may well mean a reduction of real incomes compare with the decades of rising incomes, measured wrongly because of unsustainable use of the environment.

4.4 Analogy of a home owner who does no maintenance

The following micro-economic analogy may clarify some key conceptual distinctions. Consider home owner Charles Crusoe who does no maintenance on the house. Charles's expenditures on e.g. holidays instead of on the necessary maintenance of the house are included as consumption, and thus as income in GDP. There are two main approaches of “correcting” this, for this analogy:

- (i) The first approach deducts the sum for maintenance from total consumption. This method does not specify for what purpose the deduction is spent. It need not necessarily be spent on maintenance.
- (ii) The second correction approach requires that the maintenance is actually done, and includes risk over a longer horizon, like investments to prevent flooding and an installation of solar panels and heat pumps.

With this analogy we may better see the distinction between two methods, see Chapter 31 on comparisons:

²⁶ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

²⁷ <https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement>

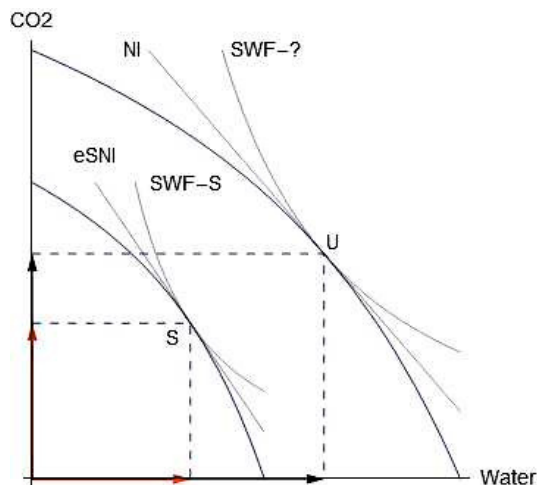
- Actual (i) “correcting NI” for the going rate of depletion of natural resources at current prices, like is done by the World Bank *Adjusted Net Savings* formerly known as *Genuine Savings*, Lange et al. (2018) – that was partly inspired by the *user-cost method* by El Serafy (2013) that itself started in 1979.
- Actual (ii) “correcting NI” for environmental sustainability, like eSNI does, to better inform about the long run risks of current activities.

This analogy from micro-economics also contains the different perspectives by the home owner and the bank that provides the mortgage. The bank is interested in the state of the collateral, its maintenance and allowances for risk, thus uses a method comparable to eSNI, and tends to neglect the owner’s official income and expenditures. When the home owner would ask for advice and refer to his income, then the bank would inform the owner that the consumption expenditures are in conflict with the maintenance of the house for sustainability.

4.5 Welfare, income and standards

The notions of welfare, income and standards can be clarified with the use of **Figure 5**. The figure gives a conventional graph from an *introduction to economics* with convex Production Possibility Frontiers (PPF) and concave indifference curves of a Social Welfare Functions (SWF).

Figure 5. Welfare, income and standards



There are two sets of PPF and SWF: (i) one with unsustainable reality (U) with income NI measured by SNA, and (ii) another with environmentally sustainable target (S) with income eSNI. The axes mention two uses of environmental functions: ²⁸ (1) exhaust of CO₂, (2) use of fresh water. The use reduces the availability. The production of more fresh water by e.g. distillation, and thus the increase of more possibilities to pollute it, causes an increase in the output of CO₂, and thus a reduction of the remaining possibilities to exhaust CO₂. Point S

²⁸ Hueting’s environmental functions will be more specific than used in this diagram. Availability or purity p and use u are opposite to each other, with $p + u = q$ for a given maximal q .

assumes natural absorption of CO₂ and natural generation of fresh water. Point U assumes additional measures to make the functions available, for example by taking from future generations.

Properties are:

- NI is a weighted sum of the use of functions at current market prices at U, and eSNI is a weighted sum of the standards at shadow prices at S.²⁹
- Whether SWF-? or SWF-S is *highest* is determined by *hypotheses*.

The observations of NI, actual use (long arrows) and market prices allow the estimation of production functions and demand curves. Assuming unsustainable optimality, they imply a SWF with indifference curve SWF-?. This optimality is unrealistic (thus the question mark), and it is not suggested that use is optimal because it is observed. The standards at S (short arrows) can be substituted in these production and demand functions. The diagram at point S assumes that all standards are binding and that the lower PPF and indifference curve SWF-S still are tangent, with unique shadow prices. The latter thus follow from the condition of a social preference for environmental sustainability, and render eSNI.

The diagram also shows the interpretation of outward or inward moves:

- A move outward is the conventional thinking that “more is better” but comes with the implicit assumption that there are additional measures for more availability of functions, for example by taking resources from the inheritance of future generations.
- A move inward is the precautionary principle that “less is better”, with the explicit observation that there actually are no real additional measures for more availability.

The diagram above has *use* on the axes, and can be compared with Hueting's diagram of the vertical demand curve – reproduced here in **Figure 7** on page 83 (see Hueting & De Boer (2001b:64), their Figure 2.7) – that has *availability* on the horizontal axis. Hueting has the schedules of elimination and damage at U *to the left of* the vertical at *standard* S, because resources are actually taken from future generations and not really “available” as **Figure 5** suggests here. Hueting gives the proper economic perspective, when natural abundance is reduced to scarcity, but is less easy to combine here with the numerical outcome that actual *use* is higher than the standard of maximal use (and minimal availability), and that NI at U has a higher value (by accounting costs as income) than eSNI at S.

The diagram may help to clarify that both NI and eSNI are part of reality and of statistics, though with different properties. NI is an estimate following current practices in SNA, and eSNI is an estimate that relies upon standards and model. The statistical properties are discussed in Chapter 18.

Of course, eSNI is work in progress. There is discussion of what can be done for new research. If we want to deal with the uncertainties then we need more and not less research. Whatever those uncertainties, given the conventional use of NI it is best to have both NI and eSNI available for decision making under risk for future generations.

²⁹ Additionally there is the decomposition in aggregate price and volume change.

The diagram uses concepts from a basic course in economics. It is remarkable that the key notions can be presented so, with the actual underlying complexity.

4.6 *Role of information also in the market place*

The following clarifies why the current state of “information” actually is guided by *conditional assumptions*. Economic agents will have only limited information about environmental sustainability. For issues pertaining to future generations, one would wish that economic agents would have full information, yet the market mechanism and also government regulations may not provide this. Observed prices will differ from a hypothetical situation with full information. Thus we can distinguish two situations of (i) either the observed prices under the assumption that these would be optimal or (ii) hypothetical prices under the assumption of environmental sustainability. Hueting’s reasoning on this diagnosis was independent from the work by Stiglitz, Mirrlees and Akerlof on asymmetric information, in which sellers and buyers do not share the same information. Yet, with the latter work, economists are more accurately aware that markets are subject to imperfections. In the present case, even the exchange of information between sellers and buyers might not work, since it are the scientists at the academia and the statistical and planning bureaus who must compose the best possible description of what environmental sustainability might mean and what it might imply.

4.7 *Asymmetric bookkeeping and the notion of NI-A*

Asymmetric bookkeeping can best be introduced by an example: when an oil spill pollutes a beach, then the costs of cleaning up are entered into NI but the damage standardly is not subtracted.

Other terms are “defensive expenditures” or “double counting” but “asymmetric bookkeeping” is to the point. Chapter 12 will discuss $NI-A = NI$ corrected for asymmetric bookkeeping = NI minus asyms = NI ex asyms. Arithmetically the total value of asymmetric bookings is $A = NI - NI-A$.

The real comparison concerns NI-A and eSNI with distance $e\Delta-A = NI-A - eSNI$.

4.8 *Comparing versus correcting*

Early texts about eSNI – like Tinbergen & Hueting (1991), here reproduced in Appendix 50 – spoke about “correcting NI”. This term borrowed from the continuous effort to improve the relevance and accuracy of the System of National Accounts (SNA). However, when NI is compared with eSNI, then NI is taken as it is, and there is no correction of it. The term “correcting NI” then distracts, because the focus is on the comparison and looking at the distance. A better expression is “to correct *the use* of NI”.

Hueting (1974a, 1980:164-165) was already cautious about the notion of “correcting NI” and suggested to use figures alongside each other.

4.9 *Phases in Hueting’s analysis*

There are both continuity and distinction between Hueting’s thesis “*New scarcity and economic growth: more welfare through less production?*” (1974a, 1980) (online PDF) and later work. This thesis originally had the negative conclusion that

there is no good way to correct NI for the new scarcity of the environment. The thesis (i) identified and provided a base to put “NI corrected for asymmetric bookkeeping at market prices” (NI-A) alongside NI, but (ii) observed that there was no solution for the more extensive and fundamental issue of ecological survival. However, in 1986 Hueting introduced the vertical demand curve found by the assumption of environmental sustainability. While the definition of eSNI forms a dramatic break with the pessimism of *New Scarcity*, the theoretical and empirical foundations by *New Scarcity* provide the bedrock upon which eSNI is possible, and the reader can enjoy seeing how the same arguments from welfare economics, cost benefit analysis and statistical measurement permeate the whole edifice.

5. *A change in national accounting from certainty to uncertainty*

5.1 *Institutional framework, modeling, forecasting and the past*

Countries tend to have an institutional distinction between a statistical office that collects the raw data and does statistical elaboration, and a planning bureau that uses the results. In the USA there are the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS) versus the Council of Economic Advisers (CEA). In the Netherlands there is CBS Statistics Netherlands versus the Central Planning Bureau (CPB).

National income is also used in planning. The statistical view on income can clarify what such planning means. When planning supports future expenditures above the means of a nation, with a wrong concept of income, then one might doubt whether this would be proper planning.

Consider a planning scenario that e.g. the Dutch economy would achieve environmental sustainability in e.g. 20 years. Environmental sustainability is a notion that applies to the world, see e.g. climate change, and thus the scenario only makes sense when the world does so too, and thus there are no large effects on the international competitive position. This exercise would require, and one would use the best available information:

- standards of environmental sustainability
- an economic model for the behaviour of economic agents when the economy moves towards environmental sustainability.

The standards are required, for otherwise we would not know what we mean when we speak about environmental sustainability. Ecologists tend to have no use for economic models and tend not to provide ready information for use in economic models. Standards and their ranges of uncertainty can be derived from their literature though. Standards thus are not *set* but derived and *recorded* by the economic statistician. Secondly, the model can only contain estimates on present behaviour and it is unknown how economic agents will “really” behave.

Uncertainties on both aspects would apply to both statistics and planning. Thus:

- These uncertainties tend to be accepted for planning and there is nothing inherent in this uncertainty itself that warrants a rejection for statistics.
- National income measured in such a scenario would be unsustainable income until the moment when sustainability is achieved. More precisely, convergence concerns NI-A rather than NI. At the end of the planning period we have $NI-A[t] = eSNI[t]$, with in this example $t = 20$.

Thus, when the notion of a *planning scenario* for environmental sustainability is accepted then by implication this means that the notion is accepted that there can be a measurement of an environmentally sustainable level of national income, that requires such standards and model, and this may be called $eSNI[t]$ with in this example $t = 20$.

The only distinction between such planning exercise and the *statistical methodology* is between the statistical choice $t = 0$ (hypothesis of instantaneity) and the planning $t \neq 0$ (hypothesis of adaptation process).

We welcome the idea that governments and their planning bureaus use forecasting models for policy making to determine whether goals for environmental sustainability are reached over time, and to select those instruments that work best for their own country or with international agreement or even treaties. This type of economic analysis however also meets with fundamental questions from economic theory, notably on income accounting, and how to explain the results to fellow economists and the public. We meet with the common confusion that a rise in production is identified with “economic growth” while production can actually be counterproductive. For this reason, the theory of national accounting steps in, with the discussion by welfare economics of the proper statistical measurement of the concept of income.

While we fully agree that it is the task of planning bureaus to look ahead, an economist working at a statistical office has a sound task to establish the proper definition and measurement of national income, *and thus also for the past*. Alongside forecasting there is also the use of the model to determine a figure in the past. In backcasting we use present data to look even further into the past. For eSNI we use current data to determine a missing variable. The notion of eSNI also throws a light on modeling practices. (See Chapter 18.)

5.2 National accounting, history, income, new uncertainty and risk

This book relies on notions of national accounting. Section 11.1 is a short review of the history of national accounting. National income (NI) will tend to be the sum of all incomes in a legal sense according to the laws of the nation, yet economic theory has its own considerations that might not be written in legal code yet. Readers who are new to income accounting are warned not to mistake revenue or expenditure for income. A wage (gross income) received from an employer belongs in first instance to revenue and need not immediately be (net) income because crucial costs must be deducted. These fundamental issues are reviewed in Section 11.2 and following.

Accounting for income already requires an awareness of capital that must be maintained for the future. Consideration of (environmental) sustainability requires a longer horizon and more factors. Section 5.1 distinguishes uncertainty in planning (variation in outcome) and uncertainty in observation (errors in variables). With a longer horizon there are also more risks. The precautionary principle causes that more costs than only asymmetric booking A must be deducted from revenue (NI) in the current observation period to arrive at proper income (eSNI), namely the costs $e\Delta - A = NI - A - eSNI = NI - A - eSNI$. The variability in outcomes in the future also causes that there may be a wider range of error in the present observation of sustainable income.

Hueting (1974a, 1980) refers to the finding by E.P. Odum that ecological collapse cannot be predicted and can be observed only when it is too late. This causes the essential insight that national accounting in our times changes from the more legal context into an issue of information management concerning risk too. For economics in general the key question becomes whether the field is open to

the current ecological risk, thus open to extending the foundations of economic theory, and, by implication for national accounting whether it will be open to the notion of extending the national accounts with variables of sustainability that compared to capital have an even longer horizon above one accounting period.

eSNI is part of a wider movement amongst economists and international bodies of governance to deal with this issue, and Chapter 31 does comparisons.

5.3 *Conditionality in welfare economics and accounting*

Hueting is both a welfare economist and a national accountant (see Section 21.4 on the creation of the CBS department of environmental statistics outside of the department of national accounts). The ecological risk can be modeled by conditionality in two fashions:

- (1) conditionality of preferences, namely assumptions on preferences with respect to standard national income versus assumptions on preferences for environmental sustainability
- (2) conditionality within accounting procedures, namely assumptions of keeping produced capital intact in order to calculate standard national income versus assumptions of keeping both capital and vital environmental functions (or critical natural capital) intact in order to calculate eSNI.

Hueting discusses both theory, which emphasizes welfare theory, and practical calculation of eSNI, which emphasizes accounting procedure.

Accountants have a tendency to emphasize accounting principles without reference to economic theory. Many accountants might not even be aware of the underlying economics. When accounting principles are presented, like the Generally Accepted Accounting Principles (GAAP), there is a tendency to present them as a list of rules, and there seems little need of discussion (e.g. because they are generally accepted). It would seem not to matter whether such principles arose only historically or were influenced by (subsequent) theory, and the main objective for accountants is to learn and apply the principles. This approach and attitude explains a focus on the LHS in **Figure 2**. This hampers communication when risk causes new theory on the RHS, generating new rules on the LHS.

5.4 *Modeling*

The calculation of eSNI was done by the IVM team under direction of Harmen Verbruggen. They adapted the model that Wouter Keller (1980) originally had developed at CBS Statistics Netherlands. This is an Applied General Equilibrium (AGE) model characterised by nested Constant Elasticity of Substitution (CES) functions. Originally this was a static model but Rob Dellink (2000) (2004) originally coming from the IVM team, in his thesis, partly at Wageningen with Ekko van Ierland, adapted it into a dynamic model, called DEAN. When Dellink transferred to the OECD Environment Directorate in 2009, where he now is the co-ordinator Modelling and Outlooks at the Environment and Economy Integration Division, he used his IVM modeling experience for the OECD ENV-linkages model,³⁰ see Château, Dellink and Lanzi (2014). This model is the OECD working

³⁰ <http://www.oecd.org/environment/indicators-modelling-outlooks/modelling.htm>

horse for key studies, like on energy subsidies, carbon pricing or the OECD Environmental Outlook to 2050.³¹

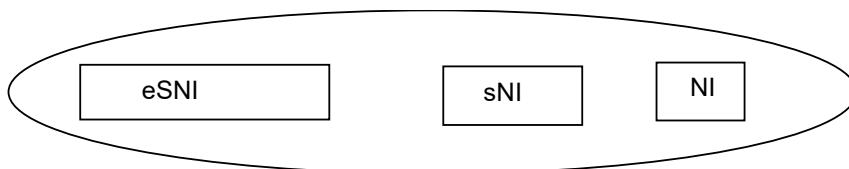
It is gratifying that the calculation on eSNI with its integrated approach has also contributed to this experience for theory and practical modeling on linking the economy and the environment, albeit now on future scenarios and not yet for statistics, and apparently not yet using the yardstick on the difference GDP – eGDP.

While we tend to accept more uncertainty for policy scenarios for the future and require more certainty for statistical observations, this experience in modeling suggests that modeling itself can be quite accepted. While NI has obvious use for other areas than the environment, we must wonder why economic statisticians working on national income are tolerant of the uncertainties in NI w.r.t. the environment and intolerant of the uncertainties in modeling for eSNI. See Section 11.3 on the notion of income and next Section 5.5 on uncertainty and validity. For experts, the combination of command of theory, experience in data gathering and actual modeling is too rare.

5.5 Uncertainty and invalidity

There is a distinction between the error in measurement of a variable (its uncertainty) and the (in)validity of using it for a particular purpose, see **Figure 6**. Looking at the range of uncertainty around eSNI (its box) is not irrelevant. Looking at the invalidity of NI with respect to environmental sustainability (the oval, also eΔ) is much more important.

Figure 6. Uncertainty and invalidity on NI and eSNI



Legend:

- NI, sNI and eSNI use the same raw data but account differently
- NI = standard national income
- sNI = sustainable national income (say over a period of 10 years)
- eSNI = environmentally sustainable national income
- boxes = *horizontal* ranges of error or uncertainty in measurement
- boxes around NI, sNI and eSNI: technical issues around these definitions
- oval, eΔ: NI is invalidly called income if preferences are for environmental sustainability, eSNI is only part of income if preferences are not for environmental sustainability.

³¹ <https://www.oecd.org/environment/indicators-modelling-outlooks/flyer%20ENV-Linkages%20model%20-%20version%2025%20Sept%202013.pdf>

We must refer to our discussion of a “true value”, in Section 7.4. Boumans (ed) (2007:4) has the same position: “‘True value’ is an idealized concept, and is unknowable.” Nevertheless, given the protocols of intended use, we still can distinguish: Boumans uses “accuracy” where the above uses “validity”:

“(…) the scope of the strategies is strongly simplified to a common aim of finding a ‘true’ value of a system variable, denoted by x (...). The reliability of measurement results can so be characterized by three features: ‘invariance’, ‘accuracy’ and ‘precision’. ‘*Invariance*’ refers to the stability of the relationship between measurand, measuring system and environment. ‘*Accuracy*’ is defined as the “closeness of the agreement between the result of a measurement and a true value of the measurand” (...), and ‘*precision*’ is defined as “closeness of agreement between quantity values obtained by replicate measurements of a quantity, under specified conditions” (...). The difference between invariance, accuracy and precision can be illustrated by an analogy of measurement with rifle shooting, where the bull’s eye represents the true value x . A group of shots is precise when the shots lie close together. A group of shots is accurate when it has its mean in the bull’s eye. When during the shooting the target remains stable this is a matter of invariance.”

Our reference to a book of 2007 should not give the impression that this very distinction would be “new”. The distinction is well-known in environmental economics, with its common criticism w.r.t. mainstream economics. Daly (1968:395):

“Perhaps Hobson’s “organic test of welfare” is simply the idea that it is better to make imprecise statements about unmeasurable but relevant magnitudes (use value, total utility) than to make more precise statements about the measurable but irrelevant magnitude (for evaluating total welfare) of exchange value.”

Apparently this perspective is not recognised at CBS Statistics Netherlands quite early on, see Chapter 24. The issue also returns in our discussion of the chapter by Frank den Butter (2007) in the Boumans (ed) (2007) volume, see Section 39.13.

5.6 Cost-Benefit Analysis (CBA) and risk

The Dasgupta & Pearce (1972) book on Cost-Benefit Analysis was included in my study of econometrics. I still regard it as quite informative, but later found the following two points:

- The authors appear not to understand Arrow’s Impossibility Theorem, see Colignatus (2001, 2014) (VTFD). Their book lacks the clarity that a Pareto improvement actually improves over a status quo, and that voters must have protection of their rights, and essentially have a veto against infringement. CBA thus better be embedded in an analysis of democracy and voting theory and the handling of minorities, including some analysis on the application of law. The easiest CBA case is that “experts” can calculate whether (monetary) benefits would be larger than (monetary) costs, but we would want to see a

democratic and/or legal check upon what these “experts” are doing. Dasgupta & Pearce (1972:1771-173) on political constraints is too short on this as well.

- A minor point is that Dasgupta & Pearce (1972:176) adopt Frank Knight's terminology on “risk” and “uncertainty”, but this is quite unfortunate and confusing, see Colignatus (2000a, 2011) (DRGTPE) on risk (including a note on Wilson and Crouch, (2001) on Risk-Benefit Analysis). In my reading, the common notion of “risk” is seen as expected loss, as $\rho = -E[x \mid x < 0]$. Knight's “uncertainty” better be called “*probabilistic ignorance*” such that risk cannot be calculated. Since CBA basically concerns a future that is uncertain, much CBA might be done with identification of confidence intervals, but often this technique is infeasible, and then one might develop scenario's for presentation to the body politic.

One reason to appreciate their CBA book is a statement like this:

“Further, like welfare economics, the theory of CBA rests upon a philosophy of *as if*: values are derived as if a particular hypothetical configuration of the economy existed, lending what many feel to be a fanciful aspect to the study.” (p15).

This fits Hueting's awareness that “statistical measurements” on NI and eSNI actually are conditional to assumptions (about what rules to apply to the raw data or ground material). Hueting's $e\Delta = NI - eSNI$ is based upon comparing two “as if”s. Statistics however deals with the past and not the future.

Dasgupta & Pearce (1972) develop the notions and techniques of contingent valuation, willingness-to-pay (WTP) and willingness-to-accept (WTA). Hueting (1974, 1980) establishes that these are inadequate to recover the true preferences for the environment, see the restatement by Hueting & De Boer (2019b:84-86). Hueting (1986b) and Hueting et al. (1992d) “Methodology” M44 gave the vertical demand curve, which method was developed to overcome the deficiencies of contingent valuation. Hueting's methodology on calculating $e\Delta = NI - eSNI$ is a clear advancement in the field of CBA. The technique is used to provide information and it is upon the body politic to see what one will do with that information.

John Adams (1995) “Risk”³² is a quite interesting volume that received many high quality reviews.³³ Adams is professor in geography with a focus on transport and his book extends onto risk in general. “Risk” also discusses environmental issues like the greenhouse effect. In 1995 Adams gives many reasons to be skeptical about global warming, and I haven't checked what his perception is in 2019. His background may still cause doubt at times whether he fully grasps an economic argument and whether he can properly deal with errors by economists. It seems that Adams rather follows the Dasgupta & Pearce CBA as “the economists' view”, instead of taking a wider view from economics and/or political economy. Adams indicates various (ideal-typical) groups in society who have diverging views: *fatalists*, *individualists*, *hierarchists*, *egalitarians*. Apparently he follows Dasgupta & Pearce that these groups should be served with information at

³² <http://www.john-adams.co.uk/books/>

³³ <http://john-adams.co.uk/wp-content/uploads/2006/reviews%20of%20risk.pdf>

the same time, while Adams rather indicates that they cannot come to agreement anyway because of their different philosophies of life. On this issue Adams (1995) suffers from lack of elaboration on parliament just like Dasgupta & Pearce (1972).

Adams' chapter 6 on "monetizing risk" has a skirmish with Pearce. Pearce apparently gets lost about contingent valuation, willingness-to-pay (WTP) and willingness-to-accept (WTA), in both accepting that these will not work for infinite values and still insisting that these methods be used. Overall Adams has the easy position of exposing the inconsistency. Adams thus makes some fun of contingent valuation but doesn't provide a clear alternative like Hueting does. Apparently Adams (1995) is unaware of the Hueting (1986b) and et al. (1992d) approach perhaps because Pearce doesn't refer to Hueting, see also Chapter 43.

Adams assigns the precautionary principle to "egalitarians" but this is needlessly restrictive, and rather the begging of the question that people will not agree. While fatalists obviously would have no use for any principle, including precaution, one may still imagine that other groups might be open to some form of the principle, with variety within the groups, whence the role for parliament.

Adams (1995:69) refers to an "absence of an agreed scale for measuring the magnitude of adverse events". However, Hueting (1986b) and Hueting et al. (1992d), the methodology, M44, developed the notion of the vertical demand curve, with the conditionality on assumptions on preferences, which prevents the occurrence of the adverse event (insustainability, non-survival): whence it is not needed to value the adverse event itself (as infinite loss). While Adams suggests that standard national income would be "objective", Hueting shows that it is also based upon assumptions on preferences. In this realm "measurement" is conditional to assumptions anyhow.

Adams (1995:170) refers to the Hitchhiker's Guide to the Galaxy:

"the unprecedented scale of attempts to apply cost-benefit analysis to global warming merits further comment. It is the largest example I can offer of the application of the hierarchist approach to risk management. I call it "Vogon economics".

I can only recommend reading of those pages. However, Adams mentions himself:

"There is one small problem with this comparison. Should their project run into difficulty the Vogon economists have another planet to which they can retreat."

Thus the comparison of CBA on Earth with Vogon CBA in the Galaxy cannot really be made and thus fails, and Adams's discussion is fun but inadequate. Clearly there are problems with CBA as Adams indicates, but his case would be stronger by referring to processes of democracy, including (potential) court decisions that granted compensations that were quite larger than the Department of Transport had been calculating.

Adams (1995:169) refers to Nordhaus:

"William Nordhaus, author of the first cost-benefit analysis of the greenhouse effect (...), puts the case against the precautionary principle

succinctly: “To defend against the worst case will quickly bankrupt any imaginative government” (Nordhaus 1992).”

However, the precautionary principle must be applied with prudence, and there would be no precaution if one would shoot oneself in the foot. In this case, we would want to see Adams correcting Nordhaus, to not distort the precautionary principle, but instead we see Adams in support of Nordhaus.

5.7 Conclusion

There is a change in national accounting from perceived certainty to recognised uncertainty, and it remains important to maintain clarity about notions of uncertainty and risk.

6. *Environmentally sustainable national income: Work in progress*

2012-02-10³⁴

6.1 *Abstract*

A paper by Hueting in *Ökologisches Wirtschaften* 2011/4 can be commented on: (1) calculation of environmentally Sustainable National Income (eSNI) is relatively cheap, (2) it is the best measure compared to alternatives, (3) scientists provide information and society decides, while society tends to be at a loss without the proper information, (4) hence eSNI deserves focus attention.

6.2 *Introduction*

Hueting (2011e) proposes a change of method at the national statistical bureau's and the agencies for the evaluation and forecasting of economic policy. First, the figure of "national income" (NI) can be adapted for asymmetric bookkeeping. Secondly, we can create the figure of "environmentally sustainable national income" (eSNI). The gap between NI-ex-asyms and eSNI indicates whether the world becomes grayer or greener. Colignatus (2008, 2009) discusses Hueting's intellectual path. Some selected comments put Hueting's paper in more perspective.

6.3 *A relatively cheap correction*

A new reader might think that the calculation of eSNI is expensive. The cost of modelling and collection of all these ecological data might seem prohibitive. However, the relevant data are collected already for normal policy making. Governments already need to keep track of clean air and water, and so on. The eSNI calculation is only a relatively small modelling exercise at the top of the pyramid of the integration of statistical indicators. At Statistics Netherlands the costs were only 0.25% of its budget. Such a cost can be quite acceptable for such an important indicator.

6.4 *The need for some focus*

The power of Hueting's analysis is that it is embedded both in the tradition of economic theory and established procedures on economic statistics. The world has a huge machine of statistics, see UNSTAT. Hueting's contribution to the environmental statistics base UN SEEA is already well accepted. This machine only requires a small nudge to start producing the figure for eSNI too. This small nudge doesn't yet come about because of a mere lack of focus by all actors involved. The prime problem is that people don't study Hueting's work. Perhaps some of his scientific statements trigger the wrong reactions or push the wrong buttons. But the statements are grounded in economic theory and statistical

³⁴ Colignatus, Th. (2012), "Environmentally sustainable national income: Work in progress", *Ökologische Wirtschaften*, 2012 / 2, p 12-13

practice, and there is no other way than use those precise words. Readers concerned about economics and the environment are advised to study Hueting's work to resolve their misgivings.

6.5 *Distracting temptations*

One problem is that statisticians observe the present while sustainability refers to the future. If Hueting had worked at a forecasting bureau he would have developed an analysis on the future, and the statistical component would have been a corollary. Now Hueting worked at Statistics Netherlands and developed the proper statistical approach, namely eSNI depends upon assumptions on preferences of present people about the future. Now the future is a corollary. The difference is immaterial. But it may take an additional round of explanation.

Hueting's analysis has long fallen into a gap between economists who neglected the environment and environmentalists who disliked economics. Now that the world can actually observe how the climate is changing, there is more attention for environmental economics. Still, there are all kinds of indicators, like the footprint, genuine progress, etcetera, that destroy focus. Statisticians aren't front page people and may not be 'seen' by professors at the academia who want to have their publications. The front page statistician by exception is Bjørn Lomborg but he does not refer to Hueting's work. Recently there is a lot of attention for happiness, but ecological survival is a prerequisite that then apparently is neglected. Authors on happiness could be advised to focus on getting eSNI accepted first amongst economists, statisticians, policy makers and the general public who currently are quite misled by using only NI.

One group of researchers proposes to abolish NI altogether but it would seem that this kind of academic discussion is better done while NI and eSNI are smoothly running in the background. Governments needed a figure like NI since they needed more overview to manage our ever complexer societies. NI has been hugely beneficial. But the new scarcity of the ecology requires an adaptation in this method, so simple is the issue.

6.6 *How to do science*

Hueting's work can be understood in the tradition of Leibniz with the spirit 'Let us sit down and look at the formula's' (no quote). NI is well-developed but still work in progress and the latter also holds for eSNI. The work and results are scientifically warranted because of this attitude. Who reads Hueting's work notes that he personally cares about the environment but also how he focusses on what is scientifically warranted. The role of the scientist is to provide information, and it is up to democratic society to decide. If society doesn't have the proper information however it can only guess at its policy and instruments. Thus the scientific ethic of creating the required information is essential.

Over the last decades, the Anglosaxon method of the debating society has grown in prominence. In a world of uncertainty, let the best debater win, is the idea. A recent book title is "Science as a contact sport" (by Stephen Schneider, though I haven't read it). My suggestion is to be openminded. Debating can be enlightening but Leibniz better has the last word. When writing Colignatus (2008, 2009) I was amazed how often people did not sit down and study the formulas.

The story of Global Warming is not only about a world economy spinning out of control but also about scientific mores. Let us learn from these decades.

6.7 *Work in progress*

As said, NI and eSNI are work in progress. Some critical points for the modelling in eSNI are:

- (1) eSNI doesn't include yet the competing use of space, e.g. for plants and wild life, nor the costs for the development and use of alternative resources.
- (2) The physical norms for sustainability are based upon judgement and thus are open to criticism, uncertainty and scientific progress.
- (3) The estimates of price and income elasticities in demand and supply functions rely on current conditions. Those will change in a process towards sustainability, but yet unknown how.
- (4) eSNI uses comparative statics. A dynamic model would give a transition path from one state to the other, with an influence of policy-instruments on the speed of adjustment.
- (5) An eSNI for one country assumes that all countries adopt sustainability, otherwise there will only be a relocation of the burden on the environment. In practice policies will differ with different effects on eSNI. A pilot for e.g. Germany and Holland would show how large the effects could be.

7. Review of some fundamental notions

7.1 Economics vis à vis other approaches

This book presents a nuanced analysis about the reception of the Tinbergen & Hueting approach since 1969. Clarity for an introduction requires some rough first outlines at the beginning, otherwise the reader will drown in detail. This roughness might be seen as violating the nuance but actually it is a promise of later detailing. There are at least three approaches w.r.t. the economy (production and the environment):

- (1) (Neoclassical) Economics, with authors like Pigou, Keynes, Robbins, Tinbergen, Hueting and me, and with the theory of economic welfare and national income accounting. While there are fundamental discussions amongst economists they are all aware that economic agents and governments must take decisions about next year's budget, and that economic theory might be of advice. The Tinbergen & Hueting approach since 1969 absorbed the literature on environment and ecology but maintained the economic paradigm of scarcity. The approach was much discriminated against by mainstream economists who were and are not interested in the environment. Currently, with the rise of interest in the environment, the tradition of discrimination against the Tinbergen & Hueting approach persists with an apparent momentum of its own.
- (2) Engineering, with authors like Dennis Meadows and Van Egmond (Chapter 40), with "system dynamics", for which economic theory is a distraction. This was used by the Club of Rome report of 1972 that neglected price developments so that many economists lost interest. A new name is "Integrated assessment modelling" (IAM),³⁵ apparently used by the IPCC and UNFCCC, which might include some economics, but it is doubtful whether it really does. Scenario's by the UN Population Division apply rules of demographics but do not include feedbacks, and would be served with IAM, and actually the inclusion of economics as well.
- (3) Biology and other. There is a remarkable collaboration here that might be motivated by a distaste for economics, that allows the destruction of nature. The Tinbergen & Hueting approach apparently is regarded as suspect since it still would be economics. The journal "Ecosystem Services" has roots in biology and ecology, though not without some early acquaintance with and misunderstanding of the Tinbergen & Hueting approach, see Sections 7.10 and 21.9.4. Mathematician Georgescu-Roegen³⁶ started with thermodynamics and entropy. Entropy is an undisputed notion in physics, but as long as the Sun keeps emitting light then Earth has an inflow of energy, and this approach on entropy may be abstractly correct but need not be immediately relevant in terms of economics. Jan Tinbergen started in physics and knew about thermodynamics but did not see much usefulness for economics, see Section

³⁵ https://en.wikipedia.org/wiki/Integrated_assessment_modelling

³⁶ https://en.wikipedia.org/wiki/Nicholas_Georgescu-Roegen

22.2 and his letter on this. Georgescu-Roegen fled from Europe to the USA and they might have given him a professorship in statistics but they gave him erroneously a professorship in “economics”. Herman Daly ³⁷ had a B.A. and went directly to a Ph. D. in “economics” with thesis supervisor Georgescu-Roegen. ³⁸ Daly continued with a “steady state”, apparently matching the influx of energy from the Sun, so that entropy indeed becomes an academic issue. There arose a journal and field called “Ecological Economics”. Hueting was present at the beginning but observed that the researchers were not really doing economics, see Section 21.9.10. The journal provided Hueting with a place to publish because mainstream economists were not so much interested in the environment, but eventually Hueting dropped out with disappointment.

A combination of (1) & (2) is called “cost-benefit IAM”. An example would be the model DICE developed by William Nordhaus. Such models might be adapted to fit the Tinbergen & Hueting approach, by inclusion of standards for environmental sustainability according to the definition of Hueting and then calculate $e\text{NI}$ and $e\Delta = \text{NI} - e\text{NI}$. There might be discussion why they would not do so.

7.2 Economics, welfare economics, political economy, income

Economics has subfields like monetary economics, public health economics and so on. There is also the field of “welfare economics”. This actually defines the subject matter of economics, and thus may also be called “economics” itself, so that we actually have “economics = welfare economics = (welfare) economics”. It remains useful to have the separate term “welfare economics”.

Colignatus (2000a, 2011) proposes a matrix with subjects and research fields, and defines “political economy” as the study of the management of the state, with focus on the *topic* of the (management of the) state, and *multidisciplinary approaches w.r.t. this topic* rather than economics only. Political economy would still be economics in a general sense.

(Welfare) economics describes *both* the relation between personal utility and the personal resources and budget line, *and* the relation between the Social Welfare Function (SWF) and national resources and national income NI. This type of analysis is used in **Figure 5** on page 42 and in Chapter 8.

- It is a basic understanding in economics that utility or welfare are not the same as income. At the national level we have $\text{SWF} \neq \text{NI}$.
- The SWF will generally depend upon heterogeneous variables like material well-being, income inequality, work and leisure, environment, history, and so on. The part that only depends upon final demand of market goods y can be the *narrow* $\text{SWF}^*[y]$, so that *numerically* there may be tangency, and $\text{SWF}^*[y] = p \cdot y = Y = \text{NI}$, with prices e.g. normalised to eliminate the nominal price level. Even then, conceptually, $\text{SWF}^* \neq \text{NI}$ (without the $[y]$).

In 1930-1940 some economists had the idea that the newly developed statistic for national income might be a good indicator for national welfare, with the term “indicator” meaning that NI and SWF would still be uncomparable but at least

³⁷ https://en.wikipedia.org/wiki/Herman_Daly

³⁸ <http://www.eoht.info/page/Herman+Daly>

move in the same direction. Soon though, welfare economists pointed out that market income was only a factor, so that NI and SWF could move in opposite directions. Given economic theory this is a no-brainer, but apparently even in 2020 there is still quite some discussion w.r.t. lay perceptions (by politicians, the general public and the media). There are two formats that are particularly relevant here:

- The growth of income or the growth of production has been called, outside of the realm of welfare economics, “economic growth”. See Chapter 17. Formally this is the rate of change of real NI, or $d\text{Log}[\text{NI}] \approx \text{NI} / \text{NI}[-1] - 1$. The growth of production can be related to the growth of employment, taxes and the deficit, and other variables, so that it is a relevant variable. However, there still appear to exist lay beliefs on the change in welfare.
- National income per capita has been abused to compare the performance of nations. Formally this is NI / POP . A transformation concerns its rate of change, or “economic growth per capita”, or $d\text{Log}[\text{NI} / \text{POP}]$, that better is named “production growth per capital”. (The Bible might prefer POP / NI .)

While Hueting has expressed $\text{SWF} \neq \text{NI}$ in general, as a no-brainer in welfare economics, he has focused on two aspects:

- $e\Delta = \text{NI} - e\text{SNI}$ provides information about the burden on the environment. The outcome would still be evaluated with other variables in a SWF (but Hueting has no work on the latter).
- He has looked at the abuse of the term “economic growth” w.r.t. environmental policy making, see the title of Hueting (1974a, 1980). Thus he doesn’t look at the abuse of income per capita. The issue on growth can be resolved rather easily by calling the growth of production or income by its proper name, namely “production or income growth”. See Chapter 17.

7.3 *The notion of income*

In this introduction, it suffices to quote El Serafy (2013:143-144):

“The fundamental principle that is flouted by applying conventional national income accounting to depleting resources is the separation that must be maintained between income and capital. This principle tells us that if you liquidate your assets and use the proceeds for consumption, you are living beyond your means, and in doing so you are undermining your ability to create future income. The accounting profession was born in the late Middle Ages in the City states of the Mediterranean basin largely to separate from the proceeds accruing to the maritime merchants that part which they could use to finance their families’ expenditure needs. Those merchants had to guard against consuming their capital, the source of their continued wellbeing. From its infancy the accounting profession has specifically addressed this task. In present-day language the accountants had been asked to define sustainable levels of *consumption* and they could do so by attempting to *keep capital intact*.”

In his effort to define “income”, sir John Hicks also looked at planning models in which expectations complicate the measurement of capital and income. The situation in statistics however is analytically simpler, see Section 11.2. National

income (NI) as defined by the System of National Accounts (SNA) looks at human-made capital. However, at issue here is the not-human-made ecological base of human existence. See Section 7.10 for more on terminology.

7.4 *Accounting, econometric modeling, uncertainty, politics and science*

We must distinguish between national accounting and statistics about reality. The distinction is that accounting uses “rules established by agreement and convention” and has no claim about what reality really is. A student may make a loan for studies and regard this as an investment for the future, but in the System of National Accounts (SNA), education is registered as consumption. There is a lot of discussion whether it should (partly) be registered differently, but precisely because there is so much discussion then one is left with no other option than agree on a convention. A national statistical office (NSO) will have national accounting as a core activity, while the academia, universities and research institutes will tend to use statistics about reality.

Thus, for clarity, the relation $NI = eSNI + e\Delta$ is a matter of accounting. The discussion about its uncertainty concerns underlying assumptions, like on the derivation of the standards for conservation of nature and the environment.³⁹ This differs from the uncertainty that we would see in a regression, like if there would be a “true” level of $eSNI^* = y_{eS}^*$ and as if we could find the error by regression.

$$y_{eS} = \beta y_{eS}^* + \varepsilon$$

However, we do not have this kind of uncertainty here, because it depends upon accounting conventions what we accept as the figure for $eSNI$. There are many possible outcomes depending upon one’s definition for a green economy, but there would be only one type of outcome, with a range of expert variability, if one adopts Hueting’s notion of the conservation of nature and the environment (following IUCN 1980). It is crucial to be aware that it is a conditional assumption.

Econometrics itself already has a complex relationship with uncertainty. We may make an econometric model M about a world phenomenon W , and then the model will contain error terms because we will never know the true state of the world. We may simulate M and use its outcomes to recover M itself, and then we could determine whether we have recovered the true M or not. Such an exercise is not possible with W since we do not know W . Our data about W are only a random sample with unknown distribution. A common conditional assumption is normality.

The distinction between accounting (convention) and statistics (reality) comes with a better awareness of the distinction between science and politics. A useful analogy is the situation when humans get a fever. Normal body temperature is around 37°C and at 44°C you are likely to be dead. It are scientists who develop the temperature scales and who determine the responses of body and mind. They might determine a general finding that at some level of fever you would be advised to call in sick and stay in bed. They may also look at risks for others, e.g. for chauffeurs with fever. Politicians may step in and impose regulations, e.g. that bus drivers may call in sick when having 40°C, for reasons of management of national budget and public transport and employee health. Both scientists and politicians can develop protocols and standards, but their roles should not be confused.

³⁹ <http://www.sni-hueting.info/#Norms>

Standard national income NI depends upon accounting practices a , assumed to be at some level of perfection, $NI[a]$. eSNI uses the same accounting practices but rearranges the data depending upon standards for environmental sustainability, $eSNI[a, s]$. For world temperature, one might take a 1°C or a 2°C difference from the level of 1850 or whatever. Hueting's definition states that the standards must *conserve nature and the environment* (IUCN 1980) and then can be derived from the scientific literature, and not be chosen by politics. His definition of eSNI provides a protocol for institutions to work with. Outcomes will differ because of uncertainty about standards and because of expert variability. Hueting's definition does not claim to pinpoint a particular value of $eSNI^*$ as the true value, since we cannot know W . A calculation of an eSNI always comes with the advice to have a sensitivity analysis. The results presented in Chapter 4 derive from a particular set of standards for environmental sustainability and are still without a sensitivity analysis. See Section 5.5 for the issue of validity, uncertainty, accuracy and precision. See Chapter 18 for whether eSNI fits the definition of statistics.

7.5 Paradigm shift

The shift from conventional national accounting – with the System of National Accounts (SNA) and standard national income (NI) – to the approach by Tinbergen & Hueting (1991) might best be seen as a paradigm shift. An analogy is the shift from a Flat Earth to a Sphere. The Flat Earth is a special case of the Sphere, namely a (part of a) Sphere with an infinite radius. There was also Keynes who presented his own *General Theory* in opposition to the earlier *special theory* of *Laissez Faire*. Keynes borrowed the distinction from Einstein.

The distinction between Newtonian and Einsteinian physics would be a useful analogy indeed to understand the shift from conventional national accounting with the System of National Accounts (SNA) to the approach by Tinbergen & Hueting (1991). Newtonian physics is a good approximation to phenomena that are at a speed much lower than the speed of light. Einsteinian physics is more accurate in general and is definitely required for phenomena close to the speed of light, which also concerns matter that has such speeding electrons / waves. If only for the purposes of analogy, we might say that we have two models of physics conditional to their assumptions. For the accounting methods: both are conditional to their assumptions as well. The SNA and NI fit legal regulations and are useful for e.g. current taxation. eSNI is relevant for environmental policy making with the precautionary principle. Potentially eSNI is more general. NI accepts as income which actually is expenditure above the means, in terms of environmental sustainability. Policy makers might consider not to tax what is not really income.

This analogy may help to understand that the national statistical offices currently have an institutional fixture on “Newtonian physics”, while the ecological challenge would require them to open up to “Einsteinian physics”.

A line of argumentation of surprising strength is that national accounting had its own historical origin apart from economics, see **Figure 2**. The argument then runs as “this is how it originated, and thus we proceed in the same way”. This argument shoves away that the same course of history gave the development of economic theory, so that the notion of income was evaluated from various angles, and so that there arose this new development from the “Newtonian” to the “Einsteinian”

view. A selective focus on this element in the historical origin and an emphasis on current institutional arrangements may cause that change is blocked, with remarkable strength. Chapters 11 and 25 will look closer at misunderstandings that can block this change. Hueting worked at CBS Statistics Netherlands that also had a “Dutch view” on SNA, that doesn’t see eSNI as part of the core task of a national statistical office. This warrants the distinction between Part 3 and Part 4: the reception of the Tinbergen & Hueting approach at CBS and outside of CBS.

7.6 *How would lemmings do their statistics ?*

Section 21.9.8.5 below – basically written in a separate paper around 2008 – arrives at a key question, rather late in a book, and it requires an abstract here. Consider the proverbial lemmings that run into the sea and drown by thousands. Let us consider how this horde of lemmings would do their statistics, running at some distance $\Delta_{\text{sea}} > 0$. Conventional lemming-statisticians, currently in control at the national statistical offices often with PhDs from highly ranking universities, would only record the position they are at, say the GPS co-ordinates. They can agree that there is a sea, as legend has it from some survivors of generations past, but this “sea” hasn’t been observed yet, and thus for them mentioning a sea would not be statistics (of the past) but “politics” (about the future). For this manner of conventional thinking it is a revolution to grow aware that there is something called Δ_{sea} which is just a current fact like the GPS position, and which can be reported about too, except that it has greater uncertainty since the sea has not been observed yet directly, but only inferred, say by changing vegetation. The uncertainty only disappears when $\Delta_{\text{sea}} \leq 0$, when statistical observation comes to an end. To my regret, the issue in this book is basically just as simple as this story about such lemmings. If the national statistical offices in the world, starting with CBS Statistics Netherlands, had not been so conventional thinking as can be observed as a fact too, world policy making about environmental sustainability in the decades since Tinbergen & Hueting (1991) would have been better informed.

7.7 *The importance of reading unencumberedly*

Progress in science requires that scientists read unencumberedly. The relevant word in Dutch is “onbevangen” which also has connotations of the open mind with impartiality and without prejudice or pressure. This book hopes to meet scientists in this fashion. Readers are invited to read these pages in such manner and to maintain and protect that state of mind.

While we indicated the paradigm shift and used the analogy of some hypothetical lemmings with risky statistical conventions, some readers might take issue, and for some reason regard such analogy as no longer belonging to scientific conversation. In a case like this, the reader is invited to maintain and protect the unencumbered state of mind and check what the discussion is really about. This particular analogy is not a comparison of humans with lemmings. The analogy is about what one regards as a fact that can be measured or estimated. While GPS is a golden standard for current location, still a good case can be made for the notion of some distance, when it would be relevant to know such distance.

This book obviously targets a change of mind, and hopefully readers are up to it.

7.8 Some major events in 2019

The year 2019 had some major events that gave an impulse to finalising this present book.⁴⁰ With the publication of Hueting & De Boer (2019b),⁴¹ readers can find in their book: (i) the basics from the thesis Hueting (1974a, 1980) that shows that the environment belongs to the subject matter of economics, and thus also to the national accounts, (ii) the vertical demand curve plus the methodology that measurement of national income is based upon conditional assumptions on preferences for environmental sustainability, (iii) the practical outcomes and proof of concept of $e\Delta = NI - eSNI$, replicated here in Chapter 4 too, (iv) documentation of the standards for environmental sustainability, (v) a review of the discussion since 1965 and deconstruction of common misunderstandings, (vi) inclusion of the Tinbergen & Hueting (1991) paper in their appendices to make it more accessible.

A major event in October 2019 was that Verbruggen (ed) (2000) became available online, i.e. the final report of the first calculation for observation year 1990.⁴² Remarkably it had not been published at a major publishing house in 2000 and till this moment it remained available only as a xerox and not as pdf in the VU-Dare system. The online availability since October 2019 is important because later reports by the IVM team have not all details of this first report. There are various issues that now can be checked more easily, also for our deconstruction.

The year 2019 also saw the Dutch economics community commemorating 50 years since the 1969 Nobel prize in economics for Ragnar Frisch (1895-1973) and Jan Tinbergen (1903-1994), under a somewhat nationalistic title “Tinbergen Today”. This celebration caused more attention amongst Dutch economists for what Tinbergen had done. This allowed the present author more scope to consult with fellow economists about their views also about the Tinbergen & Hueting (1991) article. By coincidence in 1969, CBS Statistics Netherlands on advice by Tinbergen also had appointed Hueting as head of a new department of environmental statistics with the purpose to correct GDP for damage to the environment. Remarkably, in the Dutch 2019 celebration there was hardly any (planned) attention for Tinbergen’s support for Hueting, shown by the latter appointment in 1969 and the article Tinbergen & Hueting (1991).

7.9 Comment on history of GDP

Reviewing Diane Coyle’s (2014) “*GDP: A Brief but Affectionate History*”, Marcel Boumans (2014:799) observes (my footnote):

“Actually, such a general history of national accounts does not exist yet.⁴³ It is revealing that Coyle uses a working paper on national accounts in the Netherlands (Frits Bos, MPRA paper no. 9387 [June 2008]) and an article on John Maynard Keynes’s involvement with the development of national accounts in Britain (Geoff Tily in Review of Income and Wealth [June 2009]) as two of her three main sources for her history.”

⁴⁰ The 2009 draft is at <https://mpira.ub.uni-muenchen.de/63904>

⁴¹ <http://www.sni-hueting.info/EN/NA-eSNI/index.html>

⁴² <http://www.sni-hueting.info/EN/Others/2000-Verbruggen-ed-O00-10.pdf>

⁴³ It is not clear what Boumans would think about André Vanoli (2005), see Section 11.7, and the volumes by Michael Ward (1939- 2008) who briefly mentions Hueting.

Bos (2008:50) lists Hueting's eSNI, e.g. in his table 5.2 "*Major events in Dutch national accounting since 1980*", and reports on it *correctly but incompletely*:

"Hueting (1980) stressed the economic importance of pollution and depletion of natural resources. Hueting (1991) developed a concept of Sustainable National Income (SNI): the maximum income that can be sustained without technological development and excluding the use of non-renewable resources. According to Verbruggen et al. (2000), Dutch Sustainable National Income was in 1990 56% below the official Dutch national income. The purpose of the SNI is not to provide the policy-makers with a goal for national income as such, but to indicate the sustainability gap based on current technology."

This is all. There is no reference to Tinbergen & Hueting (1991). Bos (2008) had already shown the important role by Tinbergen for the development of the national accounts since the 1930s, and it would be important to clarify to readers that Tinbergen since 1969 supported Hueting's contribution for correcting those accounts for damage to the environment. However, in an email to me of March 20 2019, Bos indicates that he still hadn't read that paper in 2019:

"If I write another article about National accounts, I will first read the article by Tinbergen and Hueting."⁴⁴

Observe that Bos (2008) above refers to the *chapter* Verbruggen et al. (2000) and not the full *report* Verbruggen (ed) (2000), see Section 39.10. Why does he not refer to Hueting (1974a) (earlier date) *and* Tinbergen & Hueting (1991) *and* the chapter by Hueting & De Boer in Verbruggen (ed) (2000) (who refer to the first two references) ? Bos apparently hadn't read those and specifies only what he has studied. Apparently he hasn't studied the Tinbergen & Hueting approach yet in 2019. This situation necessitates a distinction between traditional and conventional approaches:

- The *traditional* approach in both national accounting and its history writing has a wide scope, that includes an interest in documenting the Tinbergen & Hueting approach on the economics of ecological survival.
- The *conventional* approach in both national accounting and its history writing, e.g. adopted by Bos, neglects the Tinbergen & Hueting approach. If executed correctly, *it explicitly states this neglect* and refers to other sources where the missing information can be found. If executed incorrectly, as Bos (2008) has done, *it doesn't mention this neglect* but simply neglects the Tinbergen & Hueting approach. It e.g. doesn't mention the Tinbergen & Hueting (1991) article, and gives only superficial and incomplete mention of some work by Hueting, with often neglect of the latest work (that might illuminate misunderstandings about earlier work).

Above distinction between "conventional" and "traditional" views on both national accounting *and its history writing*, only *mentions* such history. It is only intended as a label, in order to deconstruct also the history writing by Bos. This present book is

⁴⁴ Dutch: "Als ik weer een artikel over Nationale rekeningen schrijf zal eerst ik het artikel van Tinbergen en Hueting gaan lezen."

not about history writing but is about political economy, also about national accounting. I am no historian but we cannot avoid statements about the past.

We are at risk of confusing *national accounting* and *its history*. Frits Bos includes so much history of the national accounts in his analyses that we might be inclined to judge his work as history writing while in fact his topic still concerns national accounting proper. The added history is something for historical interest, not the main issue. This sobering thought allows us to arrive at a major inference to start with. Bos failed as a national accountant, because as a national accountant he should have looked into the Tinbergen & Hueting approach. In this he is no different from the other national accountants at CBS Statistics Netherlands who evicted eSNI from CBS. If Bos were only a historian of the national accounts then he might have had more room to select his own topic of research, and e.g. look at an area without Tinbergen & Hueting (1991), but in fact Bos is not merely a historian but a national accountant who should deal with the Tinbergen & Hueting (1991) propositions and who hasn't.

Traditional accounting and its history includes what we do not find in Bos's quote above: (i) The finding by Hueting (1974a, 1980) that the new scarcity means that the environment belongs to the subject matter of economics, and thus *also to the national accounts*. (ii) Hueting (1974a, 1980) suggested to publish NI-A (NI excl. asymmetric bookkeeping) alongside NI, see Section 21.6.3. (iii) Hueting (1974a, 1980) rejected standard Cost Benefit Analysis (CBA) on "willingness to pay" and "willingness to accept", see Chapter 44. (iv) The Hueting (1986b) construction of a vertical demand curve to correct the deficiency of standard CBA, and to finally find a useful approach to correct standard NI, resulting into $e\Delta = NI - eSNI$ or $eSNI = NI - e\Delta$. (v) Hueting (1989b) allows the standards to be chosen by politics or science, and makes the analysis conditional to assumptions on preferences, which is the paradigm shift discussed in Section 7.5. Statistics is not only about the figures but also about what they mean.

In corroboration of Bos's message to me of March 20 2019, we remarkably find:

- *No work at all* by Frits Bos refers to Tinbergen & Hueting (1991) and the support that Tinbergen gave to the work by Hueting. Bos (1992) basically was written in 1991 but might have been updated. Bos (2006) and (2011a) about three centuries history repeat the above text from (2008).
- Hueting is *not at all* mentioned (i) in the thesis Bos (2003) about past, present and future of national accounting, (ii) Bos (2011b) "*National accounts: barometer, telescope and compass of the national economy*" for the Gamma Canon "What everyone must know about the gamma sciences", (iii) Bos (2013) about *meaning and measurement*, and Bos (2017) in Eureka, the journal of Eurostat. The reference to the compass is awkward since Tinbergen & Hueting (1991) show that standard national income is a wrong compass when used for the environment. Bos refers to the Stiglitz, Sen, and Fitoussi report of 2009 but their report is deficient w.r.t. the work done by Bos's (former) CBS colleagues Tinbergen and Hueting.

Bos moved to CPB in 2001 and since 2012 contributed to Cost-Benefit Analysis (CBA) on the environment. It appears that he still is (relatively) unaware of *both* the ecological risk *and* the position of eSNI within CBA, see Chapter 44. Another

major inference thus is that Bos fails in Cost Benefit Analysis (CBA) since 2012, because he entered into the field of environmental economics and then anyway should have looked at the Tinbergen & Hueting approach w.r.t. the economics of ecological survival. This happenstance allows us to identify a source of miscomprehension in his lack of knowledge in 1986-2019 in general about the Tinbergen & Hueting approach.

Thus Bos (2008) hasn't fully grasped the analysis, and via him Coyle neither. In 2019 Coyle is adviser at the UK Office for National Statistics (ONS). Authors like Den Butter (2007) (in Boumans (2007), see Section 39.13), Boumans (2014), Coyle (2014) and former director of INSEE Vanoli (2014) refer to Bos's incomplete (2006, 2008 or 2011a) or deficient (other) works. Likely these authors assume that Bos has compiled a proper history, in particular about developments at CBS where he was working, but alas. Bos might argue that eSNI has not been included in "official national accounting" and GDP, and thus doesn't form part of a "history of this official development", but eSNI has been a key element in the *discussion* within official national accounting, see also UN SEEA (2003). A proper (complete and correct) discussion of *national accounting and its history* would include the arguments why the Tinbergen & Hueting approach has not been adopted and this would allow readers to also see that such arguments are deficient. Bos however has the incomplete reporting and does not look deeper into the discussion about eSNI and thus doesn't highlight the confusion about it. It is tempting to call this "traditional history writing" but that is the wrong term since national accounting and its history writing have a tradition that would require the inclusion of Hueting's work. Thus Bos's history writing is not "traditional" but only *conventional*, improper or biased (incomplete or deficient). We will meet with the history of national accounting at various places, and more in focus in Chapter 11. We may refer to Bos's work at more places in this book. Chapter 23 collects our findings on Bos.

Chapter 41 discusses a curious piece of "history writing". See also my sheets from a presentation at the 2019 Dutch & Flemish political science conference.⁴⁵

7.10 Terminology: vital environmental functions and critical natural capital

Economic theory distinguishes capital (stock, state) and income (flow, use). Capital (a stock) associates with investments (a flow), and both of these pertain to the same kind of commodities (e.g. machines). In the same manner, an environmental function (a state variable, to be transferred to next period or generation) associates with the actual use of the function (a flow).

Hueting (1967, 1969a, 1974a, 1980) developed his concepts and analysis at a time when the terms "capital" and "services" had a well-formulated meaning in the System of National Accounts (SNA), namely for human-made goods and human-provided services. Hueting used the terms of "natural resources" and new phrases like "non-human-made physical surroundings"⁴⁶ and "environmental functions" (possible uses, with their capacity depending upon the resource level and composition) to allow a clear reasoning about the relationship between production

⁴⁵ <http://thomascool.eu/Papers/Environment/2019-06-12-Sheets-50-years-Tinbergen-Hueting.pdf>

⁴⁶ The term "non-human" reminds of "alien" and thus I will use "not-human-made".

as defined in the SNA and the environment, see for example Hueting (1974a, 1980:167 footnote).⁴⁷

Other authors have preferred later not to introduce new terms but to extend the meaning of the existing terms of *capital* and *services*, see Ahmad et al. (ed) (1989), Pearce et al. (1989:3), Pearce & Atkinson (1993) and Hamilton (1994). In their view, the natural resources including ecosystems, and their environmental functions, can be seen as items of “*natural capital*” (stocks, states). The use (flow) of environmental functions, relevant for income accounting, can also be seen as “(*ecosystem*) *services*”. What has been identified as vital environmental functions are called elsewhere “critical natural capital”.

Table 2 indicates how the terms of capital and services, as they are already covered by the SNA (first cell), might be extended under the paradigm shift by the challenge of ecological survival. The table makes a distinction by property rights, while Hueting’s point is that who owns an area of land must still distinguish between what is human-made and what happens in the ecology. There can be (unknown) feedbacks from the ecology that are not (yet) covered by property laws.

Table 2. Natural resources and human-made capital

	<i>Under property rights</i>	<i>No property rights</i>
<i>Conscious use</i>	Covered by SNA	Sea routes
<i>Unmanaged reliance upon the ecology</i>	Large natural parks	Ecological impact by the economy

Table 3 gives an overview of the terminology.

Table 3. Terminology in the literature

	<i>State variable</i>	<i>Flow variable</i>
<i>System of National Accounts (SNA)</i>	Capital	Goods and services, national income
<i>Environment, in this book</i>	Natural resources, (vital) environmental functions	Use of environmental functions, environmentally Sustainable National Income (eSNI)
<i>Environment, “capital approach” still not in the SNA</i>	(Critical) natural capital	Ecosystem services

Authors who recognise the identical meanings (so that there are only differences in terminology) are e.g. UN, EC, IMF, OECD, World Bank (2003:453) a.k.a. UN SEEA (Section 10.199, quoted below in Section 11.5), El Serafy (1998) and El Serafy (2013:5).

⁴⁷ In only a single statement, Hueting (1974a, 1980:127) uses the term “services of the environment” but without clarification whether this concerns use or potential use: “After all, the whole of production depends on the services of the environment. This well-known fact (...) does not lead to special individual behaviour as long as the functions are available to a sufficient degree.”

Someone who uses the “capital approach” (i.e. terminology) would not be likely to use the term “sustainable income”. Daly and El Serafy in the Ahmad et al (ed) (1989) volume (see also Hueting & De Boer (2019:148)) have the comment that the calculation of income requires that capital is kept intact, so that income already would be sustainable by itself, and so that “sustainable income” is a pleonasm, that is, if one approaches the issue from the angle of “capital theory”. In Hueting’s terminology it is no pleonasm, since capital belongs to SNA, and sustainability is a condition imposed from the environment.

The World Bank (at some distance of SNA) has tended to refer to “natural capital” while simultaneously looking at (genuine) savings and depletion, see Chapter 30 and the key role by Pearce (1941-2005), Chapter 43. An early reference to the distinction between produced, human, natural and social capital is O’Connor et al. (1995). A critical discussion is by Hueting and Reijnders (2004a). The value of a fish in the shop differs from the value of a fish in the water. The discussion about “ecosystems services” caused Hueting et al. (1998a) to distinguish between services and “services”:

"Environmental functions are defined as possible uses of our natural, biophysical surroundings that are useful for humans. Uses can be either passive or direct and practical. The 'services' of environmental functions are defined as their possibilities or potential to be used by humans for whatever end. Some functions can be conceived as consumption goods, others as capital goods."

The methods with their terminologies have an underlying structural identity and a quite different practical implementation. World Bank (2006:123) provides this explanation (though beware that income is not the same as the change in wealth):

"Consistent with Hicks's notion of income (Hicks 1946), sustainability requires nondecreasing levels of capital stock over time or, at the level of the individual, nondecreasing per capita capital stock. Indicators of sustainability could be based on either the value of total assets every period, or by the change in wealth and the consumption of capital (depreciation) in the conventional national accounts."

At the fundamental level of economic theory, with the methods of accounting for capital and income, the methods by Hueting or the World Bank are the same. This book maintains the terminology by Hueting (1974a, 1980), not only for comparison with his earlier work but also for the same reasons of clarity. When we speak about capital and services then these would be recognised in the SNA, and when we speak about resources and functions then they may not be in the SNA.

Apart from theory there are relevant practical differences. A weak point of the World Bank “capital approach” is the reliance upon indicators instead of the use of a full-fledged model that describes the relationship between the economy and the environment. Also, there is often a lack of environmental standards to judge the level of such indicators. When one has an indicator and a standard, then this is not enough, since one also requires information about the elimination and compensation curves for policy making. The “capital approach” tends to require that natural capital is valued in terms of money as well, which tends to come with

tedious questions, while the approach of environmentally sustainable national income (eSNI) is parsimonious in its requirements.

eSNI was part of the official Dutch national strategy on sustainable development of Johannesburg 2002, see Ministry of VROM (2002). The cabinet instructed the national planning bureaus to continue with the indicators for sustainable development. Subsequently, the World Bank “capital approach” was adopted by the new generation of researchers at CBS Statistics Netherlands in the Dutch “sustainability monitor” as CBS, CPB, MNP, SCP (2009), and later, by advice of CBS, also by the Conference of European Statisticians (CES, 2013). Both CBS et al. (2009a) and CES (2013) mention eSNI but refer to Hueting (1974a, 1980) in which eSNI is not mentioned since it was introduced by Hueting (1986b). The latter misattribution indicates that the new generation of researchers at CBS did not study both thesis and eSNI. See the discussion in Section 21.11.1.

While UN SEEA and El Serafy alerted economic researchers to the issue of terminology, there was the remarkable development that various researchers were not aware of it. For example, CBS et al. (2009a) presents the “capital approach” as “alternative” to eSNI, which suggests that the new generation may not be aware that the same economic theory is being used. The practical difference concerns the implementation and calculation of eSNI, as one of the indicators.

Likely it was Pearce (1941-2005) who pushed for the “capital approach”, i.e. the terminology in the final row of **Table 3**, perhaps at first unaware of the terminology designed by Hueting (1974a, 1980), and later not wishing to use it. Pearce apparently had first publications on the topic in 1973, one with Michael S. Common.⁴⁸ Costanza (2003) in his “early history of ecological economics” puts Hueting and Pearce in the same scene. Perhaps Pearce didn’t read Hueting’s work till the translation of “New Scarcity” 1974a in 1980, but he might have taken aspects from the discussions within this research community. Why did Pearce et al. (1989) “*Blueprint for a green economy*” not refer to Hueting, see Chapter 43 ?

7.11 Rutger Hoekstra (2019b) on terminology in UN SEEA

Chapter 27 discusses Rutger Hoekstra (2019b) “*Replacing GDP by 2030*”. The chapter shows that the book is misleading and a loss of time, and the following is an example that fits above discussion on terminology. Hoekstra (2019b:130-131):

“The fact that the SEEA Central Framework and SEEA-EEA use the capital approach and welfare economics has also affected the terminology. A case in point is the definition of the environmental assets (a synonym for “natural capital”): “Environmental assets are the naturally occurring living and non-living components of the Earth, together comprising the bio-physical environment, *that may provide benefits to humanity*” (SEEA 2012, paragraph 2.17, italics added). The word “assets” is a clear reference to the capital approach while the concept of “benefits to humanity” is related to welfare theory.

Originally, the SEEA was conceived as a “satellite account” of the SNA and the definitions of assets in the two systems are similar, although not identical. The original SNA-definition is: “An asset is a store of value

⁴⁸ <https://ideas.repec.org/e/ppe198.html>

representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time. It is a means of carrying forward value from one accounting period to another.” [ftnt] (...) the SEEA has dropped the ownership criterion because many parts of the environment are not held by an “economic owner”. [ftnt] (...)

Some natural scientists find terms such as “ecosystem services” too economic. For example, the Intergovernmental Science – Policy Platform on Biodiversity and Ecosystem Services (IPBES) recently experienced a serious setback in its deliberations. Opponents of the term “ecosystem services” proposed to speak of Nature’s Contribution to People, because it was less economic and more reflective of how indigenous people see the role of nature. [ftnt] [some quotation marks added]

(...) the terminology should not be based on one of the quality assessment approaches, whether economic or otherwise. This is surprisingly easy. It can be achieved by dropping the last six words (“*that may provide benefits to humanity*” [ftnt]) of the SEEA definition and changing “assets” to “stocks”: “Natural stocks are the total of all naturally occurring living and non-living components of the Earth, together comprising the bio-physical environment.” “

Hoekstra is close to proposing the use of Hueting’s notion of environmental functions though he doesn’t use that term. He is also quite confused, since the *environment* is the part of nature that is used by humanity.

Hoekstra (2019b:131) mentions also another shameful situation in accounting:

“(…) two of the most important environmental problems of this era, climate change and biodiversity loss, do not get a full global accounting treatment in the SEEA [2012]. [ftnt 9]” The latter on p289: “Earlier versions of the SEEA (1993 and 2003) were far more forceful in arguing that all natural capital [stocks !] should be included.”

7.12 Who coined eSNI as a term ?

Hueting (2001d:372) states about SNI / eSNI: “a term I introduced”. While it is unclear when exactly, circumstances indicate that Hueting likely did so indeed.

Hueting had been hired by CBS Statistics Netherlands in 1969 with the objective, also by recommendation by Tinbergen (Nobel Prize 1969), to see how the figure of national income could be adjusted for damage to the environment. This approach can be recognised in Hueting (1974a, 1980), with the negative conclusion (because the shadow prices cannot be found) except for asymmetric bookkeeping (that do not require shadow prices). When Hueting (1986b) developed the vertical demand curve (and other publications leading up to Hueting [1986] [1987] (1989b) at the UNEP – World Bank workshops), ⁴⁹ it was logical for him to speak about “sustainable national income”.

Other authors had a focus on sustainable development, commonly the rate of growth of per capita income. Obviously the integrals of those rates gives production or income. Yet no researcher would be interested in taking the integral,

⁴⁹ See Ahmad et al. (ed) (1989) p93-95 for the list of participants in 1983-1988. The year 1987 (Paris) is printed as 1986. Hueting participated in '83, 84, 86, 87 with a paper and 85 without one.

except for Hueting who looks at the distance $e\Delta = NI - eSNI$. It is rather the other way around, that national accounting first generates the integral value, and that the growth rates result from those. But other researchers apparently are interested in welfare and not income. Nordhaus & Tobin (1971, 1973) "*Is growth obsolete?*" use income to develop a "measure of economic welfare" (MEW) and thus focus on welfare and not income. Daly presented his *Index of Sustainable Economic Welfare* (ISEW) in 1989. In Ahmad et al. (ed) (1989) it are Daly and El Serafy who use the term "sustainable income" while Hueting's article uses the Brundtland term "sustainable economic development". Hueting may of course have introduced the term SNI in discussion with these other authors and have opted not to use it in said particular paper in order to conform with the Brundtland term. Pearce et al. (1989) use the very term (SNI) and an accounting formula without referring to Hueting at all, and instead only referring to the UNEP – World Bank workshops, thus either they coin the term themselves or use another (perhaps not explicit) reference or they take the notion from discussions potentially involving Hueting.

7.13 Von Neumann model to highlight the issue and terminology

The following will use small models in mathematical economics to highlight the link between environmental functions and "ecosystem services" and "natural capital". The next subsection will discuss the "managed" system that is recorded in the System of National Accounts (SNA) with the standard measure of national income (NI). The subsequent subsection will discuss the "not-managed" system that still provides the ecosystem services by the environmental functions. We close by the link of eSNI and conclusions.

7.13.1 A standard model for the economy and national accounts

The managed system that is recorded in the SNA may be described by a dynamic Von Neumann model, in a slight variation upon the Leontief-Solow programming model summarised by Takayama (1974:522-527). We distinguish activity levels (n -vectors) and goods and services (m -vectors). Human economic activity x requires intermediate inputs $A.x$ and has outputs $H.x$ in terms of flows, requires capital $B.x \leq k$ in terms of stocks, and requires $L.x \leq \ell$ of labour. Final demand are consumption c and investment i . The capital stock of the next period consists of current capital plus investments minus depreciation. The (square) identity matrix is I , and a diagonal matrix with depreciation rates is D . Then:

$A.x + c + i \leq H.x$	intermediate and final output
$L.x \leq \ell$	labour
$B.x \leq k$	capital requirement
$k[t + 1] = (I - D).k + i$	capital next period

If capital would have balanced growth factor $1 + g$ then there is a direct relation between c and x , that with full rank solves with a generalised inverse.

$$\begin{aligned}
i &= (gI + D).B.x \\
c &\leq (H - A - (gI + D).B).x \\
x &\geq (C'.C)^{-1}.C'.c \quad \text{with } C = H - A - (gI + D).B
\end{aligned}$$

With prices p for goods and services and wages w , we find value added VA or standard national income NI or GDP , and capital income Z and capital return r .

$$\begin{aligned}
VA &= p'.(c + i) = p'.(H - A).x \\
VA &= Z + w'.L.x \\
r &= Z / p'.k
\end{aligned}$$

The definition of *income* requires that the capital stock is left intact. One doesn't live from the proceeds of selling one's capital. The above calculation of VA thus assumes that $k[t + 1] \geq k$ or for balanced growth $g \geq 0$. A weaker condition is that monetary capital is kept intact, and then a negative value of Z clearly is subtracted from income.

For the above, the Von Neumann model has been chosen to allow for the phenomenon that some environmental functions (state, stock) and their use (ecosystem services) have already been included in the SNA and national income accounting. Consider for example the emissions trading systems. The criterion is not economic property law itself, since economic property (parts of the environment subject to ownership) can have environmental functions that are not managed. Such phenomena can be included in the accounting of ecosystem services (use of environmental functions). For the latter the Von Neumann model seems better. Thus it seems better to use this model in both cases.

7.13.2 The link between economy and ecology

By the ecology we mean all physical surroundings. Only part is measured as relevant for humanity and this part is called the "environment". It is the environment that provides for environmental functions (possible uses). Let us consider resources f ("natural capital") (μ -vector). The environmental functions of an environmental resource j (e.g. water), with level f_j (stock, state), are the possible uses i (iot), for $i = 1, \dots, n_j$, having actual usage u_{ij} (flow). Take $\lambda = n_1 + \dots + n_\mu$. The uses or ecosystem services thus give a λ -vector. The resources generate an availability for use $F.f$. Human activity x uses $M.x$ and produces $P.x$ as categorised by those functions. The net use has matrix $N = M - P$. (Observe that the competition between functions may make $F = F[f]$ and $N = N[f]$ much more period-dependent than production technologies A , H and B above.) With λ rows and μ columns, there may well exist a generalised inverse $(F'.F)^{-1}.F'$ that allows the back-calculation from net use to the reduction of resources. Otherwise a more complex calculation must be made. The resource level of the next period consists of the begin value plus the regeneration minus the actual use at the resource level.

$$\begin{array}{ll}
M.x \leq P.x + F.f \text{ or } N.x \leq F.f & \mu \text{ resources allow } \lambda \text{ uses} \\
(F'.F)^{-1}.F'.N.x \leq f & \text{translating above } x \text{ into resource use} \\
f[t+1] = (I+R).f - (F'.F)^{-1}.F'.N.x & \text{regenerative } R
\end{array}$$

We assume that humanity triggers the system to some regeneration. If humanity would not exist then $x = 0$ and also $R = 0$. The resources can find a stable minimum at regeneration when $f[t+1] = f = f_R$. Substitution gives an expression for the activity level x_R .

$$R.f_R = (F'.F)^{-1}.F'.N.x_R \quad \text{potentially solvable for } x_R$$

When f contains resources that still may support economic production for at least some decades before it collapses, the distance $f - f_R$ is quite large, and a reduction of human activity to only the regenerative capacity of the environment would be overly restrictive compared to requirements for environmental sustainability. The case is only mentioned for comparison.

For the valuation of this use of the environment, prices are difficult to obtain. Hueting (1974a, 1980) looked at methods of contingent valuation and such, and judged that those were inadequate for the ecological challenge. His practical approach to an unsolvable problem came in 1986b with the vertical demand curve.

7.13.3 The link from ecology back to national accounting (eSNI)

Due to considerations of scarcity, the economy consists of both production and environment and thus we must revise national accounting. Hueting & De Boer (2019) reason from the environmental functions and their use (or the ecosystem services) to the derivation of standards on the resources, as f_e , where the subscript stands for environmental sustainability (ecological survival). This is similar to Rockström (2018) but now is linked to the economy and national accounting. Current production is so far removed from the standards that those will be binding, so that the inequality becomes an equality. The level of resources f then would gradually reduce to the constant value $f[t+1] = f = f_c$.

$$\begin{array}{ll}
M.x_e = P.x_e + F.f_e \text{ and } x \leq x_e & \text{standard } f_e \text{ gives } x_e \\
x_e = (N'.N)^{-1}.N'.F.f_e & \text{restriction on NI} \\
f[t+1] = (I+R).f - f_e & \\
R.f_c = f_e & f[t+1] = f = f_c.
\end{array}$$

Subsequently, there will be shadow prices and wages, giving value added VA_e , called environmentally Sustainable National Income (eSNI). In the present example with the Von Neumann model with fixed coefficients, the lower level of production would generate unemployment. Hueting & De Boer (2019) rely upon a model with substitution, that maintains employment. The shadow prices are also generated from demand equations not discussed here. When the labour income quote $LIQ = w'.L.x / VA$ would be kept the same, then $w_e'.L_e.x_e = LIQ VA_e$, and $Z_e = (1 - LIQ) VA_e$.

$$\begin{aligned}
VA_e &= p_e' \cdot (c_e + i_e) = p_e' \cdot (H - A) \cdot x_e & \text{eSNI} \\
VA_e &= Z_e + w_e' \cdot L_e \cdot x_e \\
r_e &= Z_e / p_e' \cdot k
\end{aligned}$$

Subsequently $e\Delta = VA - VA_e = NI - eSNI = GDP - eGDP$ gives the distance to environmental sustainability. This is the key statistical figure that can be presented to policy makers who are familiar with the concept of national income. In the calculation $NI = eSNI + e\Delta$ the total value is kept the same, but a distinction is made between proper income eSNI (keeping the environment intact) and costs e Δ (living above our means, taking resources from future generations).

For ecosystem services it may suffice to look at their causes and effects in real variables, and there would be no inherent need to find monetary values for aggregate terms. If one has the explicit purpose to develop such valuation, then the above modeling exercise highlights the approach by Tinbergen and Hueting (1991) and its restatement and the proof of concept presented by Hueting & De Boer (2019).

7.14 Relevance for policy making (sustainability 1960)

The Organisation for Economic Co-operation and Development (OECD / OCDE) in article 1 of the Convention of December 14 1960 declared to promote policies:

“to achieve the highest sustainable economic growth and employment and a rising standard of living in member countries, while maintaining financial stability, and thus to contribute to the development of the world economy; (...)”

In 1960 “sustainable” did not yet include the environment as occurred later. Emile van Lennep was secretary-general at the OECD in 1969-1984 and created the environmental department there. OECD (2004) aspires at integration.

The IUCN, UNEP and WWF (1980) “*World Conservation Strategy: living resource conservation for sustainable development*” argues “that for development to be sustainable, it should support conservation rather than hinder it”.

In 1987 the United Nations published the report by the World Commission on Environment and Development (WCED), “*Our Common Future*”, also known as the Brundtland Report. This report established sustainable development as the joint approach for both environment and development:

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

By now many countries have subscribed to sustainable development as defined in this way.⁵⁰ While “sustainability” in 1987 got a more environmental flavour, later

⁵⁰ In The Netherlands, social-economic policy making is co-ordinated, and since the 1950s there is official recognition of main policy goals, e.g. low unemployment, low inflation, balance on the external account, responsible government finances. In 1969 the environment was included as an official goal: “the goal to improve the quality of life in the sense of preventing or reducing soil, water and air pollution, noise pollution, promotion of recreational opportunities, etc.” In 1992 a more general formulation was adopted as a policy goal: “Promoting balanced economic growth

other goals gained dominance again. Hueting's analysis has always been focused on the environment, whence we speak specifically about *environmental sustainability*. When society wants to honour the statement by its government that environmental sustainability is one of the main policy goals, then the distance between NI and eSNI shows that more must be done.

A key issue – and hopefully policy makers grow aware of this – is that “income growth” actually means “production growth”. Growth of production should not be confused with proper economic growth that concerns economic welfare. Mere income or production growth itself tends to come at the cost of the environment. The idea to “use production growth to pay for the environment” is a misunderstanding that is quite counterproductive. This misunderstanding can be found already in the very Brundtland Report, see Hueting (1990c), “*The Brundtland report: A matter of conflicting goals*”.

While this book refers to the Brundtland Report and other official government goals, to indicate the *legitimacy* for discussion with policy makers and the general public, the definition of eSNI is independent of such official statements, and derives from economic theory itself, and finds its foundation in *science* itself.

7.15 *International competitive positions*

Nations that care for the environment can suffer in their competitive position, and other nations may be free-riders. To manage this situation, it will be useful to distinguish between national statistical offices who provide for information and policy makers who use that information.

- For policy co-ordination at the level of world governance, it is advisable that all national statistical offices adopt the statistical framework of publishing both NI and eSNI, so that all nations are informed about each others' positions and about the development of those positions over time. (See Chapter 0.)
- When more countries adopt eSNI in the framework of international policy co-ordination, more countries will be induced to start caring for the environment, and countries may have less fear about their competitive positions.

Governments commonly require that advice must be scientific. Scientific advisers recognise that NI by itself provides little information, and already supplement this, in satellite accounts, with data about CO₂ emissions and other indicators about the environment. This method of advice suffers from the incommensurability of those indicators. El Serafy (2014) – reproduced here in Appendix 53 – observes that these satellite accounts put the environment outside of economics. eSNI is designed to be used alongside of NI. Since eSNI comes from the same theory in welfare economics and practice in statistical measurement as NI, economic advisers could easily understand eSNI, and include it in their advice. The advantage of eSNI is that it provides a figure about the past position and is less sensitive to rosy assumptions in forecasts for the future. The use of NI and eSNI and their distance is scientifically correct. Scientific advisers would be able to explain to their governments how such a system of co-ordination

within the pursuit of sustainable development.” Kolnaar (2000) A new situation arose because of the Maastricht Treaty and the introduction of the euro, and now the UNFCCC Paris Agreement.

would work and how valuable it would be for effective policy making that also considers the competitive positions of nations.

7.16 Social dynamics

The World Bank has its *Adjusted Net Savings* (ANS) indicator, formerly known as *Genuine Savings* (GS), see Lange et al. (2018). This is a major advance over 1960 when this did not exist. An advance might also cause a delay in another respect. The World Bank might not have the resources for the methodology of eSNI, with the need of an economic model for each country and internationally co-ordinated environmental standards with local variation. When the World Bank puts emphasis on its ANS / GS indicator then national statistical offices might feel that they are less in need of change, and the World Bank itself might also come to think that its indicator is the best there is, and no longer look into alternatives or criticism. This book will look at various of such causes and occurrences of social dynamics, with eSNI as the backbone of the story.

7.17 eSNI, sustainable development and the OECD green growth

OECD (2011a:1) states:

“In June 2009, Ministers from 34 countries signed a Green Growth Declaration, declaring that they will: “Strengthen their efforts to pursue green growth strategies as part of their responses to the crisis and beyond, acknowledging that green and growth can go hand-in-hand.” They endorsed a mandate for the OECD to develop a Green Growth Strategy, bringing together economic, environmental, social, technological, and development aspects into a comprehensive framework. The Strategy responds to that mandate. It forms part of the OECD contributions to the Rio+20 Conference in June 2012.”

This seems like a continuation of the Brundtland notion of “sustainable development”, but p4 expresses the same kind of reasoning that Hueting (1988) (1990c) gives why the Brundtland approach was deficient w.r.t. the environment:

“Green growth has not been conceived as a replacement for sustainable development, but rather should be considered a subset of it. It is narrower in scope, entailing an operational policy agenda that can help achieve concrete, measurable progress at the interface of the economy and the environment. It provides a strong focus on fostering the necessary conditions for innovation, investment and competition that can give rise to new sources of economic growth, *consistent with resilient ecosystems*.”
(my italics)

When the emphasis lies on “*consistent with resilient ecosystems*” then this reminds of Hueting’s emphasis on the vital environmental functions that generate eSNI. Indeed, while the OECD here neglects the work by Tinbergen and Hueting, the problem of ecological survival doesn’t go away, and then the OECD needs new phraseology to deal with the issue or at least seem to deal with it. The OECD study refers to the Rockström et al. 2009 notion of nine “planetary boundaries” that are fundamental in maintaining a “safe operating space for humanity”, which

reminds of the 1972 Club of Rome limits to growth and the Hueting (1969a) environmental functions, see also Rockström (2018). Indeed, if the problem is that you are hitting some boundary then it is a no-brainer to speak about those boundaries. The advance in the literature is that the boundaries are identified in ever greater detail. The chaos in the literature is that researchers do not read or refer properly, and all such other evidence of human fallability, see Chapter 21.

To some extent, the OECD approach to green growth might allow countries to drop the component of international development assistance. One suppose that this is not the OECD objective.

Adopting the OECD approach, CBS Statistics Netherlands (2015), “Green growth in the Netherlands”, shows remarkable institutional amnesia. The list of references only contains few items before 2011, like to the Brundtland report. For these authors the scientific research on this topic apparently had made a reboot in 2011, see p15:

“The concept of ‘greening the economy’ is still relatively new. Two major recent initiatives focus on the economic and ecological aspects of sustainability, namely the green growth strategy of the OECD and the green economy of UNEP. Although both initiatives broadly encompass the same topics, there are some conceptual differences.

According to the definition formulated by the OECD (OECD, 2011a), green growth is about *‘fostering economic growth and development while ensuring that the quality and quantity of natural assets can continue to provide the environmental services on which our well-being relies. It is also about fostering investment, competition and innovation which will underpin sustained growth and give rise to new economic opportunities’*.

UNEP defines a green economy as one that results in *‘improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities’* (UNEP, 2011). Statistics Netherlands has chosen to apply the OECD framework to measure green growth as this currently provides the most elaborate measurement framework. [ftnt]”

Who knows about the work by Tinbergen & Hueting recognises the paraphrasing of their findings, and wonders why such paraphrasing is needed: natural resources and environmental functions (stocks) → natural assets, use of environmental functions (flows) → environmental services, economic welfare → well-being, sustainable → sustained growth. The implication of the OECD approach, also adopted by CBS Statistics Netherlands, is that they suggest that they do not need to calculate an actual figure for eSNI, and thus do not need to provide critical information, while the *raison d’être* of these institutes is to provide for information.

8. *The choice on environmental sustainability: information, or the meta-SWF approach to a shift of preferences*

8.1 *Abstract*

If an economic system has a regime switch then we could assume that the preferences have remained basically the same but that only the state of information has changed. An alternative view is that there has been a shift of preferences, as for example individual persons can change their mind too. Economic theory needs the concept of a 'meta social welfare function' (meta-SWF) in order to explain switches in preference regimes. The switch in environmental policy from laissez faire to environmental sustainability is an interesting example for this argument. The present discussion looks at regime switches, but one might also look at intermediate cases, like moving from one unsustainable policy to another one but closer to environmental sustainability. A study on actual (regime) switches should not be confused with Hueting's approach on conditionality in measuring national income.

8.2 *Introduction*

Colignatus (1992, 2000a, 2005, 2011) presents the extended social welfare function $SWF(x; I)$, where x is the allocation over agents, and where the state of information I is included in the SWF, to express in a shorthand fashion that society's choice can depend upon the state of information. The basic notion is that the SWF remains the same over the regimes, but a condition can change. Information is basically just an example for such a condition, since also another variable can cause the switch. In a sense we could allow for time as the 'explanatory' variable. Basically, of course, we can have a dynamic situation that gives the evolution of the SWF over time, with perhaps a dramatic change at the switch point. But simply designing a path of $SWF(t)$ will not do, since economics has to model the process of choice that is involved in the making of the change. An alternative approach is to assume different social welfare functions per regime, for example $SWF(x)$ and $SWF^*(x)$ if there are two regimes. But with different SWF's we would need a meta-SWF to explain the shift.

The issue actually holds for any regime switch. A useful example is the issue of the choice in environmental policy between laissez faire and sustainability.

PM 1. The structure used here would also hold for a choice between the current situation and a point closer to sustainability: this also involves a meta-SWF. We now only consider the more extreme outcome of a regime switch.

PM 2. Hueting & De Boer (2019b) use conditionality in measuring national income. In that approach also two outcomes are compared: standard national income (NI) and environmentally sustainable national income (eSNI). The present approach on making an actual choice should not be confused with this conditionality in measuring national income (though there is a basic similarity).

8.3 *The environmental issue*

The environment can be seen as generating various functions that enable life and economic activity. In the past these functions were free, and thus had no price attached to them. Nowadays, however, these functions become scarce, and thus get to be priced. The (unmanaged) market price – or ‘laissez faire’ price – of an environmental function can be derived as the cost that an economic agent has to make if he or she wants to enjoy the function. Alternatively, the government may impose controls to influence that price (and we get a market with controls). Choosing a correct price is important also for statistical purposes, since a figure like ‘national income’ is calculated while using prices.

A government can have various objectives when choosing its controls. One important objective might be ‘environmental sustainability’, i.e. that the environmental functions are used such that the vital functions remain available and nature can run its course, and such that later generations are not overly hindered by current uses. Hueting presents the choice for environmental sustainability as one of the options for socially optimality. The choice for environmental sustainability would generally mean that people would use less resources, and ‘national income’ as currently measured might well be lower. By economic intuition we expect that a move to a better situation is reflected in the upward movement of at least some indicator. If ‘national income’ goes down, then at least social welfare has to go up. This paper hopes to clarify this issue. Hueting’s method of conditionality in measuring national income should not be confused with actual choices, but there is a basic similarity in the structure of the mechanism.

We will show in particular:

- (a) Once environmental sustainability has been chosen as a goal, then the social optimum is reached at the point of sustainability.
- (b) The move from laissez faire to the objective of environmental sustainability may be a change of preferences.
- (c) The latter move may however also mean a *lower* social welfare.
- (d) To understand the switch of preferences, economic theory needs the concept of a ‘meta-social welfare function’, which guides the overall selection of preferences. The switch can only be regarded as an improvement if it is determined as such in the meta-SWF.

A meta-SWF is, in itself, not too difficult to understand. In the same way a person can change his or her mind. Also, an older generation may prefer laissez faire, while a younger generation may choose sustainability, and hence eventually there would be a switch of preferences.

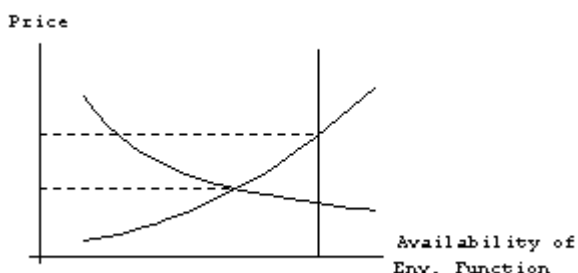
It follows, nevertheless, that the discussion on environmental sustainability may be a bit more complex than originally thought (with the use of only one SWF).

8.4 *Basic concepts*

Figure 7 is the Hueting graph of the relation between an environmental function and its price. The upward sloping curve gives the producer costs (‘supply’), found by looking at the costs of making the function available – such as water clean-up. The downward sloping curve gives the laissez faire user costs (‘demand’), on what

the economy pays on compensation and accepts as damages, based upon such laissez faire prices. It could be constructed from the efforts by the agents to compensate for the loss of function by choosing other activities or using other resources. These costs should be added to give total unit costs. The suggestion is that the observed choice is at the minimum of this summed costs. Basically, though, a social welfare function would select the observed point, by balancing the environmental costs with other objectives (not shown). (We may also have the tautological situation that other considerations are included in current market prices, so that it suffices to take the minimum of costs.) Anyway, statistically, we could observe the implied price (unit cost) at 'observed preferences'. Alternatively, society imposes a norm of higher availability, and then the intersection of the vertical norm and the cost curves gives the normed price.

Figure 7. Environmental function and its price



Incidentally, society's norm comes about from a condition or assumption on individual preferences. It has been conjectured by some that Hueting would 'impose' the norm of environmental sustainability. This however appears to be a misunderstanding. The difference between the laissez faire situation and an economy that requires environmental sustainability may come about for more than one reason. For Hueting there is the conditionality in measurement. For us, now, we want to see how an actual regime switch might be modeled.

8.5 Model

It will be useful to model the problem. Let us consider two non-overlapping generations who 'share' 100 units of oil and 100 units of water. The first generation will make the decisive decision how much to use itself, and it will bequeath the remainder to its descendants. The percentage of resources taken by a generation will be the same for all resources ($p\%$ of oil and $p\%$ of water).

To decide, the first generation uses a social welfare function (SWF), which function not only contains its own direct income y_{Now} but also the indirect welfare that it derives from the situation for the descendants. This indirect welfare is based on the direct income y_{Future} that the descendants are hypothesised to achieve. (The difference in valuation might be modeled by a rate of discount, but it is doubtful whether this would reflect how agents arrive at their decision.)

The SWF will here be a Constant Elasticity of Substitution (CES) function that neglects the distribution of income. Next to an 'egotistic' base situation SWF, we regard the alternative SWF* in which society switches its preferences so that it becomes more understanding of the needs of future generations. The SWF* includes a bonus welfare injection that derives from making the switch:

$$SWF = \left(0.7 y_{Now}^{-\rho} + 0.3 y_{Future}^{-\rho} \right)^{-1/\rho}$$

$$SWF^* = \left(0.5 y_{Now}^{-\rho} + 0.5 y_{Future}^{-\rho} \right)^{-1/\rho} + bonus$$

The income of the generations is determined by production functions that depend upon the allocations of the factors of oil and water. With a constant technology, and $i = Now, Future$:

$$y_i = \left(0.4 oil_i^{-r} + 0.6 water_i^{-r} \right)^{-1/r}$$

8.6 Graphs

We solve the model by the program originally developed by Noguchi (1993) and further developed by Cool (1999). In the plots, the base 'egotistic' situation has *continuous lines*, and the alternative 'sustainable' situation has *dashed lines*. We use $\rho = 2/3$ ($\sigma = 3/5$) and $r = -2/3$ ($\sigma = 3$). We assume that the switch *bonus* = 0.

Figure 8 plots the production possibility frontiers and the SWF indifference maps of the two situations. Clearly the alternative SWF allows more consumption for the future generation.

Figure 8. Production Possibility Frontiers & Indifference Maps

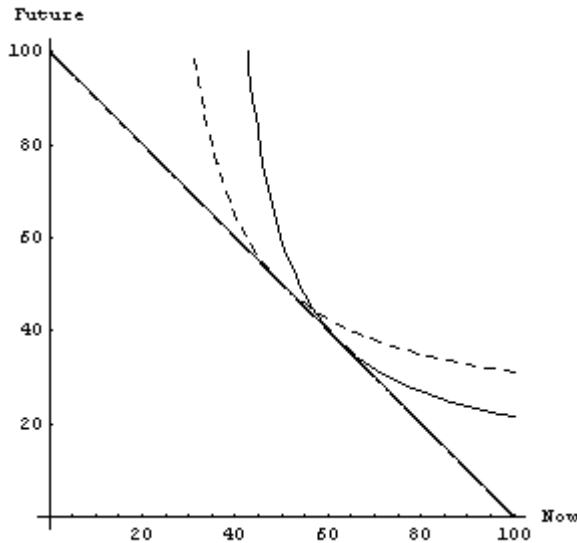
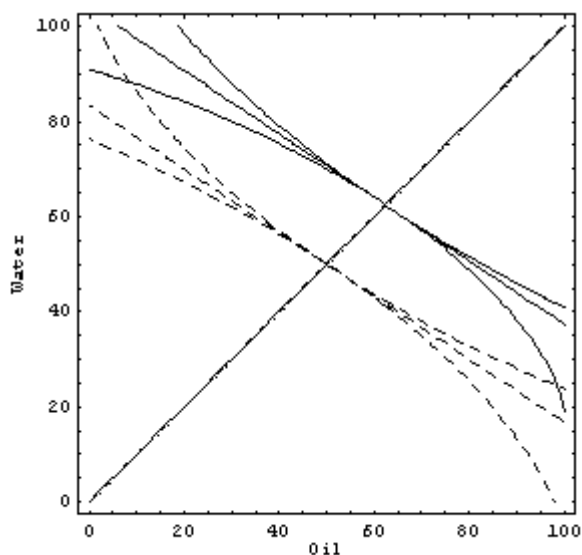


Figure 9 plots the Edgeworth-Bowley diagram, with Now in the lower left and the Future in the upper right. Since the production functions are the same, the contract curve is a straight line.

Figure 9. Edgeworth-Bowley Diagram



8.7 Tables

The tables give the numerical outcomes of the two regimes. The social optima are found as in **Table 4**. The associated allocations are in **Table 5** – left and right side. Given our simple assumptions, we also get a simple result. When you compare the two regimes, please note that the prices are normalised *per regime* to a unit price for Now, and thus are not comparable over regimes.

Table 4. Utility, production and national income for two regimes

	<i>Utility level</i>	<i>National income</i>	<i>Product prices</i> <i>Now & Future</i>		<i>Production</i> <i>Now & Future</i>	
<i>Base</i>	52.6	100	1	1	62.5	37.5
<i>Alternative</i>	50	100	1	1	50	50

Note: All prices are scaled so that the product price of the Now-sector = 1. This is also done per regime, so that the price levels over the regimes are not comparable.

Table 5. Allocations

	<i>Base</i>		<i>Alternative</i>	
	<i>Oil</i>	<i>Water</i>	<i>Oil</i>	<i>Water</i>
Now	62.5	62.5	50	50
Future	37.5	37.5	50	50
<i>Total</i>	100	100	100	100
Price	0.4	0.6	0.4	0.6
National Income Share	0.4	0.6	0.4	0.6

8.8 Closer understanding

We arrive at a closer understanding by regarding two other graphs. Let us choose water allocation at the optimal level, and vary the allocation of oil. **Figure 10** shows the SWF and SWF* graphs as functions of the allocation of oil to the Now generation. **Figure 11** plots the output levels of the Now and Future generation. Output of the Now generation goes up when it uses more and more oil. At the same time the resource for the Future generation goes down, and hence income goes down. As the income of the Future generation reduces then this eventually affects the social welfare of the Now generation as well.

Figure 10. Maximising SWF

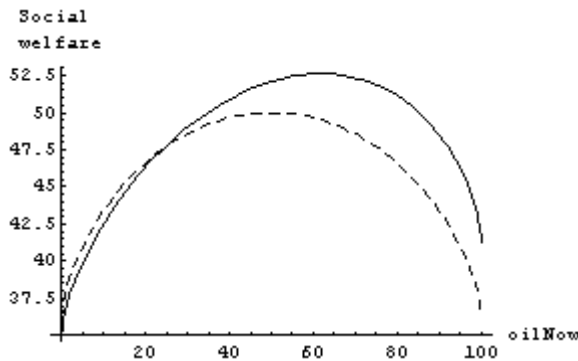
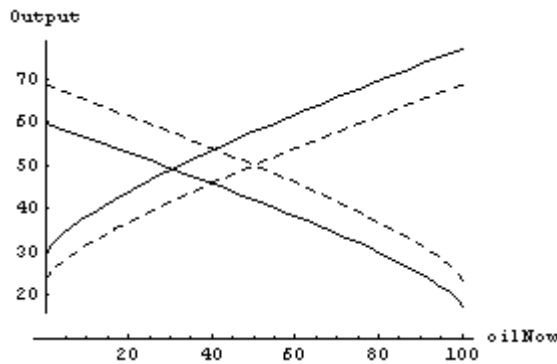


Figure 11. Output



We now can understand the Hueting graph a bit better. The switch from the laissez faire situation to the normed 'sustainability' situation can be a switch from one SWF to an alternative SWF*. The horizontal axes in **Figure 10** and **Figure 11** give depletion, which is the opposite of availability. Due to the higher preference for presumed future consumption, current output becomes less and future output goes up, and hence the availability of the resource goes up as well.

In this example, we see that the absolute value of social welfare is *less* in the new situation. Lesser consumption Now is compensated by a benefit to the future generations, but not fully. With ordinal welfare, this does not mean much of course. If we assign meaning to the numerical values, however, then a non-zero switch bonus is required. In this case the bonus should be at least 2.6 welfare function points (or output to that effect). In a general approach, we would need a meta-SWF to choose between the SWF and SWF* – i.e. to deal with that constant. Such a meta-SWF would automatically assign a value to the different welfare scales.

Alternatively, if we use the $SWF(x; I)$ approach, then the regime switch could be the result of a change of the state of information from $I = 0$ to $I = 1$, and we would get $SWF(x, 0) = SWF(x)$ and $SWF(x; 1) = SWF^*(x)$. By implication the two welfare scales are considered to be comparable, and the *bonus* would be the implied value of the information.

This discussion thus corroborates Hueting's position, but adds a useful clarification. This analysis also shows that there is scope for research on how people's choices are affected.

We may consider: *If* society decides for environmental sustainability, then apparently this is a (meta-SWF) improvement. A problem with this position could be Hume's gap between *Is* and *Ought*. From observing a certain situation, we cannot conclude that it apparently is optimal. However, Hueting's position would be valid if the emphasis is on 'decides'. If society *decides*, i.e. aggregates its preferences, to environmental sustainability, then this by definition gives the new social preference. But for the same reason, it is not obvious that society would make this choice. It might as well think that environmental sustainability has no *bonus*. Note for example that the SWF* optimum certainly is lower in terms of the original SWF, so some people who think in terms of the original function will have a hard time to see the improvement.

8.9 Conclusion

We clarified that regime switches can be represented by the information approach or by the meta-SWF approach to preference switches. And we showed that these are equivalent to some extent.

Using this, we clarified the discussion on the policy choice on environmental sustainability.

This analysis also shows that there is scope for research on how people's choices are affected.

PM. Hueting & De Boer (2019b) use conditionality in measuring national income. In that approach also two outcomes are compared: standard national income (NI) and environmentally sustainable national income (eSNI). The present approach on making an actual choice should not be confused with this conditionality in measuring national income for information only (though there is a basic similarity).

8.10 Appendix: Program

The (relatively short) Economics Pack program to produce above results can be found in Colignatus (2000b) on the internet.

9. *Flooding of the Netherlands*

9.1 *Survival of a country too*

This book will pay particular attention to the discussion in the Netherlands, a country that eventually will be flooded because of global warming. All countries will tend to suffer from global warming but the Dutch case is more of an existential nature. Apparently an early warning was by geologist Wallace Broecker in 1975, who also coined the phrase: “*Climatic Change: Are We on the Brink of a Pronounced Global Warming?*”⁵¹ Dutch weatherman and climate researcher Peter Kuipers Munneke has the following rough “before date” when Holland will be flooded:⁵²

“The question is not if the Netherlands will disappear below sea level, but when. (...) So, even with the strongest greenhouse gas reduction and if the most conservative climate scenario came to fruition, the Oosterscheldekering dam will not make it to its 200th anniversary. (...) The year 2100, 2400 or 4000 AD could be a possible best before date for the Netherlands.”

9.2 *Social welfare function and indicators of welfare*

9.2.1 *Past and future, and the use of a model*

The 1990-2019 Dutch discussion about social welfare and its indicators tends to overlook the crucial difference between past and future. Planning may use scenario's but tends to require a single main forecast (“the central path”) and then it makes sense to construct a “social welfare function” (SWF) that includes processes of social and political power. In practical planning at CPB this SWF is rather hidden in parts of the models like the consumption function and reaction equations on global trade and such. In welfare theory we derive demand functions from the SWF but can also integrate demand function back into the SWF. It would make sense to make the SWF structure more explicit for some purposes, e.g. for political parties for elections. In contrast, for the past, it does not make sense to try to estimate something like a “true SWF”. Utility is psychic and unobservable. One can ask scores but this leads to scientific discussions about the meaning and relevance of such exercises. Every person is entitled to have his or her own views about what would be social welfare. At best one can relate indicators of inputs and outputs of different policy measures, per area of policy making, and evaluate whether announced policies have success or not, with possibly unintended effects. Measurement of the national accounts and levels of production or income are part of this scheme to get indicators for inputs and outputs. Income is only a factor in social welfare. It is part and parcel of the Tinbergen & Hueting approach that social welfare cannot be measured for the past. Tinbergen still remained

⁵¹ <https://www.nytimes.com/2019/02/19/obituaries/wallace-broecker-dead.html>

⁵² <https://www.uu.nl/en/news/the-question-is-not-if-the-netherlands-will-disappear-below-sea-level-but-when>

interested for measures for policy making for the future (likely with cardinal utility). Yet, when eSNI for the past still relies upon a model, then the model would tend to contain a SWF. The crux here lies in modeling.

9.2.2 CPB and the future

In Holland, the creation of CPB in 1945 as a new independent outgrowth of CBS likely also caused a (temporary) shift in econometric expertise. CPB was involved in modeling and continued developing this expertise while the major body of CBS likely continued relying on methods of descriptive statistics, see Chapter 18, though Tinbergen at CPB actually found himself in competition with his former CBS department that wanted to continue on econometric modeling. With Tinbergen's view on planning, it was also seen as a task of CPB to investigate the notion of a social welfare function. Don (2019:9):

“Looking back in 1987–1988, Tinbergen remembered that, for a long time, he had preferred a CPB which would not only explore possibilities but also express preferences, scientifically derived from the maximization of the prosperity of the population.”

Van Eijk & Sandee (1959) used an explicit welfare function for the quantitative determination of an optimal economic policy. CPB discontinued looking into this approach, for reasons that may require more historical attention than given by Passenier (1994) and Don (2019) and their references. One confusing influence was by Kenneth Arrow's “impossibility theorem”, see the deconstruction by Colignatus (2001, 2014).⁵³ Tinbergen was aware that Arrow's impossibility required ordinal utility while Tinbergen tended to favour cardinal utility.

In 1986, Van Eijk was member of the Dutch Scientific Council for Government Policy (WRR) and participated in WRR (1987), “*Room for growth*” (and this growth was explicitly “sustainable growth”), that used a dynamic input-output model with 18 sectors and multi-criteria linear programming on bandwidths instead of behavioural equations. Restrictions due to the environment were a key component. This imposition of environmental restrictions is comparable to Hueting's vertical demand curve, though (i) without its welfare theoretic foundation, (ii) without emphasis on environmental sustainability (with world implications) and (iii) without the link to national income accounting.

Still, CPB remained wary of policy optimisation methods. Colignatus (1990) revived the suggestion but did not meet with interest. Colignatus (2000a, 2011) (DRGTPE) discusses the problem that arises when scientists would estimate a social welfare function (SWF) and use this to forecast what policy makers might tend to do, with possibly self-fulfilling or self-denying consequences. The logical implication of scientific independence is the requirement of a constitutional Economic Supreme Court, that can function within the framework of checks and balances, as equal with the other constitutional powers of a modern democracy.

9.2.3 CBS and the past

As CPB thus took some distance from empirical research into the notion of social welfare, it was a twist of history that discussion in Dutch society caused that

⁵³ <https://zenodo.org/record/1269392>

CBS Statistics Netherlands came to the fore on this subject. The discussion about “sustainability” caused the idea of a “monitor”, see Section 21.11.1. The notion of sustainability, originally focused on the environment, got polluted with all kinds of other aspects than the environment, see the current Sustainable Development Goals (SDGs). This generated the idea, at least at CBS, that the “monitor” should contain a plethora of indicators. Apparently the researchers at CBS had no proper education in welfare theory, see Sections 21.11.1 and 21.11.4 and Chapters 40, 27 and 28, and they made three major conceptual errors and inconsistencies:

- (i) The presentation of the indicators was divorced from the evaluation of policies. Normally an indicator derives its meaning and relevance within the context of a discussion about policy intentions, costs and effects, but now indicators from various sources are put onto the same page, in a “wheel of welfare”. (Supposedly readers construct their own social welfare function ?) CBS now tries to convince the world, with also its international organisations, that the main interest lies in *data* from the past, while the true interest lies in *confronting policy and data*. CBS thus blocks itself from noticing that it has embarked upon a project that it rather meaningless to start with.
- (ii) CBS appears blind to the practical relevance of the use of a SWF for planning a central path and modeling for eSNI. It is correct, and CBS confirms this, that there is no sense in trying to find a true SWF in the data of the past, but the use of a SWF still has relevance, like Tinbergen opted for a planning approach with estimates for the future, or like eSNI uses a model that may contain a SWF.
- (iii) eSNI was ejected from the Dutch “monitor on sustainable development” (MDN), see Section 21.11.1 and Chapter 40. The argument was (a) that it would be a welfare indicator, which it is not, or (b) that it is a “compounded indicator”, while CBS did not remove NI too. Thus CBS had a great theoretical foundation with Tinbergen and Hueting, but younger researchers opted not to study their work, and they started afresh creating their own hobby horse of this “monitor”.

9.2.4 Dutch “broad welfare”

Some agents in this process felt uncomfortable with the terminology of (environmental) sustainability and opted for the terminology of welfare theory. This eventually caused the creation of a temporary commission in the Dutch House of Representatives, with their report Grashoff et al. (2016), that assigned CBS with the task of creating a “monitor of broad welfare” (MBW) (a pleonasm), see Section 21.11.9. CBS researcher Rutger Hoekstra (see Chapter 27), assigned from CBS to advise this parliamentary commission, misinformed the commission, for he will not have said anything different than what we can diagnose as misinformation in his other work. The current idea is that CBS presents this MBW monitor each year on the third Wednesday of May, potentially with some consequences for the new annual budget presented in September. Potentially this monitor is backward looking, while there still remain issues on the relevance for policy making for the future and on the empirical quality.

9.2.5 *Synopsis*

The following synopsis of these developments definitively is too simple but helps to create perspective: (i) Hueting (1967, 1968) criticised that policy makers erroneously interpreted standard NI and “economic growth” in terms of welfare. He managed to get attention for the *World Conservation Strategy*, which got translated as an approach for sustainability. Following in the steps of Tinbergen and the creators of the national accounts Hueting maintained a leading role of CBS at the international fora. (ii) Jeroen van den Bergh (Chapter 35) (PhD VU) did not understand welfare theory and national accounting but adopted the terminology of welfare theory, mainly because he observed that this increased his popularity even though he had no results to show in this field and only coined ever newer terms to suggest that he had something new. (iii) Rutger Hoekstra (Chapter 27) did his PhD VU with Van den Bergh and landed at CBS. Though he never properly studied Hueting (1974, 1980) and Tinbergen & Hueting (1991) and eSNI, he received the cloak of the leading role of CBS at the international fora, and he used Van den Bergh’s distortions and the terminology of welfare theory and its indicators to remove Hueting’s eSNI from the MDN monitor, even though both the monitor and eSNI concern sustainability. Hoekstra stated that eSNI could be removed because it failed as a welfare indicator – while it wasn’t intended so, and while welfare theory, that was used to develop eSNI, indicates that it would be curious to try to construct such an indicator for the past.

9.2.6 *The future of planning*

For the time being, CBS Statistics Netherlands (letter to Hueting June 18 2019) wants to embed eSNI within the context of this MBW, under the condition that someone else takes the responsibility of calculating it.

In all likelihood Tinbergen would have advised a key role of CPB for policy aspects for the future. Potentially at some time in the future, the cycle of attention might shift towards policy making again, with modeling of relations between policy and indicators, and the use of a SWF as an efficient format.

9.3 *Happiness and scarcity*

The phenomenon of a new focus of research on “broad welfare” (a pleonasm) also generated the epi-phenomenon of research into a notion of happiness. This is no new issue, see the “pursuit of happiness” in the US Constitution. However it is remarkable that the discussion about environmental sustainability apparently was seriously side-tracked by a sudden attention for happiness. One of the most happy countries in the world suddenly thought that the dikes were high enough and that more information about happiness had priority over ecological survival.

Before discussing happiness, let me first point to the modeling of satiation – for example by Takayama (1974), for example with a utility top within the budget area (and not at a boundary), using the notions of utility and budget from economic theory. When one must choose one apple from a basket of apples there is still the decision problem which apple to take, which process requires time and mental effort. This modeling of choice still is economic modeling (using concepts of economic theory) even though there is no scarcity of apples because there is an abundance of apples. Thus scarcity is a sufficient condition to say that something

is “economics” but not a necessary condition. Though it helps when we can find a hidden scarcity like time and mental effort. The key point remains choice under restrictions (whether those are slack or not).

My suggestion is that happiness is not different from the original notions of utility and welfare. Happiness might have special properties, like satiation has special properties, but this need not be a reason to claim that happiness is more important than ecological survival, though when Holland floods, it better floods happily than unhappily.

Huetting tends to hold that scarcity is also a necessary condition to call something “economics”. If happiness is not subject to scarcity (love and friendship are like manna from heaven) then according to him it would be non-economic. My reply: when you want to help people to focus on ecological survival, it is not a strong argument to classify happiness as non-economic. People who focus on happiness will still focus on happiness even when you give an argument that it would be non-economic.

I would rather emphasize the issue of choice. Rather than go along with the seeming lack of scarcity, I would look for the hidden scarcity, in the mental energy and focus in decision making. In the economic literature, happiness seems to be a valid notion. Apparently various researchers find use in this angle of research. In my perception all this still falls under the economic notion of utility or welfare. Within the umbrella of economics, the choice between happiness and ecological survival would find a proper place.

Nevertheless, the attention for happiness distracts from environmental sustainability. It seems as if these researchers on “broad welfare” took every opportunity not to discuss environmental destruction and eSNI and embraced all other topics of welfare that distracted from this, see Section 21.11.1.

9.4 The Dutch Polder Model

Jared Diamond (2005), in *“Collapse: How Societies Choose to Fail or Succeed”*, contemplates world environmental sustainability, and considers how societies in the past have faced similar choices. One of his main suggestions is that the Dutch “polder model”⁵⁴ might help the world to avoid a new collapse. Interestingly, this present book discusses events in Holland, and finds that this “polder model” has only limited success in dealing with scientific information. A property of the “polder model” seems to be that it often comes into action only after some disaster. Notably, Dutch climatologists Katsman et al. (2007) refer to the common estimate of a rise of the sea level by about 1 meter by 2100, and suggest “given the uncertainties” not to worry about rises above 1.5 meter (including gravity by the Greenland ice mass on the Dutch sea level). Yet, it are those uncertainties, e.g. a surprise meltdown of Antarctica, that turn the matter into *decision making under risk* and that would warrant precautionary measures. It is amazing that precisely the Dutch are so mild to risks on the sea level. It is this blindness towards risk, and measures expressing that risk, that play such a key role in the issue of eSNI.

⁵⁴ https://en.wikipedia.org/wiki/Polder_model

9.5 Anatomy of Dutch society and its academia

Like Anthony Sampson had his “*Anatomy of Britain*” the discussion of this book at times makes me wonder whether an “anatomy of Holland” would be helpful,⁵⁵ and in particular about its academia. This book will quote scholars on content, thus not on character and affiliation. Yet, with the evidence collected in this book, and after this collecting, some patterns emerge that point to character and affiliation rather than content. For econometricians, the Tinbergen & Hueting approach is a no-brainer, and it is troubling that Dutch academia after Hueting et al. (1992d) did not accept it, and that Dutch society did not implement it into the annual policy making cycle. As said, Adams (1995) indicates (ideal-typical) groups in society: *fatalists, individualists, hierarchists, egalitarians*. It would be a major research effort to develop sound definitions and check empirically whether such attitudes are at play also in this discussion about the reception of the Tinbergen & Hueting approach. This present book has no scope for such research effort. Nevertheless it can be mentioned that Dutch universities each have their own history and character.

The following is only indicative and paints with broad strokes, and it was written as a result of composing this book, and not at its preconception. We may use the term “religion” for the Dutch versions of it. Other countries have their own conceptions of religion. For observers outside of Holland the emphasis may remain on Holland and not on religion per se.

The universities of Leiden and Groningen have a religious background in deep history, in 1575 resp. 1614, and seem to have evolved towards science, though Leiden still focuses on (by god given to the state) law and has no proper department of (empirical) economics. Free University (VU Amsterdam), Tilburg, and Radboud (Nijmegen) have “more recent”, say 1900, religious origins. The VU originates from emancipation by the protestant “little people”⁵⁶ against the protestant elite. Tilburg and Radboud originate from emancipation by catholics against the protestant ruling class, first the elite and then also those “little people”. Due to national financing of universities, the religious links of these “new” universities are not as strong nowadays as they were in the past but the heritage can still be observed, and apparently there is scheming behind the scenes to make sure that board members still have the original denominations. These “new” (religious) universities come with a notion of stewardship of (god given) nature. The large departments on environmental economics in Holland can be found precisely at these “new” universities. Researchers from those universities may still have an attitude that they and only they know better how to save nature (from human malpractice, and since it is human it can only be sin). Arguments in scientific papers may not be about science but serve a missionary task, if only to show that the authors know better how to deal with nature, because of some higher purpose that only they know about. When criticised, the academic descendants of the “little people” may react as if criticism puts them into existential crisis. (When something is little then showing deficiency leaves even less.) They

⁵⁵ An author like Noud Köper seems to do a lot already.

⁵⁶ Wikipedia is a portal and no source:
https://en.wikipedia.org/wiki/Abraham_Kuyper#Political_views

may respond not on content but with irrationality, burking or *ad hominem*s. An innocent researcher will be at a loss about what is happening. Perhaps this phenomenon is at play in how researchers at VU IVM handled the Alleingang scenario and its criticism, see Section 21.9.12. For this and other issues see in particular Chapters 27, 28, 35, 38, 39, 41, 42. However, this issue is not isolated at only those universities. Researchers graduating at these “new” universities may find teaching and research positions at the other “general” universities, while graduates of the general universities may be less inclined to seek employment at the “new” universities because of their religious flavour and culture. It is like Mormons graduating at Brigham Young University (BYU) who might find employment elsewhere but few general graduates seeking employment at BYU. There seems to be a basic imbalance here, also when university positions are allocated based upon citations.

Chapters 27, 28, 35, 38, 39 give evidence of a peculiar way of referring by the considered researchers who graduated at or with Ph.D. from VU Amsterdam. References seem to be targetted at reputation rather than at content. Fellow researchers at VU may be referred to on minor issues while major findings by others may hardly be referred to (unless they can be used to suggest that their work is better than Hueting’s). Non-VU authors can be paraphrased so that a reference is no longer needed. A paraphrase also allows the option to misrepresent a view, so that a critical point of view can be cut down like the proverbial straw man. They hardly ever refer to the Tinbergen & Hueting (1991) paper. They tend to refer to works by Hueting that are often difficult to find in the library and often of an old date. For eSNI they may refer to Hueting (1974a, 1980) that doesn’t discuss eSNI. It is a structural phenomenon, and the following three cases are only examples that highlight the absurdity of this kind of refererring. Den Butter, Hofkes and Verbruggen (1994) for example manage to discuss the issue of eSNI without referring to Hueting or relevant sources, see Section 39.9. Opschoor (1990) in Chapter 38 discusses aspects of Hueting’s views, and even uses the new term “sustainable national income”, that cannot be found in the paper that he refers to. Thus he uses papers that he doesn’t refer to. The paper that he refers to is relatively difficult to find (certainly in 1990). Perhaps most telling is the way of referring by Opschoor (compiler) et al. (2009) who discuss the removal of eSNI from the Dutch monitor on sustainability, see Section 21.11.1 and Chapter 40. Hueting is mentioned in the text but again there are no reference to the support in Tinbergen & Hueting (1991) and there is no direct reference to any paper or protest by Hueting. The situation is deeply problematic.

University Wageningen started out as an agricultural college, with a very practical orientation and closely linked to the Ministry of Agriculture, with practical links to the European Common Agricultural Policy. Over time Wageningen developed into a university with high level research in the natural sciences. Its biologists, ecologists and engineers may be oblivious of economics, or develop their own ideas about what “economics” would be. See Section 21.9.4 and Colignatus (2019b) *“National Accounts in the Anthropocene”*.

10. Completing the introduction

10.1 Reading the original works

One is advised to read the original publications. Tinbergen & Hueting (1991) – discussed in Appendix 50 – reads like written yesterday. Some other works can be advised, like notably Hueting (1974a, 1980) now online, and Hueting and De Boer (2001b), and Hueting & De Boer (2019b).⁵⁷ The issues are rather subtle and my way of stating issues differs from the original authors.

As said, the purpose of the present book is to look at Tinbergen & Hueting's work from a metalevel, from didactics, history and with comparisons.

10.2 Contents of this book

This introductory Part has a short paper about the work by Hueting which paper originally was published as Colignatus (2001). There are the empirical findings for the Netherlands 1990-2015, that form a proof of concept. There is a paper on the meta-SWF (social welfare function) for the choice between standard national income (NI) and environmentally sustainable national income (eSNI). The reader should be aware that this presentation is not given by Hueting. However, I think that it provides a useful introduction into the issues involved in a format that economists will generally understand, including *that a choice must be made* – which is the concept of that meta-SWF. Hueting's position is that it is unclear to what choice that meta-SWF would lead since the preferences are unknown, which leads to the conditional measurement. We can agree that eSNI can always be calculated for such conditions, like the sword of Damocles, precisely since the preferences are unknown.

The next chapters provide additional notions to clarify aspects. A key discussion is about the term “economic growth”, and there is the advice that the national statistical offices start publishing their national eSNI.

In the Summer of 2001 Bjørn Lomborg published his book *The skeptical environmentalist*, as an update of an earlier Danish version. Unfortunately, he does not refer to Hueting's work. Lomborg relies on the argument “that national income has to grow before one is rich enough to care for the environment” – but this is precisely the fallacy that Hueting warns for. Lomborg, originally trained as a political scientist takes here the position of a statistician, but it is unclear whether he is as versed in national accounting like Tinbergen and Hueting. Lomborg's book has many good qualities but misses out on eSNI. So we may hope that the meeting of minds of these statisticians will produce a beneficial result. Below we will also meet the film *An inconvenient truth* by Gore et al. (2006), the UK Stern Review (2006) and Lomborg (2007) “Cool it!” in a reprise, which clarifies that this meeting of minds hasn't occurred yet.

A top-down exposition is used in the paper on the seminal contribution. The paper “*The Old Man and the eSNI*” relates of the advance and adversity in

⁵⁷ <http://www.sni-hueting.info/>

Hueting's research over the years. By linking to the actual path of creation the reader can grasp in a bottom-up manner on what is achieved on content.

The subsequent chapters compare the approach by Tinbergen & Hueting vis-à-vis Weitzman, Nordhaus and Stern, and others.

While directing their proposal to the world of economists and national accountants, Tinbergen & Hueting presuppose much as known. This book will spend attention to the work by Salah el Serafy, since he also combines national accounting and the environment, and he discusses details that cannot be found with other authors who have this combined interest.

10.3 Limitations of this study

My perspective on this topic is rather limited. Some aspects can be mentioned.

(i) I am no environmental economist and only an econometrician who has some comments on the work by other economists.

(ii) In my perspective, the subject of this book has only limited value. The much larger, surmounting and encompassing issue in economic theory is discussed by Colignatus (2005, 2011) (DRGTPE) (or earlier statements). That is, my main overall advice is that democratic nations adopt a constitutional amendment for an Economic Supreme Court (ESC). Having an ESC makes that science gets a level playing field with political management – and note that Political Economy is the science of management of the state. Having an ESC makes that we have a better decision making structure to settle complex issues. The ESCs of the various nations would communicate with each other and integrate their scientific findings, and thus provide a better base for national decision making and international co-operation. Of which ecological survival would be only one of the topics. Of course, survival is a *sine qua non*. This analysis is extended by Colignatus (2020).

(iii) DRGTPE takes unemployment as the key example of how the absence of an Economic Supreme Court causes a socially worse situation. For economic policy, unemployment is the key economic variable rather than income. Income is important of course and a rentier would not be classified as unemployed. But the point is that we cannot all be rentiers and the main policy issue is to keep all of us decently employed. This approach thus differs from the Tinbergen & Hueting focus on survival and then select income and “economic growth” as the key intermediate policy variable. Unemployment is one of the Hueting (1996) “three myths” (which analysis I agree with), but unemployment is for Hueting only a subordinate variable while he does not present a solution for unemployment.

(iv) The environment seems to me to be (only) another example of policy failure due to information mismanagement. I never have had much affinity with environmental issues though I was aware of them of course. In the mid 1990s, I had the fortunate privilege to meet Hueting. It appeared that Hueting's analysis had been much neglected in policy making and this eventually caused me first to support the Hueting Symposium and subsequently to write some papers. The latter now are collected here.

In consideration of Hueting's position, I have decided to keep the issue of DRGTPE and unemployment as much separate as possible from his issue of

national accounting and the environment. It might be confusing for more readers when such issues are lumped together, and enlightening for too few. Thus this book will be limited in this respect too. This book does not expound the argument for an ESC and neither uses the environment as an example case or argument for an ESC.

(v) An example of policy failure on the environment is that national governments were not able 30 years ago, around 1990, to agree on a carbon tax. There now is an appeal by 27 Nobel Prize laureates that advises to such a carbon tax,⁵⁸ and the arguments are basically from a first year course in economics. In this 1990-2019 period policy makers have set up a system of emission trading (e.g. EU ETS), that gives bonuses to big polluters and that has created entrenched interests with lobbying power to keep the emission trading system as it is. Discussion of this would fit the Political Economy and Public Choice approaches, and will not be pursued here.

(vi) A red line is the choice between a “social welfare function” (SWF) and “national income” (NI) as a factor or even conventional indicator for welfare. See the discussion in Section 9.2. At CPB in 1986, a draft book by me on the theory of production contained a chapter on “the horrors of real value added” with the suggestion to forget about income as the intermediate variable and concentrate on both the SWF and the production function. (This is not quite the same as the abolition of GDP since it might have use for other purposes.) A reorganization caused this draft to be shelved. A later suggestion to look into unemployment and the SWF was rejected by the directorate with a reference to Arrow’s Theorem. This clarifies my 1990 paper on that theorem, and eventually Colignatus (2001, 2014). From the present angle we can also imagine a SWF that incorporates ecological survival. It may be a bit remarkable that the crux of attention in the Netherlands on “Broad Welfare” (a pleonasm) landed at CBS while it would have been more logical that CPB would have taken the lead because of its modeling experience. Presumably, National Statistical Offices will have more problems with calculating social welfare functions, and economic welfare theory suggests that one should not even try for the past. Whatever this be, we stick to the Tinbergen & Hueting approach on eSNI.

(vii) When a society wants to discover its SWF for planning for the future, then its system of democracy is relevant. Colignatus (2018a) and Dutch (2018b) discuss democracy. Remarkably, the system of district representation, as used in the USA, UK and France, is rather proto-democratic, compared the the equal proportional representation as used in Holland, Sweden and Denmark. Perhaps some countries must first improve their democracies before they want to use eSNI. The advice to calculate $e\Delta = NI - eSNI$ is a scientific advice, but it is a different issue whether it will be listened to.

(viii) A drawback of this book is that there is an *aweful overabundance of repetition*. A baseline is that the Hueting et al. (1992d) CBS report M44 or the summary Hueting (2008) – only some 20 pages – would be sufficient for National Statistical Offices around the globe to decide to construct eSNI figures and for

⁵⁸ <https://www.econstatement.org/>

economic policy advisers to start using both NI and eSNI in their policy advice. When more ink flows then this necessarily comes at the cost of repetition. The scope for human misunderstanding and misconception is unlimited and every angle apparently requires its own elucidation. In itself that is intellectually interesting. Hence, we take this object called eSNI and investigate it from all sides, focussing on each detail, and looking at each side apart, and not worrying when it appears afterwards that all sides are basically the same, and other such repetitions. The only condition is that the research report is written well so that repetition does not become tedious or boring.

Part 2. National accounting and statistics

11. History, definition of income, core and satellite

11.1 A nutshell history of national accounting

The System of National Accounts (SNA) describes the collection of raw data and their elaboration targeted at the construction of national income (NI) and related accounts. The notion of national income came up historically without firm theoretical foundation. E.g. a strong influence was in the UK when World War II caused calculations about "*How to pay for the war?*" and after the war it was the Marshall Plan that stimulated the development. National accounting then got much theoretical support from the Keynesian approach in macro-economics. National income became a multi-purpose variable applied in a great variety of theoretical frameworks. A mundane purpose might be to establish the capacity to pay taxes or to finance investments, or to monitor budget deficits for the EU. Criticism on NI for purposes of welfare economics and green accounting should not be regarded as criticism on NI in general, since it remains a highly useful variable.

Let us restate the definition of (national) "income" in a nutshell, in which we set depreciation of capital at zero but allow for depletion of capital.⁵⁹ Expenditure is the sum of consumption and investment: $E = C + I$. Expenditure is financed by income and depletion or destructive use of capital in proportion u : $E = Y + uK$. Income consists of wages and net capital earnings: $Y = wL + rK$, with $r \geq 0$ for otherwise it would be depletion. Thus $E = C + I = wL + (r + u)K$. When there is no depletion, or $u = 0$, then expenditure also gives income: $Y = E$. When a nation depletes its capital in order to finance expenditures, or $u > 0$, then it lives above its means or income: $Y < E$. For accountants it is not acceptable for a person to claim to have an income when it is negative, because then one is incurring debt.

In the 1960s awareness grew that natural resources were at risk. Individual firms and households have income statements but no environmental accounts, and official statistical offices can only collect statements that exist. In 1969 CBS Statistics Netherlands on recommendation by Jan Tinbergen, appointed Hueting, to investigate the adaptation of the national accounts for the environment. Hueting was a welfare economist by training. Van Tuinen (2009:437): "Since the origin of statistics on national income and related variables, welfare economics has produced arguments as to why GDP does not correctly measure economic welfare." Hueting also joined Tinbergen and John Hicks in highlighting that there are different concepts of income. Something that is income under one definition need not be income under another definition. The theoretical issue for welfare economics condenses into the very practical point of measuring a particular concept of income. The analysis reported here provides for precise definitions and practical insights: both NI and eSNI are "national income", but each under its own conditions. When official statistical offices present NI as national income using the definition of SNA, then this is correct in itself, but they tend to forget to mention the

⁵⁹ E = expenditure, Y = income, C = consumption, I = investments, w = wage, L = labour force, r = return on capital, K = capital stock. See Chapter 14 for (un-)sustainable use of capital.

conditions when the use of NI is relevant. It is incorrect to report about “economic growth” when this only concerns production growth. Also, when there is decision making under uncertainty and risk on the environment, then the statistical offices should clarify that NI is a misleading notion of income that wrongly accounts some part of expenditure as income too. For proper advice to the public and policy makers it is best to present NI, eSNI and NI-A and their distances.

11.2 Accounting for income, Hicks versus Tinbergen ⁶⁰

Our discussion relies upon concepts that have a long history in economic theory and national accounting. John Hicks (1904-1989) (Nobel Prize 1972), was one of the giants in economics, and, amongst other things, helped to clarify the notion of income. Hicks was also famous for pointing to the importance of accounting for doing proper economics. A common reference is to Hick’s distinction between:

- *fundist capital*, that uses a sum of money that may be embodied in goods
- *materialist capital*, that looks at goods and recognises unique properties.

Accounting of the latter may cause more extensive bookkeeping but still requires some link to money somewhere, as money is the unit for bookkeeping, medium of exchange, and store of value.

There is a debate between Herman Daly and Roefie Hueting in the Van Ierland et al. (2001) Symposium book. This discussion causes Hueting (2001d:345-346) to reflect on the income notions by Hicks versus Tinbergen. This is essentially captured by Hicks’s own distinction between fundist and materialist capital.

Hicksian income uses the rule:

Income is what one can spend (consume) in the course of a year without being worse off at year’s end.

For fundist capital, the criterion for “not being worse off” lies in the same amount of money. For materialist capital, Hueting states:

“But whether one is better or worse off depends on one’s preferences for current consumption relative to future consumption options.”

The notion of fundist capital tends to be important for methods of national accounting in SNA. Simplified, the sum of the expenditures on consumption and investment is taken as equal to the sum of wages and capital earnings. In conventional notation $Y = C + I = wL + rK$, assuming $u = 0$. ⁶¹ A nation lives above its means or income when it depletes capital to finance expenditures. In statistics, the collected data may be incomplete, and accountants may check the numbers by using an independent view about capital earnings, using fundist capital, and by using Hicks’s rule on capital income. Apparently Hicks’s rule has been quite useful in practice.

⁶⁰ Written without having read Vanoli (2005:364-370) “Hicks’ concept of income and national accounts : interpretation issues”, though with awareness of the statement: “the concept of income can only be used by the positive theoretical economist at his own risk. For him [Hicks] it is a very dangerous term, which should be avoided.” Ex ante expectations of income of course differ from ex post realisations, and individuals from groups.

⁶¹ See Chapter 14 on (un-)sustainable use of capital.

The situation is quite different for a modeling exercise. In modeling we have perfect information about all variables, and income follows without doubt from summing consumption and investment, equal to expenditures. For modeling the fundist approach is distractive and the real focus is on materialist capital.

Using a model, the assumption for eSNI generates levels of consumption and investment, and then simply addition (including indices for volumes and prices) generates the level of national income. There is no need to check how this relates to the booking value of capital, since the model generates perfect information about the variables.

Economists working on National Accounts might not understand how the situation of modeling differs from their conventions on working with conventional statistical data that tend not to be so perfect.

11.3 Referring to both economic theory and statistical practice

National accountants are familiar with the idea that there are different notions of income. There are various definitions of income, e.g. GDP, NDP, GNP, NNP. Each application requires its own definition of income. SNA has been developed particularly with the application of Keynesian macro-economics in mind, but this does not preclude the awareness that there exists a range of notions of income.

At CBS Statistics Netherlands, the approach has been to try for a stable “institutional core” such that terms and methods of registrations are close to legal and conventional definitions in economic practice. Around this core there can be modules of an “analytic” kind that transform these data for particular use. For example, financial assets can be deflated to show the loss of value due to inflation. This approach of having a core with modules is helpful for users so that the data are basically available, though it comes with a perhaps bewildering multitude of possible uses.

There is a tendency at the national statistical offices to hold that this range of notions of income is so large that users of the national accounts must develop their own expertise. It would be beyond the capacity of a national statistical office to support all users on each and every kind of notion of income. Ultimately it is the user who is responsible for any application. **Table 6** gives the current view.

Table 6. Current view at national statistical offices

<i>Task of official statistics (figures)</i>	<i>Users (interpretations)</i>
SNA: Collection of base material	
SNA: Standard <i>national income</i> NI	Other notions of income, like eSNI
UN SEEA: Environmental indicators	

That said, there still is a dominance of SNA that does not square with the challenge to the environment. The Keynesian consumption function $C = c Y + c_0$ can be of good use for macro-economics, and thus we can appreciate the statistical observation of variables like C and Y . However, we are dealing now with a different economic problem, namely ecological survival. There are reasons to think that components of C and Y actually are costs and mere expenditures and no part of proper final demand and income. It would be awkward if it were suggested that it would be *statistics* to fix the original Keynesian notions for

eternity and forget about possible *new* economic insights: this comes across as if the statistician takes the seat of the planner with the adagium in 1990 (or 2020): “This is what we Statisticians have always done. Have you forgotten what you as Planner asked of us 50 (or 80) years ago ?”

National statistical offices still have a mission to report their figures clearly and to exert stewardship w.r.t. the use of their data. The following refers to the dual result mentioned in Section 1.5. This stewardship can now be improved in two ways, allowing a move from **Table 6** to **Table 7**:

- (i) The current convention is to report GDP as a result of SNA – production, also expressed in its name “gross domestic product” – and leave the responsibility to users when they interpret it as a (sole) indicator of welfare. This convention can be criticised by itself, since stewardship requires a better communication with users about the distinction between GDP and welfare, so that the users better express awareness on this too. GDP can now be published with an explanation that if users consider an interpretation in terms of welfare then welfare theory provides for the conditionality of the interpretation with respect to environmental sustainability. See **Table 7**, RHS.
- (ii) It is incorrect to think that all error lies with users only. When the bureau publishes NI as *income*, with the rule that *income* = *concurrent production*,⁶² then it would be strange to think that users would be in error of regarding NI as *income* indeed. There is an *own responsibility* for the bureau itself with respect to the publication of income. In general something which is income under one definition might not be income under another definition. For the use for policy on environmental sustainability NI still accounts cost $e\Delta = NI - eSNI$ as income when it is not, i.e. when eSNI is proper income. Communication can be improved much. The bureau would opt to state clearly “NI is income assuming SNA and not under environmental sustainability”, or “NI is income under the legal rules of the EU and not under environmental sustainability”, and would refer to eSNI for use as income for policy making about environmental sustainability. This stewardship on figures of income is more mundane than under (i), and fits with the historical origin of national accounting starting with practical application. See **Table 7**, LHS.

Table 7. Scientific view at statistical offices

<i>Task of official statistics (figures)</i>	<i>Users (interpretations)</i>
SNA: Collection of base material	
UN SEEA: Environmental indicators	
SNA and eSNI: Standard <i>national income</i> NI and eSNI are high level figures that are conditional upon the assumptions for their calculation	Other notions of income. Welfare theoretic interpretations of NI and eSNI with their conditions

Presently we can observe a dubious duplicity in the presentation of the figures of SNA, as done with the view in **Table 6**. On the one hand a national statistical office can present those figures “as is” and defer all responsibility to users

⁶² *Concurrent* means that the levels must apply at the same point, see e.g. **Figure 5**.

themselves. On the other hand the bureau can go along with the use of NI as “national income” because it is being presented as such in SNA. Criticism that NI is *no* “national income” then comes into conflict with both the definition of SNA and the rejoinder that users are free to provide their own definition. Such a response by a national statistical institute is too simple, since Hueting’s analysis shows that SNA is fundamentally deficient on the notion of “national income”. What is national income *depends upon conditions* how it is calculated, and it is inadequate to not be clear about those conditions (especially when you *observe* misunderstanding).

11.4 Institutionalised misunderstanding

Table 6 reflects on the LHS that SNA *also* had roots in “measurement without theory”, and on the RHS that theory and interpretation were put at the user level. **Table 7** questions whether this old view still is adequate.

These points indicate that there is a theoretical crisis in economics that is not discussed clearly as a crisis. The old views have been encoded in the SNA-manual and institutionalised at national statistical offices. In this manner they tend to dominate discussions on economic policy making, with institutionalised reflexes to fend off criticism.

For the possible move from **Table 6** to **Table 7** there are various possible misunderstandings that may block such a move. A national accountant might block any change, for example by referring to the historical origin of statistics without economics, and claiming that an economic interpretation would not be an advance. A national accountant might focus on only the RHS with neglect of the LHS, or conversely. He or she might mistake a discussion on the LHS as a discussion on the RHS, or conversely. This list is not exhaustive.

Notably, it might be a misunderstanding that welfare theory is a “user application”, in the same way as higher level theories like Keynesian economics, input-output analysis etcetera are “user applications”. Crucially, foundations are at a different level than various competing theories at a higher level. Keynesian economics, input-output analysis etcetera are higher level theories that rely on notions of scarcity and individual decision making as furnished by foundational economics.

Thus we have:

- (i) It was perhaps thought for some decades that the figures constructed by the statistical agencies, such as unemployment or national income, could be interpreted in a narrowed concept of welfare, but now there is hardly any support for such a narrowed interpretation
- (ii) no higher level theory can repair that lack of interpretation at the foundation
- (iii) thus SNA figures are still without adequate theory at the foundational level (so that we have “measurement without (adequate) theory”), unless we follow welfare theory and Hueting, and accept that SNA must also be interpreted with some theory. This would fit the observation that welfare economics has been critical on national income accounting from the beginning.

The distinction between the analysis at the foundations versus the higher level economic theories can also be formulated in a different way. A more standard interpretation is the degree of openness of the researcher or accountant to the

ecological challenge. When the researcher is mentally closed to the ecological challenge then there is no need to adapt the foundations of economics as Hueting does. When the researcher is open to the challenge, as e.g. recently formulated by Diamond (2005) “*Collapse*”, then there is scope to reconsider the foundations of economics and include the new scarcities. When we consider the choice by national accountants on what to include in SNA then if they only see *user interpretation* on greenness (the RHS of **Table 6**) then these national accountants are distracted from what is relevant in terms of construction of theory at the *foundational level* in economics itself, with its effect on SNA, i.e. the move on the LHS of **Table 6** to the LHS of **Table 7**.

Some possible causes for misunderstanding that block the move from **Table 6** to **Table 7** are:

- (1) *Not to see* that Hueting’s analysis is fundamental for the subject of economics itself.
- (2) *To reject* that Hueting’s analysis affects not just the core of economics but also *all* economic approaches such as Keynesian economics etcetera, and thus also such “economic statistical core”.
- (3) *To categorize* his approach as a specific application of welfare economics or environmental economics, and thus to classify it as only one of the many possible uses of the data. (To see only the RHS but not the LHS of **Table 7**.)
- (4) *To accept* the development of a module on the environment as part of the statistical task (UN SEEA) but not a module on eSNI.
- (5) *To reject* a choice on the “core (economic or statistical) model”, on the LHS of **Table 6**, but allow a change from the RHS of **Table 6** to the RHS of **Table 7**, essentially creating a hybrid in-between table, by idealising the historical origin of national accounting as “measurement without theory”, with neglect of the issue of income, and by denying that it is a valid issue that economic theory solves the theoretical gap on the foundations, and by denying that such solution has a valid impact on the view on SNA.

We are tempted to describe the situation as an institutional gap between (a) economists interested in theory (such as MEW, ISEW, Ecological Footprint, etcetera) and (b) the operational economic statisticians at the national statistical offices. To some extent this is a useful description since these different authors started to write and publish for different audiences, so that this crisis at the root of economic theory does not resound in the economic literature at large. On the other hand this is not quite the proper description. (i) Economic statisticians are aware of the various economic theories. (ii) Their choice to be ‘as neutral as possible’ has been guided by theory. Koopmans (1947) is a classic paper about measurement without theory. To some extent this approach is present when a figure for “national income” is published that no longer has a specified theoretical base but only a manual how it is created. (iii) There is also a viewpoint that it is not quite measurement without theory when there are these competing theories, while national accountant Bos (1995)(2003)(2007) mentions that observation in itself always depends upon theory (perhaps also an implied notion of income). But it suggests a crisis that (a) and (b) form a gap and (i) - (iii) are in conflict.

Table 6 remains problematic and dogmatic, and does not properly answer to **Table 7**. Competing theories, such as Keynesian economics or input-output analysis, are high-level theories and differ from foundational analysis, and the suggestion as if these are comparable is wrong. The suggestion behind **Table 6**, as if the foundational criticism from welfare economics w.r.t. the LHS would also be a high level “user application” for the RHS, fails.

National accountants have been put into a position where they as economic statisticians have had to decide on what is proper economic theory, and they have responded by declining such a choice, or, actually, by presenting SNA as a “non-choice” and referring other theories to “user applications”. Their response “not to choose” is deficient when it is not accompanied by *an insistence that economic theory solves the theoretical gap on the foundations*. Being silent on this, and behaving as if they do not need to communicate on such insistence, even when there is criticism by some economists, is only possible because an institutional format that allows such non-communication. Their position may also come about because of disinterest by “influential” economic theorists and because of a rejection of Hueting’s analysis as *relevant theory that should be an influence*.

Hueting solves the theory gap in an essential way. Not by providing an indicator for total welfare. Not by restoring the paradise of the “tradition” to narrow welfare down to NI. But by restoring the context of economic decision making. While the SNA claims a historical origin in “measurement without theory” this can be debunked now, since the notion of income is not without theory. Subsequently we can show the need for different concepts of income, depending upon their use.

PM 1. Hueting has two results: both the analysis on foundations in welfare theory and the accountancy on the concept of income rather than welfare.

PM 2. It is a bit immaterial whether eSNI is calculated at the statistical core or as a module. Both NI and eSNI have to be calculated. The crucial step for national accountants might be to see and accept the difference between analysis on the foundations of economics versus economic theories of a higher level. Hueting’s discussion on the LHS of **Table 6** and **Table 7** should not be mistaken as one on the RHS.

PM 3. There is a fundamental difference between observing raw data, such as a sales slip, and making imputations e.g. by a simulation model. The function that the current national accountants select for themselves, measurement without (adequate) theory, would have to remain in existence also when eSNI would be included in SNA. Thus the present discussion is not about abolition of that function. Instead, it is a discussion about completeness. A painting with only a single colour would hardly be called a painting. When these are the painters in town then the question is why they don’t add another colour to create a true painting.

PM 4. There are also other developments in economic theory that might be seen as being at the foundations. A suggestion from behavioural economics is that agents are no utility maximizers. Apart from the question whether these insights really lead to different foundations they are not discussed here.

PM 5. Analysis at the foundations has e.g. also resulted in behavioural economics that e.g. calls into question whether people are “rational”, and

additional analysis on “happiness” that e.g. calls into question what our motives and drives are. Conceivably, these approaches may call into question whether Lionel Robbins’ definition of economics (with the notion of scarcity) is still adequate and similarly whether the neoclassical approach as used by Hueting still is adequate as well. We might draw the analogy with the shift from mercantilism to utility analysis, to indicate what changes might happen at the level of the foundations. However, apart from the question whether such new approaches are really alternative to neoclassical approach, Hueting’s foundational analysis remains robust under such alternative approaches (while its statistical counterpart links up to the institutional approach that is also robust in measurement).

11.5 UN SEEA

The UN *Handbook of National Accounting – Integrated Environmental and Economic Accounting 2003* (UN SEEA) gives an overview of methods to relate national income to the environment, see UN, EC, IMF, OECD, World Bank (2003). A basic aspect there is the formulation of the *satellite accounts*, that record the economic use of the environmental functions, see also the criticism by El Serafy (2014) – reproduced here as Appendix 53.

In sections 10.199-214, p453-457 there, the editors of UN SEEA, refer to Hueting & De Boer (2001b), and give their evaluation. Section 10.199 states:

“Much of the initiative to look for an alternative path for the economy rather than a different measure of the existing economy came from the work of Hueting in the late 1960’s and early 1970’s. He introduced the concept of environmental function referred to throughout this manual, explaining how pressure on functions leads to scarcity or competition for these functions. As with any economic good or service, this scarcity gives rise to an economic value due to the opportunity costs involved in their use or appropriation. The concern is then to define aggregate indicators to characterise a sustainable economy which ensures the maintenance of key environmental functions in perpetuity. Such an economy may be described as a ‘greened’ version of the existing economy where typically an increase in national income is secured at the expense of worsening environmental degradation. Interest then focusses not on the new aggregates themselves but the gap between the existing economy and the greened version.”

Apart from this evaluation by the editors, Hueting and De Boer also contributed the method of *environmentally sustainable national income* (eSNI) directly, and this was included in UN SEEA 2003 Section 11.163-171, p504-507. The estimate by Verbruggen et al. (2001) at IVM obviously was important for this inclusion.

11.6 Relation of welfare, income and satellite indicators, and uncertainty

Table 8 shows relations between welfare and national income and the satellite accounts. Each row gives a period in time.

In the 1930s national income might have been seen as a measure for social welfare but in the 1960s this obviously was invalid. It is an option to include e.g. work and leisure in the Social Welfare Function. The UN SEEA records *use* of environmental functions which is not informative when *standards* are lacking. Their use would be important for social welfare but it might be overly complicated to

include all of them in the Social Welfare Function directly. It is much more practical to determine an aggregate indicator for the overall distance to environmental sustainability by looking at income instead of welfare, calculate eSNI and compare NI and eSNI (as partial indicators, i.e. factors, of welfare) by $e\Delta = NI - eSNI$.

Table 8. Uncertainty in relationships and measurement

<i>National income and satellite indicators</i>	<i>Social welfare</i>	<i>Environmental sustainability</i>
1936 standard National Income (NI)	Acceptable as a first approach, assumes optimality	–
1974 standard National Income (NI)	Unacceptable, requires amendment for unemployment and so on	Uncertainty so large that it fails: basically invalid
1974, UN SEEA 2003 Environmental indicators	Components of welfare, but too complex for a summary statistic	Data but no information: use, no standards and no aggregation
1992, 2019 environmentally Sustainable National Income (eSNI)	eSNI is comparable to NI, and there is conditionality w.r.t. assumptions on social preferences on sustainability	The uncertainty is described, there are more complete standards, aggregation allows comparison to NI

11.7 History writing but with unprocessed changes between 1997 and 2002

In the history book by former director of the INSEE Vanoli (2005:350), translated from French 2002:

“The second approach is in particular the topic of research, which associates German, ^[63] French and Dutch economists and statisticians under the seal of “green stamp” [see in the Annotated Bibliography references to the 1997 Report, published by R. Brouwer and M. O'Connor]. The Dutch statistician [sic] Rufie [sic] Hueting, a pioneer in integrating the analysis of the effects of economic activity on environmental functions (sources of materials and energy, sink for all kinds of residuals, provider of services, support of life, etc.) with the political [sic] responses in terms of sustainability, tries *though not convincingly* [my italics], to associate the measurement of the consequences of the standard-related constraints, and the adjustment of an *ex-post* NDP. Partly at least by reaction, the NAMEA project, that combines national account monetary data and environmental data in physical quantities without confusing [sic] them, is also developed in the Netherlands (...).”

Comments: (i) Vanoli in 2002/2005 obviously did not refer to later publications by Frits Bos, see Section 7.9. (ii) He doesn't refer to Tinbergen & Hueting (1991)

⁶³ Including W. Radermacher, later DG Eurostat 2008-2016, Section 21.10.7 and Chapter 46.

or Verbruggen (ed) (2000) that were available in 2002. (iii) Unfortunately Vanoli does not state why he is not convinced. In the Greenstamp final summary report, Brouwer and O'Connor (1997) state:

"We thus favour the third approach, which is to make estimates of environmentally adjusted national income using multi-sector national economic models." (p8)

They reject the Hueting et al. (1992) methodology of calculating costs without the use of a model. Hueting not much later agreed with the use of a model, as in fact was done by Verbruggen (ed) (2000), but Hueting also remarks that a model introduces additional assumptions, for example because no model has ever been tested on changes affecting 50% of production. Thus when Vanoli in 2002 refers to this Greenstamp report, his "not convincingly" would likely refer to Hueting's 1992 lack of a model, and thus one might understand Vanoli's preference for the satellite accounts (NAMEA). But he also refers to *politics*, so he may have more objections. See Chapter 45 for the "it is politics" confusion in Greenstamp and thus perhaps also for their readers.

Vanoli (2014:32) in the Eurostat journal shows that he has not understood the Hueting (1974a, 1980) thesis that the environment falls under the subject matter of economics, though his history book mentions the thesis in the annotated bibliography. Perhaps a statistician now allows for a counterfactual "as if":

"In contrast with the usual representation that treats nature as a part of an enlarged economy, in this suggestion 'Economy' and 'Nature' are thought of as two different entities, included in a super-entity called 'Planet'."

Vanoli refers to UN SEEA (2003) and Bos (2006) and (2011a), and then could have benefitted from the news over 1997-2002, since both sources refer to Verbruggen (ed) (2000), and Vanoli might indeed have requested the latter report, but he does not mention it. Vanoli (2014:9 & 33-34) states that he is "sceptical" about an integrated approach, and:

"Apparently, there was never a comprehensive study of this issue that needs to be revisited systematically. (...) Nevertheless when measurements depend on theoretical assumptions that are at odds with important characteristics of the real-world economy, they are not good candidates for integration in the national accounts. Similarly estimated values, although expressed in monetary terms, that may not be considered transaction equivalent values cannot be integrated either."

Comments: (i) He neglects a comprehensive study that does *exist*, and neglects that measurement is possible by using standards and models that fit the real-world economy, see the *proof of concept* given in our Chapter 4. (ii) It is true that NI is in market prices and eSNI and eΔ in shadow prices but they are at the same *price level*, and the latter is the necessary and sufficient condition for comparison. The internal movements of prices and volumes along the production possibility frontiers are relevant for understanding the internal changes but not for deflation over periods (with different levels of technology).

12. *Asymmetric bookkeeping*

12.1 *Introduction*

For capital it is accepted that damage must be deducted, e.g. as depreciation. Repair is only entered positively under the condition that damage is deducted. An accounting method may enter depreciation using a rule of thumb, and then allow actual repair to be entered via investments into gross value added.

When the Netherlands raises the dikes because of the rising sea level, then its national income rises, and the country has to give a higher contribution to the EU. This is another curious effect from accounting costs as income. In this case, there might be stronger argument to actually correct the SNA, also since those bookings are in current prices. However, Hueting's proposal is to use figures alongside each other.

12.2 *General principle*

The more general principle is that repair indicates that there has been damage. When the *amount of damage* is measured by the *sum spent on repair*, then this sum constitutes no income. This holds for consumer spending that contains such elements of repair, like repairing a house after flooding, or for investments that compensate for environmental damage, like raising dikes. Recording these as final demand means that costs of production are included in the measure of production, which gives an inflated value of actual production.

While the principle seems clear, there arises the practical problem of *setting standards* on recognising damage. This might invite the criticism of arbitrariness. When a volcano destroys a region then it might be valid to argue that this is a force of nature, so that all human restoration efforts are adding value. However, one might also say that people should never have built close to the volcano in the first place. Insurance companies would be familiar with the topic. It would be too simple to say that earlier generations who damaged the environment were a force of nature, so that our current repairs truly raise welfare.

We presently consider the issue for national accounting. An example that has caused discussion amongst national accountants is the following. When a car pollutes the air then we can install a catalyst to reproduce the previous clean air. Current methods of the national accounts record that the sale of the catalyst generates a flow of income for who produces that catalyst. In itself this is correct since the change from polluted air to clean air is an improvement. However, the quality of the air has not changed from the original situation before the polluting car was introduced. The "counterproduction" by the car has to enter somewhere too. The recorded income from the catalyst is better subtracted from the supposed income from making the car.

While the issue is mentioned in Hueting (1974a, 1980) the name *asymmetric bookkeeping* was adopted only later. It is useful to refer to some other authors to show international awareness by renowned economists that there is a problem in the National Accounts indeed. While the phenomenon applies for more areas, Hueting concentrates on the environment.

12.3 Nordhaus & Tobin (1972) and Tinbergen (1985)

Nordhaus & Tobin (1972:7) use the term “Instrumental Expenditures”:

“Some consumer outlays are only instrumental, for example, the costs of commuting to work. Some government “purchases” are also of this nature – for example, police services, sanitation services, road maintenance, national defense. (...) The second reason is that defense expenditures are input rather than output data. Measurable output is especially elusive in the case of defense. Conceptually, the output of the defense effort is national security. Has the value of the nation's security risen from \$0.5 billion to \$50 billion over the period from 1929 to 1965? Obviously not. It is patently more reasonable to assume that the rise in expenditure was due to deterioration in international relations and to changes in military technology. The cost of providing a given level of security has risen enormously. If there has been no corresponding gain in security since 1929, the defense cost series is a very misleading indicator of improvements in welfare.”

Jan Tinbergen was one of the developers of the national accounts and the notion of NI and its quantification. Tinbergen (1985:35) devotes a chapter to “counterproduction”:

“In this chapter I propose to discuss a number of phenomena which can be subsumed under one category, which I shall call *counterproduction*. I could also have opted – following physics – for anti-production (similar to anti-matter), because the phenomena under discussion annihilate certain parts of social production, which thus vanish. I opted for counter-production since this corresponds with the phrase counterproductive, already in use. By counterproduction I mean acts of individuals in the economy which negate other individuals' production, and also reduce social product.”

12.4 Accounting tables involving more columns

For macro-economics, the deduction NI minus asymmetric bookkeeping = NI – A = NI-A is straightforward. For accounting practice the challenge lies in accepting the existence of and measuring the sector for elimination, repair and compensation (ERC) in the first place.

When we are interested in sectoral results, then the statistical agency must make an estimate where most ERC costs are caused. This depends upon the particular production technology that is used in the economy as well.

An example in **Table 9** has the conventional setup for a NI of 111 units, intermediate deliveries of 19 and thus output of 130. The table contains a sector for elimination, repair and compensation (ERC). The expenditures for ERC exclude direct damages that people might accept without spending funds on them. Let us assume that the ERC sector has an output of 8. These are all costs. When consumers have these costs, then conventional accounting makes the error of booking them as consumption and thus “final demand”. When such costs have a

durable character, like dikes, they will be booked conventionally as investments, and thus “final demand” too.

Table 9 has “consumption” 5 and “investments” 2 for products and services provided by the ERC sector. Conventionally these are accounted as “final demand”, to a total of $5 + 2 = 7$. With intermediate deliveries of 1, the ERC sector has output of $7 + 1 = 8$. The sector has a wage sum of 3 and there remains a handsome income for capital of 3. NI records a value added of 6 for this sector.

Table 9. Accounting of elimination, repair and compensation (ERC) in NI

	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	80	20	100	113
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1	5	2	7	8
Sum	11	6	2	19	88	23	111	130
Labour	80	2	3					
Capital	22	1	3					
NI	102	3	6				111	
Total	113	9	8					

For a sectoral presentation we look for an alternative table that shows the value added of $NI-A = 111 - 7 = 104$ while maintaining output of 130. For this example we assume that we know the pollution caused by the different sectors. Let us discuss two ways how the asymmetric entries can be booked better.

12.5 Accounting correction using intermediate deliveries

Hueting (1974a, 1980:172-174) (2011f) suggests to correct via intermediate deliveries.^{64 65} **Table 10** contains the setup. Properties are:

Table 10. Accounting of ERC in NI-A, using intermediate deliveries

	Wheat	Other	ERCA	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	80	20	100	113
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1				1
A	5	1	1	7				7
Sum	16	7	3	26	83	21	104	130
Labour	80	2	3					
Capital	17	0	2					
NI-A	97	2	5				104	
Total	113	9	8					

⁶⁴ Hueting (1974a, 1980:172-174) simplifies to one pollution entry but complicates the setting with a policy measure and a new sector, while the actual problem is the mere method of accounting. When we restrict attention to his tables 5.1 and 5.3 then we see that pseudo-final-demand is shifted to intermediary demand, which shows the method.

⁶⁵ Hueting & De Boer (2019b) state that correction for asymmetry is for real values. However, bookkeeping tends to start with nominal values, and then those are deflated. The wage sum in a sector remains the same, so that the reassigned costs are subtracted from capital income.

- For comparison of **Table 9** and **Table 10** it is more convenient to insert a separate line for A = asymmetric bookkeeping = pseudo-final-demand. The separate line helps to keep the information about the original deliveries.
- The rows ERC + A find their counterpart in the column ERCA.
- The distribution over the sectors would require detailed research by the statistical agency. See also the reference to Leontief in Huetting (1974a:79). We have assumed {5, 1, 1}, with remaining nonnegative capital income. If we would assume a distribution {0, 0, 7} so that all A are recorded as an intermediate delivery of ERC to itself, then this sector would have a capital income of $3 - 7 = -4$.
- This setup loses the information about the original distinction between “consumption” and “investment”. The decisions by consumers and investors are considered less relevant than the analysis on technology. For example for an input-output-analysis with the inverse matrix of multiplier coefficients, it are these “intermediate deliveries” that provide the proper technology.
- It would be simple to include lines for Capital + A and $NI = NI-A + A$.

12.6 Accounting correction like inventories

In **Table 11** expenditure flows to the sector of elimination, repair and compensation (ERC) have been deducted from output (gross proceeds) like a reduction in inventories. See also the small model in Chapter 14.

Table 11. Accounting of ERC in NI-A, like inventories

	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	80	20	100	113
Other	0	5	0	5	3	1	4	9
Sum					83	21	104	
ERC	1	0	0	1	5	2	7	8
Sum	11	6	2	19	88	23	111	130
Labour	80	2	3				85	
Capital	17	0	2				19	
NI-A	97	2	5				104	
A	5	1	1				7	
Cap+A	22	1	3					
NI	102	3	6				111	
Total	113	9	8					130

Properties are:

- The information about the origin in “consumption” and “investment” is kept.
- The asyms A are not regarded as intermediate deliveries but as corrections on value added, via corrections on output per sector.

The asyms crucially do not (yet) belong to the input-output-table of intermediate deliveries, since the decision makers on those expenditures are consumers and investors. The expenditures are accounted but still recognised as costs. However, for an input-output-analysis with technology we may consider to transform to the matrix of intermediate deliveries again.

12.7 Accounting for price and volume changes

Asymmetric bookkeeping is also relevant for understanding of price and volume changes, or growth accounting. **Table 12** contains the classic setup for chained Laspeyres volume and Paasche price indices. The symbols and formulas are:

- The former monetary value level (niveau) $WN[-1]$ plus the change in volume VD in constant prices gives the current volume level: $WN[-1] + VD = VN$.
- The current volume level VN plus the change in the price level gives the current monetary level: $VN + PD = WN$.
- Percentage changes are $VP = VD / WN[-1] * 100$ and $PP = PD / VN * 100$.
- The levels and their changes are additive, also for sums of variables.
- Per sector, output and input levels are equal, for $WN[-1]$, VN and WN .

Consider **Table 9** (with asymmetry). Let the volume of consumption rise from 80 to 81 in the Wheat sector and from 5 to 6 in the ERC sector. Total final demand then rises in volume by 2, from 111 to 113. Let this be mirrored by a rise of labour volume from 80 to 81 for the Wheat sector and from 3 to 4 for the ERC sector. NI rises in volume with 2 from 111 to 113 as well. Let us include a price rise of 2 points or 10% for investment demand for the Wheat sector. The rest remains the same. For **Table 10** (without asymmetry) NI-A however grows only by 1 from 104 to 105. **Table 12** gives the changes (bold figures) for the Wheat sector.

Table 12. Example for the Wheat sector, sales (row) and costs (column)

	Value WN[-1]	Laspeyres volume		Level VN	Paasche price		Value WN
Sales		VD (dif)	VP (%)		PD (dif)	PP (%)	
Intmed	13	0	0.0%	13	0	0.0%	13
	80	1	1.3%	81	0	0.0%	81
	20	0	0.0%	20	2	10.0%	22
Fin. Dem.	100	1	1.0%	101	2	2.0%	103
Output	113	1	0.9%	114	2	1.8%	116

Costs with asymmetric bookkeeping

Intmed	11	0	0.0%	11	0	0.0%	11
Labour	80	1	1.3%	81	0	0.0%	81
Capital	22	0	0.0%	22	2	9.1%	24
Val. Add.	102	1	1.0%	103	2	1.9%	105
Input	113	1	0.9%	114	2	1.8%	116

Costs with without asymmetric bookkeeping

Other	11	0	0.0%	11	0	0.0%	11
A	5	1	20.0%	6	0	0.0%	6
Intmed	16	1	6.3%	17	0	0.0%	17
Labour	80	1	1.3%	81	0	0.0%	81
Capital	17	-1	-5.9%	16	2	12.5%	18
Val. Add.	97	0	0.0%	97	2	2.1%	99
Input	113	1	0.9%	114	2	1.8%	116

The next section (Appendix to this Chapter) gives the full indexation tables for both asymmetry and the correction via the intermediate deliveries.

In asymmetric bookkeeping, the volume of NI would rise by 2 from 111 to 113. Without asymmetric bookkeeping, and with correction via intermediate deliveries, the volume of NI-A would rise by 1 from 104 to 105.

For the ERC & A sector, we see that the volume of output rises from 8 to 9, which fits the rise from its labour volume from 3 to 4 at constant wages. This is the 1 point change that constitutes the volume rise of NI-A from 104 to 105.

The deviation in bookkeeping shows up in the Wheat sector. The following looks at the Wheat sector for the difference between NI and NI-A.

With asymmetric bookkeeping for Wheat:

- As assumed, the (uncorrected) intermediate deliveries have no changes in prices and volumes. Thus the sales 13 and costs 11 remain the same.
- For consumers the price remains the same and the volume rises by 1. For investors the price rises by 2 points and the volume remains the same. Thus the value of final demand rises from $WN[-1] = 100$ to current $WN = 103$.
- Total sales then rise in value from 113 to 116.

Wages are constant, and labour input rises with 1 point or 1.3% in volume. Also the costs A have a rise of 1 point or 20% in volume.

When booked asymmetrically, then A does not affect the calculation for the wheat sector itself.

- The volume change in labour covers the volume change in sales.
- The gain in the price level results into a gain in capital income of 9.1%
- The value added of the sector contributes 1 point to the rise in the volume of national income NI. It contributes 2 points to the rise in the price level.

Without asymmetric bookkeeping, when A is booked correctly, then we see that the capital income of the sector was overstated at 22 and actually is 17. But also the development will be different.

- The volume rise in costs A (measured in prices from the last period), from 16 to 17, causes that value added in the Wheat sector keeps a constant volume.
- The volume rise in labour costs of 1 thus requires a reduction in the volume of capital income with -1.
- The value added of Wheat contributes 0 points to the rise in the volume of national income NI-A. The contribution to the rise in the price level remains 2.
- The proceeds from the higher sales price for investments still lands in capital income, and compensates for the loss in volume. When we sum the two components then capital income grows to the current value 18.

In sum, asymmetric bookkeeping does not only affect our understanding of the levels but also our understanding of developments.

12.8 Appendix. Volume and price indexation for asymmetry and correction

The next two pages give the indexation tables for asymmetry and the correction.

WN[-1]	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	80	20	100	113
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1	5	2	7	8
Sum	11	6	2	19	88	23	111	130
Labour	80	2	3					
Capital	22	1	3					
NI	102	3	6				111	
Total	113	9	8					

VD	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat				0	1		1	1
Other				0			0	0
ERC				0	1		1	1
Sum	0	0	0	0	2	0	2	2
Labour	1		1					
Capital	0	0	0					
NI	1	0	1				2	
Total	1	0	1					

VN	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	81	20	101	114
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1	6	2	8	9
Sum	11	6	2	19	90	23	113	132
Labour	81	2	4					
Capital	22	1	3					
NI	103	3	7				113	
Total	114	9	9					

PD	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat				0		2	2	2
Other				0			0	0
ERC				0			0	0
Sum	0	0	0	0	0	2	2	2
Labour								
Capital	2	0	0					
NI	2	0	0				2	
Total	2	0	0					

WN	Wheat	Other	ERC	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	81	22	103	116
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1	6	2	8	9
Sum	11	6	2	19	90	25	115	134
Labour	81	2	4					
Capital	24	1	3					
NI	105	3	7				115	
Total	116	9	9					

WN[-1]	Wheat	Other	ERCA	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	80	20	100	113
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1				1
A	5	1	1	7				7
Sum	16	7	3	26	83	21	104	130
Labour	80	2	3					
Capital	17	0	2					
NI-A	97	2	5				104	
Total	113	9	8					

VD	Wheat	Other	ERCA	Intmed	Cons	Inv	Final	Total
Wheat				0	1		1	1
Other				0			0	0
ERC				0				0
A	1			1				1
Sum	1	0	0	1	1	0	1	2
Labour	1		1					
Capital	-1	0	0					
NI-A	0	0	1				1	
Total	1	0	1					

VN	Wheat	Other	ERCA	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	81	20	101	114
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1				1
A	6	1	1	8				8
Sum	17	7	3	27	84	21	105	132
Labour	81	2	4					
Capital	16	0	2					
NI-A	97	2	6				105	
Total	114	9	9					

PD	Wheat	Other	ERCA	Intmed	Cons	Inv	Final	Total
Wheat				0		2	2	2
Other				0			0	0
ERC				0				0
A				0				0
Sum	0	0	0	0	0	2	2	2
Labour								
Capital	2	0	0					
NI-A	2	0	0				2	
Total	2	0	0					

WN	Wheat	Other	ERCA	Intmed	Cons	Inv	Final	Total
Wheat	10	1	2	13	81	22	103	116
Other	0	5	0	5	3	1	4	9
ERC	1	0	0	1				1
A	6	1	1	8				8
Sum	17	7	3	27	84	23	107	134
Labour	81	2	4					
Capital	18	0	2					
NI-A	99	2	6				107	
Total	116	9	9					

13. *El Serafy on income accounting*

13.1 *A student of Hicks*

Salah el Serafy (1927-2016) received his doctorate in economics at Oxford in 1957 supervised by John Hicks.

El Serafy (2014) is a 'call to arms' to economists to get more involved with national accounting again – here Appendix 53. We will look closely at El Serafy (2013) – his final study *Macroeconomics and the Environment*. His book is a refresher for national accounting and the history and methods on national income, including the history about the satellite accounts for the environment instead of their incorporation in the SNA.

For example, El Serafy's (2013:60) reference to Marshall can be much appreciated, since it helps to understand that not all natural resources need to be exploited for production and income:

“And almost every use of the term capital, which is known to history, has corresponded more or less closely to a parallel use of the term income: in almost every used capital has been *that part of a man's stock from which he expects to derive an income*. (Marshall, 1920; italics in the original)”

We refer to El Serafy (2013) also because it contains misunderstandings w.r.t. eSNI. Since El Serafy has worked at the World Bank, these misunderstandings must have had some impact on the current views at the World Bank. The World Bank's choice for the *Adjusted Net Savings* method – formerly known as *Genuine Savings* and partly inspired by El Serafy's user-cost method – must be understood from practical but also theoretical angles. Potentially the World Bank saw no scope to practically develop a model for each separate country to determine its eSNI, yet there appear to have been conceptual issues in theory as well.

13.2 *On terminology and Hueting's environmental functions*

El Serafy (2013:5):

“Economically viewed – and a narrow view at that – it is not in fact the natural resources per se that need protection, but their services. In an effort to reduce the complexity of the issues involved and to form a bridge connecting the environment with economics, the work of the Dutch economist Roefie Hueting is remarkable. Imaginatively, he coined the concept of 'environmental functions' which are services provided by Nature and are being progressively stressed [Hueting, 1974a, 1980]. From my perspective, the cost of safeguarding, repairing and maintaining these environmental functions should be recognized explicitly in the national accounts simply by invoking the fundamental maxim of 'maintaining capital intact' (El Serafy, 1998).”

El Serafy unfortunately associates environmental functions (possible uses, state variables) with services (uses, flow variables), but otherwise the analysis is valid. See the Section 7.10 on terminology.

13.3 Sustainability versus environmental sustainability

We fully agree with El Serafy (2013:144) on the challenge to SNA, except for the distinction between “sustainable” and “environmentally sustainable”.

“The SNA, in failing to distinguish between unsustainable receipts derived from the sale of natural assets, and sustainable income produced by the original factors of production, disregards the fundamental concept of [net revenue], which should guide consumption and the assessment of the [wealth] of the revenue recipients.

The distinction between capital and income has remained crucial throughout the development of economics. In the present day Hicks paraphrased this principle into a definition of income as that amount which a person can consume during a given period and still be as well off at the end of the period as at the beginning. [fnt] More specifically, we are told in no uncertain terms that: ‘if a person’s receipts are derived from the exploitation of a wasting asset, liable to give out at a future date, we shall say that his receipts are in excess of his income’ (Hicks, 1946, p. 187).

The natural resources being exploited are indeed “wasting assets”. If they are nonrenewable (for example, most minerals) or if they are renewable (for example, forests or fisheries or agricultural soil), but are not actually being renewed through careful restoration, they are also wasting assets. This means that receipts from their exploitation will give out in the future, and the revenue they generate is greater than income associated with them. Ignoring this elementary fact makes a mockery of what has been passing as economic analysis and policy prescription for economies based on natural resources and for which no effort has been made to compensate for draining their national wealth. Maintaining capital intact is not a marginal issue. It is central to economic behavior and analysis, and it is a poor economist indeed who is unable to tell the difference between capital and income.”

This is a splendid quote, except for the fact that El Serafy only considers depletion and does not consider the wider ecological impact.

13.4 Rich and poor countries

El Serafy (2013:11) about the user-cost method that he took from Hicks’s work:

“For the richer countries the adjustments it brings will tend to be slight in most cases, and could indeed be shunted for convenience into satellite accounts. But for many of the poorer countries the satellite accounts can hardly be sufficient. (...) If the size of the needed adjustment itself is significant it should be shown clearly above board and not hidden in peripheral accounts, and the change should be highlighted as *economic* in substance and purpose.”

Rich countries however are also prime actors.

13.5 *Accounting depletion or the ecology*

Remarkably, El Serafy (2013) hardly discusses Climate Change. El Serafy (2013:337) fnnt 9 states:

"Pollution could of course be viewed as depletion of the environment's capacity to absorb wastes. This line of argument, which was suggested to me by Herman Daly, is interesting and merits investigation."

We infer that El Serafy (2013) basically neglects the very topic that eSNI is about. It is useful to observe this, because many statements by El Serafy seem to pertain to environmental sustainability but on close reading do not do so.

El Serafy (2013:10) is curiously blind on ecological survival:

"On matters concerning pollution there should be little difference between the rich and poor countries concerns. In my view, pollution does not need the SNA in the same way the deterioration of the natural sources of raw materials and energy does. Thus it is understandable that the industrialized countries on the whole are fairly content with their national accounts without much adjustment, comfortable with the minor modification introduced by SNA93, which their own experts so obviously shepherded."

El Serafy (2013:36) acknowledges:

"An imaginative practical suggestion has been made by Roefie Hueting to associate pollution with GDP. This begins by setting standards of 'tolerable' pollution, assessing the cost of reaching them, and charging this cost against GDP. [ftnt]"

We can accept this acknowledgement with appreciation, even while El Serafy erroneously suggests that such pollution would be less relevant for both rich and poor countries alike, and even while we need to look closer at that footnote. We will do so in Chapter 32.

13.6 *Substitutability versus accounting methods*

It is a technical issue whether goods can be substituted for each other.

- Low or zero substitutability is associated with "strong sustainability".
- High or even infinite substitutability is associated with "weak sustainability".

Hueting found that the distinction on weak or strong sustainability does not apply to ecologically vital functions, for which eSNI applies.

Hicks's distinction in accounting methods between fundist or materialist capital should not be confused with this distinction in technical substitutability.

El Serafy (2013:30) however creates confusion by suggesting that the accounting approach of fundist capital would be "weak sustainability (economic)" as opposed to "strong sustainability" (environmental)". His choice of terms runs counter to economic theory and environmental economics in the literature, see

Table 13.

Table 13. Weak and strong sustainability

<i>Sustainability</i>	<i>Literature: substitutability</i>	<i>El Serafy</i>
<i>Weak</i>	High to infinity	fundist capital
<i>Strong</i>	Low to zero	materialist capital

Some points to observe are:

- The distinction between “economic” and “environmental” is not relevant for the issue of substitutability. The environment falls within economics when functions are scarce (Huetting 1974a, 1980).
- Accounting methods should not be confused with technical substitutability.
- For vital functions, the distinction between weak and strong sustainability is useless. There still is the choice between fundist and materialist methods.

However, when you would hold that environmental functions would really be exchangeable with money, then the obvious accounting method would be fundist, and this might be an easy way to understand weak sustainability.

The latter is not El Serafy’s point of view though. Apparently he regards the notion of substitutability as not belonging to the realm of accountancy, which may be why he thinks that there is room to redefine the common notions to fit his own purpose.

For a different reason, we actually agree with El Serafy that the distinction on substitutability is not so relevant. However, one better sticks to the definitions.

13.7 Positive versus normative

While eSNI is conditional upon the assumption of a preference for environmental sustainability, a common misunderstanding is that eSNI is based upon a normative or political position. However, *conditionality* is something that is *non-political*. It is not normative but *positive*. An even larger misunderstanding is that NI would *not* be based upon an assumption on preferences. *Both* NI *and* eSNI are based upon assumptions. We need both indicators to gauge the current situation.

El Serafy (2013:228) again provides a recommendable statement on income accounting:

“By my drawing attention to the fact that *proper* income measurement is a *sine qua non* for the accurate gauging of economic expansion I, as well as others, have insisted that capital, including natural capital, must be maintained intact. [fnt] This fundamental requirement which has for centuries been recognized by accountants (...) and which was later adopted by successive generations of economists, found expression half a century ago in Hicks’s (1946) standard definition of income in *Value and Capital*, a definition which is probably acceptable to most economists: in order to ascertain income in the current period, enough from current receipts must be put aside to compensate for capital deterioration so that future income might be sustained.”

El Serafy suggests that natural capital can be treated as fundist:

“This would mean that the stock of natural capital that contributes to production may be reduced, provided that other forms of capital are increased so that capital in general is kept intact.”

However, for vital functions this means “*après nous le déluge*”. A scientific adviser is expected to provide an indicator about the true situation.

El Serafy (2013:230) describes the Tinbergen – Hueting approach as normative:

“This totally objective (and ‘positive’, i.e. value neutral) requirement, that capital, in its ‘fundist’ sense, be kept intact for the purpose of properly measuring income and its growth, came in time to be called ‘weak sustainability’. But this was subsequently ‘strengthened’ as sustainability got converted to a normative injunction to keep natural capital (...) intact. Thus the focus moved from *income* estimation to preserving the *stock* of natural capital undiminished as an objective not as a means to the estimation of income.”

However, the calculation of eSNI is not normative. There is no choice, as El Serafy suggests, between *either* income measurement *or* maintaining “natural capital” as an objective. The calculation of eSNI is somewhat different, since the condition on environmental sustainability generates an estimate of income.

El Serafy (2013:231-232) strongly rejects the approach that leads to eSNI:

“‘Strong sustainability’, by contrast, is a normative concept, and relates to the immensely complex stock of environmental assets and properties. Many of these are not easy (in the famous Pigouvian phrase, 1924, p. 11) ‘to bring into a relationship with the measuring rod of money’. Thus for that reason alone they cannot be brought into national accounting. The fact that parts of the environment seem now to lie beyond what economists regard as not their concern does not necessarily mean that such parts do not exist, or that they might not assert themselves as scarce elements in the future.”

The reader sees the challenge that Tinbergen & Hueting faced. The environment indeed is immensely complex, and many functions might still seem free with a zero price while actually there may be costs in indirect manner that we attribute to other variables. It is a science and art to make a wise selection of what economics and statistics can handle, with the objective of creating the index of environmentally sustainable national income (eSNI), so that also Salah el Serafy’s misgivings are provided with adequate answers.

13.8 The role of the scientific adviser

We concur with the role of the scientific adviser, El Serafy (2013:32):

“The of-repeated charge that weak sustainability urges the destruction of natural capital is baseless. Methods using weak sustainability, such as the user cost, do not recommend future action. The future is not addressed at all save through the narrow chink of maintaining capital intact, and this only from one account period from the next. Though called weak, there is nothing feeble about it as an instrument for greening the

accounts. Remember also that it is not the business of accountants to recommend future investment, either in the aggregate or for specific activities – nor for that matter its spread over future time.”

We agree with the unbiased role of the scientific adviser and accountant. However, the information that is provided should also be accurate. It is true that the user-cost correction of GDP does not *urge* the destruction of natural capital, but we regard it as problematic that it *hides* the phenomenon if there is such destruction that merits attention on the grounds of economic welfare also for future generations. When a mine of iron ore is depleted then this might not matter so much since the iron might be recycled in the economy. When oil reserves are depleted in such manner that CO₂ contributes to global warming then it is misinformative to focus only on resource depletion, in a monetary estimate only, and forget about global warming.

14. A small model for NI, User Cost and eSNI

14.1 Abstract

Capital loss can be deducted from gross income via depreciation or via treating it as a change in inventory, and in the latter case it is called "(excess) user cost". This notion helps to distinguish NI, NI with EI Serafy's method on resource depletion and eSNI.

14.2 Introduction

About GDP and NDP, EI Serafy (2001b) stated:

- "Selling natural assets and including the proceeds in the gross domestic product, GDP, is wrong on both economic and accounting grounds."
- "Even though NDP is rarely estimated, depreciation of produced assets is fairly small and predictable. Declines in natural assets, on the other hand, may be large and volatile, and are not reflected at all in the estimates of GDP commonly used for macroeconomic analysis."
- "For economic purposes, a better approach would be to calculate the user cost component of resource declines, and either subtract this from GDP as capital consumption or (much better) exclude it from the gross product altogether."

The "user cost" are the investments required to maintain the capital level.

14.3 Two flows

In the RES Newsletter EI Serafy (2014) recalled:

"Exploiting finite natural resources without replenishment is akin to mining and Marshall had taken pains to explain that the surplus realized in mining, often miscalled rent, should be split into proper 'rent' which is income and 'royalty' which is capital."

Santopietro (1998) summarized EI Serafy's position as:

"EI-Serafy (1989) argued that the surplus for a depletable resource represents two values: (1) a true income component which can be consumed; and (2) a separate depletion cost. The depletion cost is the amount that needs to be reinvested in order to sustain the economy's ability to provide future generations with the ability to enjoy a non-declining level of consumption. In this line of thinking, the net price method overstates the true depletion cost. Von Amsberg took EI-Serafy's method and applied the strong sustainability criterion to it by calling for a depletion cost sufficiently large that when invested in the production of a substitute, future generations will be able to enjoy a non-declining flow of similar services."

It was actually John Hicks who distinguished *fundist* and *materialist* capital in accounting. In both cases there is Hicks's accounting principle of keeping capital

intact for income estimation purposes. El Serafy puts emphasis on fundist capital, thus with monetary value. A depletion of a natural asset can be compensated by a gain in other capital. The alternative is to look at the physical stock of goods. El Serafy: "damaged or depleted natural capital cannot easily be replaced with manufactured capital."

14.4 *Not depreciation but inventory change*

About the depreciation approach, used in **Table 14** below, El Serafy (2013:147-148) states:

"I use the expression, 'depreciation approach', to refer to a method of adjusting the national accounts by treating the depletion of a natural resource similarly to the depreciation of fixed assets. (...) On reflection, however, I moved away from this approach, both for practical as well as conceptual considerations. First, the conceptual: it is wrong to describe as current production that which is not current production. GDP is an important measurement and is much more in use than NDP. Even if NDP and its national parallel NNP are correctly measured, the whole apparatus of GDP with its sectoral structure, input-output connections, and changes over time would remain incorrectly calculated if revenues from depletable resources were to continue being counted as value added in GDP."

The alternative via inventories is used in **Table 15** below. El Serafy (2014):

"Third, if stock erosion is viewed correctly as Marshall advised as emanating from 'Nature's store', accounting conventions dictate that using-up stocks must be dealt with at the gross income estimation stage. Clearly natural resources are not 'fixed capital' but inventories, and the User Cost implicit in using them up should be recognized for correct accounting."

14.5 *A small model*

When a home owner sells the house then the proceeds are not his income. He might rent out a room in the house to pay for maintenance costs. Farmers sell the proceeds from their crop but keep some seeds apart for seeding next year. We will call this sustainability. This must be distinguished from environmental sustainability that we discuss below.

Since Keynes, macro-economics has tended to link consumption to income but let us now relate it to the capital stock that might be depleted. Let the price of a depletable resource be $p = 1$, and let the physical resource stock K be economic capital too: $K \sim p K$. The first is in physical units and the second would be in money. Let us take the resource as the numeraire, so that $K = p K$.

- For investment: Let physical investment $J = b K$. Let $1 + g$ be the physical return factor on physical investment. The approach and notation in economics has gross investment $I = (1 + g) J = (1 + g) b K$, also as $I = r K = (i + d) K$ with d depreciation and i a rate of interest. Thus we have $r = (1 + g) b = i + d$.

- For consumption: Let $w L$ be services without use of capital. For consumption of the depletable resource we distinguish a fraction s that is sustainable and a fraction u that is unsustainable. Total consumption is $C = (s + u) K + w L$, and we have sustainability when $u = 0$. When $u = 0$ then $K[t+1] = K$, and then we can deduce that $s = g b$, see **Table 14**, so that sustainable consumption is determined by the physical return factor of physical investments.
- From these two: $\Delta = u K$ are the excess user costs or excess investment that are required to keep the resource intact, i.e. in excess over depreciation that fits with sustainability. When consumption is sustainable $u = 0$ then such excess costs are not incurred (with still common depreciation).
- **Table 14** has the calculation as in SNA, with $GDP = C + I = D + NDP$, with u included in D .
- **Table 15** shows how El Serafy would want to do it. The LHS is the same, and the RHS has a separate deduction of (excess) user costs Δ from the stock, like a mutation in inventory levels. He corrects $GDP^* = GDP - \Delta$ and $D^* = D - \Delta$. His arguments are put in the Appendix to this Chapter below.

When u is included in depreciation D then NDP gives sustainable consumption $s K + w L$, while the figure of GDP will be inaccurate by unsustainable depletion u . It depends upon practice, of course, what accounting really manages to achieve. As $u K$ occurs in expenditure flows, it may happen in current accounting that it isn't estimated correctly, or isn't even included in depreciation D , so that in practice not only GDP but also NDP is off-track.

Table 14. The SNA method for GDP and NDP with accurate u

<i>Physical, sustainable if $u = 0$</i>	<i>Nominal, with $p = 1$, and $I = (1 + g) J$</i>
$C = (s + u) K + w L$	$C = (s + u) K + w L$
$J = b K$	$I = r K = (i + d) K$ (gross investment)
$K[t+1] = (1 - s - u - b) K + (1 + g) J$	$K[t+1] = (1 + r) K - D$
$K[t+1] = (1 - u) K$	$D = d K = (s + u + b) K = (r + u) K$
$s = g b$	$r = (1 + g) b = s + b, \quad 1 - u = 1 + i$
$d = s + u + b$	$GDP = Y = C + I = (s + u + r) K + w L$
$0 \leq s + u + b \leq 1$	$NDP = Y - D = s K + w L = g b K + w L$

Table 15. The direct User Cost correction, i.e. not via depreciation

<i>Physical, sustainable if $u = 0$</i>	<i>Nominal, with $p = 1$, and user cost $\Delta = u K$</i>
$C = (s + u) K + w L$	$C = (s + u) K + w L$
$J = b K$	$I = r K = (i^* + d^*) K$ (gross investment)
$K[t+1] = (1 - s - u - b) K + (1 + g) J$	$K[t+1] = (1 + r) K - D^* - \Delta$ with $\Delta = u K$
$K[t+1] = (1 - u) K$	$D^* = d^* K = (s + b) K = r K$ (no user cost)
$s = g b$	$r = (1 + g) b = s + b$, and $r = i^* + d^*, i^* = 0$
$d = s + u + b$	$GDP^* = Y^* = C + I - \Delta = (s + r) K + w L$
$0 \leq s + u + b \leq 1$	$NDP = Y^* - D^* = s K + w L = g b K + w L$

An example is selling the natural resource, putting the proceeds into a bank, and live from the perpetuity. With ρ the money rate of interest, then sustainable income is $s K = \rho K$, so that $s = \rho$. Then $b = 1$ because all money is in the bank, and $1 + g = 1 + \rho = r$. It follows that $GDP = (1 + 2\rho) K + w L$ and $NDP = \rho K + w L$. Normally we do not regard the whole capital as the investment but for money it makes sense. In practice money in the bank is only a financial arrangement and the true return must still come from productive investments.

It also compares to selling the house and rent it back at ρK . Then maintenance is included in the rent, thus one room would be rented to someone else.

PM. This simple model has the following implication. A one time deviation from sustainability causes a one time GDP growth, but also forces to continue to deviate from sustainability for ever more, with $K[t] = (1 - u)^t K[0]$ merely to maintain the income level without any growth. It is only a simple model to clarify a basic idea.

14.6 Environmental sustainability

Above model also applies to environmental sustainability by replacing $s + u$ with $es + eu$, with $es \leq s$ and $eu \geq u$. For example, the home owner must put aside additional investments for an installation of solar panels or heat pumps, or to relocate it because of flooding. Sustainability and environmental sustainability have the same model here, and only different data. However, practical modeling can be different. Mere *sustainability* might rely on actually observed values of the going rate of depleting, while *environmental sustainability* with es and eu would require more involved modeling to come to grips with the current (conservative) expectations on future development.

14.7 Money versus physics

El Serafy only looks at accounting for income. If the home owner proceeds with spending maintenance sums for consumption, so that the house deteriorates, then El Serafy cannot object to this, because his account has entered the accurate value of what would be income. He might regard the valuation of the house as problematic but basically he stays away from stock values, since those are not relevant since they are assumed to remain the same during the accounting period.

El Serafy (2013:3-4):

"A key characteristic of this approach – my approach – is that it avoids deriving the flow accounts from stock values. Important as this link is for theoretical analysis, it becomes a curse for accounting. In my method, stocks remain important, but are firmly place in the background, to be reckoned in physical terms only. Comparing the physical stocks to physical extraction during an accounting period suggests the life expectancy of the resource from the perspective of the current account period. This life expectancy is a fundamental indicator of resource 'sustainability'."

By this he means that the stock might be sold in the market in say 10 years, while the monetary perpetuity is forever. However, those resource proceeds might not be put into a bank or sovereign fund, but might also be spent on consumption. Each new period may start with a lower resource level, without memory of the

original level. Within a few decades the resource may actually be depleted, without any capital left. El Serafy's method makes sure that proceeds from sales are distinguished between income and user costs, but the latter part can still be consumed, which means that the accountant has measured income in a fundist manner but has not measured materialist capital and economic capacity.

14.8 Conclusion

El Serafy received his doctorate in economics at Oxford in 1957, supervised by John Hicks, one of the giants in economics, and also famous for his insistence on proper accounting. El Serafy (2014) laments that this heritage has gotten lost:

- "However, as the economists' interest in studying social accounting faded the accountants and statisticians have taken over, often disregarding the concerns of economics, and disclaiming any hint that the national accounts should be estimating income."
- "Their message in brief is that no adjustment for environmental losses can be expected within the mainframe of the national accounts. This in effect is a death sentence on 'green accounting'."

El Serafy has a point. He is joined by Tinbergen & Huetting (1991).

El Serafy's user cost correction for resource depletion makes some sense within Hicksian income accounting as fundist capital but not for full accounting of materialist capital and economic capacity. The method works e.g. by assuming a nonzero rate of interest but accounting for future generations would rather use a zero rate of interest.

This discussion helps to see why it is important that Tinbergen and Huetting (1991) compare NI with eSNI. GDP contains expenditures that are unsustainable. The comparison of uncorrected GDP to eGDP contains information about the distance to environmental sustainability. El Serafy's $GDP - GDP^*$ doesn't highlight environmentally unsustainable expenditures, while $GDP^* - eGDP$ does not seem to be so informative either.

14.9 Appendix: Arguments for direct deduction from GDP

El Serafy (2014) advises that resource depletion is removed from income altogether. Users of time series of GDP might suggest to do corrections at the level of NDP, because they would want to maintain their series on GDP. El Serafy insists on correcting GDP:

"Any presumption that removing 'royalty' (the capital element) from GDP entries relating to natural resources might be taken care of at the level of estimating NDP cannot be accepted for more than one reason." With my comments:

- "First, NDP is not often reckoned at all, and if reckoned there is no unanimity over the amount to be used for the capital consumption involved." (Comment: But would there be unanimity for correction at the level of GDP ?)
- "Second, natural resource deterioration due to commercial exploitation is not 'depreciation' in the accepted sense; it does not conform to standard wear-and-tear allowances applied at year-end to asset categories, and may in fact amount to as much as 100 per cent of the asset. In the latter case proceeds of the asset sale will all be a User Cost and must be exiled altogether from GDP."

(Comment: Agreed. Gross income still is income and not just expenditure flows. It makes sense to distinguish depletion from wear-and-tear.)

- “Third, (...)” quoted in subsection 14.4. (Comment: In above small model, depreciation can still cover “wear-and-tear” from sustainable use, and it suffices to deduct the *excess* user cost from expenditure flows.)
- “Such economic reasoning appears to escape the concerns of the estimators who have taken charge of the accounts resisting the economic logic behind the ‘greening’ quest.” (Comment: It would help to have a quote & reference by someone who understands the method and still rejects it with an argument.)

15. Advice that eSNI is calculated by national statistical offices

15.1 Advice

National statistical offices have the mission to provide adequate information, and thus they are advised that they calculate and publish eSNI on a regular base.

- Environmental sustainability standards can be *derived* from the scientific literature, and thus are not *set*, but *recorded* in statistics and *referred to*.
- One would also use the (for this purpose) best available economic model.
- There is uncertainty in the standards and the model, yet see the comments on sensitivity analysis below.
- The national statistical offices are also advised to adopt the reasoning in Sections 5.5, 11.3, and Chapter 17, namely for the stewardship on the use of the published figures.

This advice holds in general. See e.g. Nordhaus (2007b) on the USA in Section 29.17. It will be useful to take CBS Statistics Netherlands as an example of the more general situation, because Hueting has developed eSNI there, with in-house discussion and learning. The discussion about CBS & eSNI belongs to political economy and we refer to Chapter 21 for more details.

15.2 CBS as an example for a general case

For an understanding of the situation more in general, with CBS as example, it is useful to mention the mission of CBS. The relevant article 3 (in the recent regulation of 2017) reads, and has the following sub-points: ^{66 67 68}

- “1. The task of the CBS is to carry out statistical research on account of the government for practice, policy and research purposes and to publish the statistics compiled on the basis of such research.
2. The CBS shall be responsible for fostering:
 - a. the provision of statistical information on account of the government which meets the needs of practice, policy and science;
 - b. the accuracy and completeness of the statistics to be published on account of the government;
3. None of Our Ministers shall commission new statistical research or amend existing research without first consulting the director general.”

The changes with respect to article 3 in the regulation of 2003 are the inclusion of points 2 and 3: While Dutch Parliament might request a Monitor of Broad Welfare (MBW) for the completeness of information (under 2), the director general might raise objections against suggestions that are too wild (under 3). The point of completeness is relevant here: a publication of NI is incomplete w.r.t. the environment when eSNI is not published at the same time.

⁶⁶ <https://wetten.overheid.nl/BWBR0015926/2017-01-01>

⁶⁷ <https://english.rijksdienstcn.com/other-services/statistics-netherlands-cbs>

⁶⁸ https://www.cbs.nl/-/media/_pdf/2017/28/statistics-netherlands-act-2017-0101.pdf

The CBS website gives its mission statement (January 2019): ⁶⁹

“In a society where the amount of information is growing explosively, free access to reliable and integral data is crucial. As the national statistical office, Statistics Netherlands (CBS) provides reliable statistical information and data to produce insight into social issues, thus supporting the public debate, policy development and decision-making while contributing to prosperity, well-being and democracy.

CBS was established in 1899 in response to the need for independent and reliable information that advances the understanding of social issues. This is still the main role of CBS. Through time, CBS has grown into an innovative knowledge institution, with continuous adoption of new technologies and developments in order to safeguard the quality of its data and its independent position.”

15.3 eSNI was placed outside of CBS Statistics Netherlands

CBS (1997) ⁷⁰ gives the official statement CBS Statistics Netherlands: ⁷¹

“Statistics Netherlands considers it important that efforts to achieve a sustainable national income are continued. The work done so far by Mr Hueting and others at Statistics Netherlands offers a solid base for this. However, it has become clear that Statistics Netherlands cannot handle the project alone; cooperation with other research institutions is necessary, in particular when setting standards for sustainable use of the environment and in model simulations. In addition, time and again it appears that the subject is apparently sensitive and gives rise to an unusual amount of controversy and misunderstanding. That is why Statistics Netherlands is looking for ways to ensure that research is continued *in the study sphere*; for example at a university institute. The Ministries of Economic Affairs and VROM are active in creating support for a project in the academic sphere.”

Indeed, a bit later Minister of Economic Affairs Hans Wijers and Minister of the Environment Margreth de Boer decided for such calculation, and Section 21.9.6 discusses how this happened. Subsequently, Verbruggen (ed) (2000) presented a *proof of concept*, see Chapter 4.

The Dutch minister of Economic Affairs Laurens Jan Brinkhorst and state secretary on environment Pieter van Geel decided in 2004 that eSNI would be

⁶⁹ <https://www.cbs.nl/en-gb/about-us/organisation>

⁷⁰ <http://www.sni-hueting.info/NL/index.html#CBS1997>

⁷¹ Dutch: “Het CBS vindt het belangrijk dat de pogingen om tot een duurzaam nationaal inkomen te komen worden voortgezet. Het tot dusver door de heer Hueting en anderen binnen het CBS verrichte werk biedt daartoe een solide basis. Het is echter duidelijk geworden dat het CBS het project niet alleen aan kan; samenwerking met andere onderzoeksinstituten is noodzakelijk, met name bij de vaststelling van de normen voor een duurzaam gebruik van het milieu en bij de modelsimulaties. Daarbij komt dat telkens weer blijkt dat het onderwerp kennelijk gevoelig ligt en aanleiding geeft tot ongewoon veel controverses en misverstanden. Daarom zoekt het CBS naar mogelijkheden om te bereiken dat het onderzoek *in de studiesfeer* wordt voortgezet; bijvoorbeeld bij een universitair instituut. De Ministeries van EZ en VROM zijn actief om een draagvlak te creëren voor een project in de academische sfeer.”

calculated by RIVM.⁷² Their text implies that Hueting is author of eSNI and that CBS would be involved only for the availability of basic data. The department at RIVM that looked after the calculations was later made independent as the Milieu- en Natuur- Planbureau (MNP) in 2005-2008, and subsequently reorganised into the current PBL.⁷³ RIVM-MNP-PBL apparently had less affinity with national accounting and stopped calculating eSNI after 2008, apparently without informing others or Hueting, see Section 21.11.7. This process itself has complexity of itself: (i) eSNI was removed of a monitor MDN 2009, (ii) such removal differs from stopping the calculation, (iii) eSNI was included again in the monitor MBW 2018. These developments are discussed in Chapter 21.

In 2019, there is no official statement by CBS Statistics Netherlands that gives a reason why it does not calculate and publish eSNI on a regular base, even while there is the *proof of concept*. Writing to Hueting on June 18 2019, CBS DG Tjark Tjin-A-Tsoi states that eSNI has been included in the MBW, and implies that it will be mentioned again when there are new data.

Above quote of CBS 1997 can be deconstructed:

- (1) Standards for environmental sustainability are not *set* but are derived from the scientific literature. This was in fact done by CBS (in contact with others) for the VU IVM calculations.⁷⁴
- (2) CBS can make models itself, or adapt from models by CPB and PBL.
- (3) The costs for the above are 5 personyears per annum, see Section 20.6.
- (4) The 1997 statement is *formal* and not on *content*. CBS (1997) (likely mostly drafted by Hueting) gives many arguments on content that would lead to the conclusion that CBS would have to calculate eSNI, if it wants to perform its task to calculate national income. This argument on content suddenly meets with the *formal* objections that fall from the sky. There is no reasoned argument that tries to balance the issue on *content in whole*.
- (5) The unusual amount of controversy and misunderstanding derives much from unscientific behaviour within CBS Statistics Netherlands itself, see the Chapters in Part 3. It would be *management* to move such issues outside of the bureau indeed, but this rewards agents with unscientific behaviour. *Better management* would be to maintain criteria of science. When managers observe that they cannot maintain such criteria then they better infer that they are incompetent, and start a search for who would be able to do so.

The thinking at CBS in 1997 is reflected in the paper Van Tuinen (2009), retired, by CBS board member at the time and former director of the department of National Accounts, presented at the OECD and published in the *Journal of Official Statistics*. Van Tuinen's argumentation fails, as is discussed separately in Chapter 25. Observe that there remains a distinction between (official) CBS and this paper. Van Tuinen (2009) refers to the *undisputedness* (Dutch "onbetwistheid") of "regular" statistics published by CBS, as this was also a motto at his time at the board. In 2019 the criterion apparently has become *reliability*. Chapter 25 shows

⁷² <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

⁷³ https://en.wikipedia.org/wiki/Netherlands_Environmental_Assessment_Agency

⁷⁴ <http://www.sni-hueting.info/#Norms>

that this notion of “undisputedness” is problematic indeed. Still, the notion of *reliability* should take account of the distinction between validity and uncertainty, see Section 5.5.

15.4 *Closing comment*

CBS Statistics Netherlands had a sound reputation in the world of official statistics. See Chapter 21 how this came about by work by people like Tinbergen, Oomens and also Hueting. Younger statisticians at CBS benefitted from this reputation but seem to have missed out on some aspects of science.

Van Tuinen (2009) gave what perhaps were the best arguments against publication of eSNI by national statistical offices. His argumentation fails. The advice still stands that the national statistical offices calculate their national eSNI.

16. A short history of the use of the term “economic growth” at CBS Statistics Netherlands

The following short history is important enough to elevate it to the position of a separate short Chapter (and not include it in Chapter 17 or 21).

16.1 During Hueting’s period at CBS 1969-1994

Hueting worked at CBS 1969-1994 and continued as adviser till 2000. His work, also in the subsequent period actually till 2019, requires the understanding that, *in his recollection* (personal communication):

- CBS itself did not use the identification of production growth with “economic growth”. CBS itself used only “growth in the volume of production”.
- CBS was aware that outside of CBS there was this identification of production growth with “economic growth”.

Hueting’s perception of this is much determined by his period at CBS till his retirement in 1994. Apparently he has not been following developments there on this issue. This explains why his work before 2019 doesn’t contain a protest that CBS makes wrong use of the term itself.

This also explains that Hueting sees only a role for CBS to explain *to outsiders* that it is improper to identify *production growth = economic growth*.

This also fits the discussion in Chapter 25 of Van Tuinen (2009), on the role of a statistical office to educate its users on the meaning of the statistics. See also Section 11.3 on the role of the Department of National Accounts versus external users of those accounts.

16.2 Now in 2019

However, in 2019, CBS Statistics Netherlands identifies *production growth = economic growth*. See footnotes 77-79. CBS (2016) in presenting the National Accounts 2015 speaks about economic growth while making the identification, and without warning about a possible confusion with economic welfare.

16.3 Apparently a switch in-between

Thus somewhere in-between, likely after Hueting’s retirement in 1994, CBS switched to the identification.

In Holland, CPB was the agency that estimated and used the term “economic growth”, for example CPB (1966:1). CBS only followed at some distance. Van Rossum, Notten & Eding (2018) look back on 75 years of National Accounts in the Netherlands, and report on p5-6:

“Equating GDP development with economic growth is a relatively recent phenomenon. Although the national accounts system celebrates its 75th anniversary in 2018, GDP has only been at the center of CBS’s macro-economic reporting since the mid-1980s. Before that, GDP was in the margins of the Dutch national accounts. Regular reporting on the

development of the size of the Dutch economy did not occur until long after the Second World War.

The development of the volume of GDP in the Netherlands was only published for the first time for the 1981 reporting year in the annual book of tables of national accounts. Only then had a method been developed to accurately calculate annual volume changes. But also for the 1981 reporting year the development of the volume of GDP was not nearly as central to the publication as it is today.

It was only for the 1986 reporting year (published in 1987) for the first time that, by means of a new setup, the volume of GDP was given a prominent role in the book of tables of the national accounts. From that moment on, this indicator was central to the first summary table of the book. For the first time, the change in volume of GDP was presented moreover as "an indicator of economic growth". [CBS (1987), *Nationale rekeningen 1986*. p19] In the same period, March 1986, Statistics Netherlands also released quarterly data for the first time. Here too, the development of the volume of GDP was (and is) central."

Indeed, from my period at CPB I recall that Sake de Boer around 1987 presented the new CBS deflated input-output tables.

The distinction between "indicator of economic growth" and "economic growth" would fit the hesitation around 1987 to adopt the identification. This fits Hueting's recollection that the identification wasn't made in his period at CBS.

Unfortunately, the authors do not tell exactly when the identification was made, and why. One can imagine that users looking for "economic growth" in CBS publications might grow frustrated when they cannot find such a figure. Yet, in Hueting's period at CBS this apparently wasn't seen as a problem, so, what changed ?

17. Advice to have an international conference on the definition of the term “economic growth”

17.1 Introduction

Sometimes international scientific conferences succeed in establishing standards, like recently on the kilogram. Within economic science there is a fundamental confusion about the term “economic growth”. It is advisable to have an international conference to establish a sound definition.

Lionel Robbins (1932) stated about the subject matter of economics that it “studies human behaviour as a relationship between ends and scarce means which have alternative use”. The field in economics that stays close to this definition is called “welfare economics”. There has been a development within economics that is less strict, i.e. “non-welfare-economics”. National accounting has roots outside of Robbins’s definition. Let us relate this definition of economics to these issues of income, production and growth. There is a distinction between (i) the *term* “economic growth” and (ii) the *definitions* for which the term is intended to stand. Outside of welfare economics, the *term* “economic growth” has become internally inconsistent, like “square circle”.

Below we will first review consistent terms and definitions (that the conference is advised to adopt) and then look at the current chaos and the likely history how this chaos originated.

17.2 Consistent terms and definitions

An enlightened use of terms would help to diminish confusion:

- (a) Currently, the “economic growth” of a country is defined – *outside of welfare economics* – as the relative increase in the market value of the goods and services produced by its economy. Let us put a stop to this definition. There is no loss in economic and statistical accuracy to replace this by stating that: The “production growth” of a country is defined as the relative increase in the market value of the goods and services produced by its economy.
- (b) Economic modeling and national accounting cannot avoid the technical use of the equality of *production* = *concurrent income*, or *income* = *concurrent production*.⁷⁵ There is still some freedom in stewardship in how to present it. Keeping GDP as *production*, then what is *income* depends upon the particular use and need of definition, like for example GDP according to SNA, for taxes and budget deficits, and, alongside GDP, eSNI = eGDP according to its methodology, for environmental policy making.
- (c) Who intends to speak about increase in welfare can do so, and specify it.
- (d) Subsequently, “economic growth” is superfluous, and can be avoided as another confusing *term* like “square circle” (see below), except for consistent use in welfare economics. A welfare economist who notices the use of the *term* “economic growth” would tend to protest when it is not used in welfare theoretic

⁷⁵ *Concurrent* means that the levels must apply at the same point, see e.g. **Figure 5**.

manner. It is advisable that economics and statistics succeed in a joint redefinition for it to refer to welfare.

- (e) For example, Article 3 of the Treaty on European Union ⁷⁶ then can be edited with: “It shall work for the (also environmentally) sustainable development of Europe based on balanced production growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment, with at least respect of environmental sustainability standards.”
- (f) PM. When e Δ -A grows fast then this cannot be claimed as a *full* success when the distance e Δ -A = NI-A – eSNi is not getting (significantly) smaller. Thus growth is not sufficient by itself.

17.3 Two definitions for the same term: this is asking for problems

Section 11.3 referred to the stewardship by national statistical offices with respect to the use of the published figures.

Hueting & De Boer (2019b) derive *from the subject matter of economics*:

“Economic theory does not call for continuing growth of *production*. Economic growth can mean nothing other than an increase in welfare – i.e. the level of satisfaction of needs or wants.”

Outside of welfare economics, namely in both *non-welfare-economics* and *economic statistics*, including national accounting, the “economic growth” of a country is currently defined conventionally, in conflict with the latter statement, as *the relative increase in the market value of the goods and services produced by its economy*. ^{77 78 79} Outside of welfare economics, economic growth thus *is* defined as the growth of *production* (GDP). Thus:

- Economic science has *two definitions* for this same *term*. One in welfare theory and one outside of it. It is unscientific that a science allows that there are two definitions for the same *term*.
- There are also *two terms* for the same notion, *economic growth* = *production growth*, which is not inconsistent, but might still be confusing, if not for experts then for lay users.

⁷⁶ The current article reads: “The Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance.”

⁷⁷ For example, the website of CBS Statistics Netherlands defines “economic growth” as “The growth of the volume of GDP (frequently in market prices).” The page devoted to “economic growth” (with that title) explains it in layman’s terms as a measure for the “size” of the economy. If the economy = GDP then logically *growth of GDP* can be presented as *growth of the economy*. Then it is a matter of language to express the latter as “economic growth”. However, “*economic growth*” differs from “*economy growth*”. This is not merely poetic freedom.

⁷⁸ <https://web.archive.org/web/20190116194524/https://www.cbs.nl/nl-nl/onzee-diensten/methoden/begrippen?tab=e#id=economische-groei>

⁷⁹ <https://web.archive.org/web/20190111105726/https://www.cbs.nl/nl-nl/reeksen/economische-groei>

17.4 *Subject matter of economics versus historical happenstance*

The *term* has a history that can be clarified by reference to **Figure 5** on page 42.

- In an optimal point S or U we find (i) production in the PPF, (ii) the indifference contour of the Social Welfare Function (SWF), (iii) the tangent that gives income. With these three notions, economic theory has no need for the *term* “economic growth”.
- The *term* came into circulation in the 1930s or before when all indicators moved in the same direction, while welfare is unobservable and when income could be regarded as a fair indicator. In the 1930s “*more*” meant “*better*”, and an outward move gave a joint rise of production, income and welfare.
- The *term* “economic” basically refers to the subject matter of economics. It associates with *prudence, effectiveness and efficiency*, and when the latter grow then this would tend to be seen as positive. Potentially in the 1930s this was a seductive embellishment of the notion of merely production growth. Perhaps some authors wanted to overcome the distinction between material production and services, and then opted for the general denominator “economic”.
- This situation has now changed. Since the 1960s, “*more*” production could also mean less environmentally sustainable, and might mean “*less*” welfare, depending upon the hypothesis. In **Figure 5** there is not only the conventional outward movement but also the inward movement because of a conditionality on environmental sustainability – with awareness that also point U is conditional to assumptions.

With this history, we can understand that there are two terms for the same thing, namely *production growth = economic growth*. It came about by happenstance, without rational scrutiny.

Contrary to this happenstance, there are the foundations of economics with the subject matter of economics and welfare theory. Those are not haphazard, but scrutinized, and those result into the alternative view given in Section 17.2.

17.5 *Considerations to define the term uniquely and soundly*

Welfare economics thus invites economists to change the use of the *term* outside of welfare economics and to switch to “production growth” – which is quite unlikely to happen just by itself.

The strongest argument is to distinguish the *term* and the underlying *definitions*. Outside of welfare theory, the *term* “economic growth” has become internally inconsistent, like “square circle”.

- In the same way, zoologists might define *cow = horse*, yet people would know that these are different animals. The definition would be internally inconsistent since some properties associated with the one animal conflict with some properties associated with the other one.
- The *term* “economic growth” associates “*economic*” with *prudence* but it sticks upon a *definition of growth* that invites the destruction of the ecology which destruction threatens the survival of humanity – which is not prudent. This is inconsistent.

A sanatory use of terms comes with the consideration to refrain from using the *term* at all, unless the various fields of economics can come together in agreement, to refresh the awareness about the subject matter of economics, and to identify “economic growth” with increase in welfare indeed.

Economics is sometimes called imperialistic, i.e. that it encroaches upon other fields, like for example public choice, behavioural economics, and so on. On the use of the *term* “economic growth”, welfare economics has an imperialist claim on other fields of economics. Welfare economics has been doing so from the early 1900s but the risks on environmental sustainability like global warming and rising sea levels have raised the stakes.

There is every reason to be wary of production growth. The production growth as measured using GDP indicates a physical volume. Its growth is generated mainly by the sectors that burden the environment the most, see Hueting (1981b), Tinbergen and Hueting (1991), the CBS *Methodology of eSNI*, Hueting et al. (1992d) appendix 3, and De Haan (2004). Thus the *term* that is used for this production growth should be chosen with care. When the *term economic growth* is used, with suggestion of welfare (and prudence, effectiveness, efficiency), then this causes a wrong compass. It is simply better to use the *term production growth*, because that is what it is.

Economic growth theory can also be called production growth theory – and it is often about GDP that has “product” in its name.

Economics as a field and profession suffers in reputation and attractiveness when it uses terms with multiple meanings and when it becomes associated with destruction of human survival and living conditions instead of enhancing welfare, as it originally started out.

Remarkably, some (non-economic) researchers who rejected the impact of “economic growth” upon the environment, also rejected contributions from economics *in full* – see Røpke (2004). Economic analysis itself got tainted by negative impacts of production, and economists were labeled as advocates for this, merely because of being economists. With insufficient understanding of economics those researchers – and perhaps a part of the general public – were wrongfooted by the *term* “economic growth”. With their rejection of economics, these researchers were less effective in dealing with economic policy making. Better terminology will open up a wider audience for better understanding of economics.

Some economists propose to abolish GDP, see Van den Bergh (2006). Economist Hoekstra did a thesis under Van den Bergh’s supervision, then was at CBS, and now in 2019 presents a book “Replacing GDP by 2030”, see Chapter 27 below. This is a curious proposition. GDP is not the issue, since production can be a component of welfare, and GDP is required for the distance $e\Delta - A = NI - A - eSNI$. Why would one wish to replace this ?

There is a distinction between (i) GDP in levels, and (ii) the equation *economic growth* = *GDP growth*. The present discussion only concerns the *term* “economic growth”. The present discussion in this subsection does not concern: (a) GDP and its measurement, or its publication by national statistical offices, (b) the distinction between level and growth, (c) the point that GDP can be a component of welfare,

and GDP growth too. None of these aspects are at issue in this subsection. However, the *term* “economic growth” shouldn’t be equated with GDP growth.

With the experience since the 1960s of structurally inoptimal stewardship by the national statistical offices w.r.t. the *term* “economic growth” it seems an unavoidable conclusion that it is better to refrain from using the *term* “economic growth” instead of trying to educate people – policy makers, researchers, teachers, journalists, voters – to apply the *term* in a better manner. Apparently the choice of technical *terms* must take into account that their adoption by users can imply their wrong interpretation. The current *term* comes with high costs to undo such wrong use. Stewardship shoots itself in the foot by presenting something that immediately must be undone again. First learning to use something and then unlearning again is quite difficult and inefficient. Apparently there are some deep psychological hooks (like welfare, prudence, effectiveness and efficiency) in the *term* that keep users, but also economists and statisticians, hooked onto the wrong formulation and thus also wrong belief.

Economics and national accounting use the equality *production = concurrent income* (see also the optimal points in **Figure 5**), and while income tends to be agreeable, production can also concern costs that must be deducted from revenue to arrive at income proper (thus at a different level of concurrency). The *growth of GDP* can be seen as the *growth of activity in the economy*, and users would understand that this may also concern costs: for example when dikes must be raised and houses must be repaired from hurricane damage. Growth of production is not necessarily a good thing, while growth of income would be so, if it really is income. It are only conventions in national accounting and its presentation that cause the wrong emphasis in the application of said equality.

When laws and regulations speak about “economic growth” then lawmakers better specify whether they mean production growth or the growth of welfare. National statistical offices might be forced by law and regulation to publish figures on “economic growth”, even when there is this duplicity in meaning. The bureaus can invite lawmakers to become more specific.

17.6 Example of a panel

While the above explains how the *term* would be used properly, it is instructive to consider an example of confusion in conventional use. This example is presented by a panel of Dutch economists, see Van Dalen and Koedijk (2013), who score agreement, disagreement or blanks on economic statements:

- (1) “In practice, promoting economic growth [production growth] is at the expense of preserving the environment”: agree 54%, disagree 25%, other blank.
- (2) “Despite emphasizing environmental objectives, the government still rewards unsustainable behaviour and makes sustainable behavior more difficult”: agree 65%, disagree 7%, other blank.
- (3) “When governments publish Green GNPs politicians and policymakers will make more efforts to preserve the environment and to limit global warming”: agree 35%, disagree 48%, other blank.

With changing weather patterns, such awareness is likely to rise, though the figures are difficult to interpret: perhaps 54% think about conventional production

that damages the environment and perhaps 25% think about elimination measures that work out well for both production and environment.

Considerations are:

(a) In non-welfare terms, Question (1) is not about welfare, and basically about production and technology. The members of the panel are likely to interpret "economic growth" as growth of GDP. The statement likely is, and interpreted as, about either at the *production efficiency frontier* (**Figure 5**, PPF at U), or a move outward from that frontier. A prime notion in economics is that, *at efficiency*, a gain of some good thing comes at the loss of another good thing. Above statement suggests that a gain in a "*good thing of production*" comes at the cost of a "*good thing of the environment*". The question basically seeks confirmation that the members of the panel are economists indeed. The members of the panel would understand **Figure 5**, though likely in the sense of "more is better" as in the 1930s, and less likely in terms of Huetting's conditionality on the preference for sustainability. A recession with negative growth might be seen as positive for the environment, technically, but not necessarily as welfare enhancing, because of the loss of production.

(b) In terms of welfare, production may *not* be a good thing when it damages the environment. The simultaneous reduction of production and gain in environment might be welfare enhancing. The statement and the interpretation by the panel likely is not about *economic efficiency* (Pareto optimality) or *attainment of social welfare* (the move from SWF-? to SWF-S).

(c) If the members of the panel are well-versed in welfare economics, then they would make proper distinction between production and welfare. However, they might not be so well versed. The latter likely would also hold for a general audience that reads their report. Confusion about production and welfare cannot be simply excluded. Under such circumstances the *term* "economic growth" suggests the context of welfare, and we cannot exclude such undertones. This diagnosis refers to the *term* and not to the conventional definition on production, and the expert understanding by those who employ the latter (non-welfare) definition. The statement then would read as that "the increase of economic welfare comes at the expense of the environment": with 54% agreement. This would be the outward movement in **Figure 5**, and advocacy against environmental sustainability (i.e. the inward move from SWF-? to SWF-S). Perhaps the 25% are aware that "less" (production) is "more" (welfare).

(all) Question (1) of this panel thus has the risk of confusion, with potentially also opposite meanings of support and rejection.

This example highlights the problematic nature of the *term* "economic growth" when not used consistently within only the proper welfare theoretic interpretation.

Hopefully the panel will read this book and reconsider Question (3). Publication of eSNI will enhance clarity about the current situation, and also cause more people to study what it means. For who has doubts: it is a no-regret policy to provide for more information.

18. *eSNI and the definition of statistics*

18.1 *Abstract*

eSNI fits the definition of statistics. The property of being a statistic does not imply that a national statistical office would need to calculate it.

18.2 *Summary*

This discussion presumes that the reader has studied the definition of national income (NI) and environmentally sustainable national income (eSNI), see Hueting & De Boer (2019b). The figure of NI is an important statistic for most areas where it is used but it is problematic when used in policy making on the environment when it is not used alongside the statistic provided by eSNI.

For statistics on the current year of observation, the only (direct) facts are the raw data or “ground materials”. Preferences are unobservable but expenditures in money are. The sum of the expenditures on consumption and investment must be equal to the sum of wages and capital earnings (value added). The definition of income uses the notion of capital depletion. When a nation depletes capital to finance expenditures then it lives above its means (income). The System of National Accounts (SNA) defines accounting rules to calculate “national income”, yet those rules do not consider sustainable use of environmental functions. eSNI identifies what part of NI is not *income* but only *expenditure*, by which the current generation lives above its means w.r.t. future generations. Thus both NI and eSNI use the same raw data and only have different rules of accounting. The measurement problem of unobservable preferences can be solved by making conditional assumptions on the preference for environmental sustainability.

This distinguishes: (i) For welfare theory as relevant for policy makers there are different assumptions on the unobservable preferences. (ii) For national accounting there are different definitions of income, with different rules of accounting and methodology. For the latter, eSNI fits the definition of statistics.

The observation “*eSNI fits the definition of statistics*” should not be confused with the statement that it would fit the mission of a national statistical office like CBS Statistics Netherlands to calculate eSNI. The latter issue is not discussed here. We may still state though: A national statistical office will make a judgement on relevance and reliability when NI is used for the purpose of environmental policy making. A national statistical office, likely in collaboration with other agencies, would tend to present eSNI alongside NI, and present the distance $e\Delta = NI - eSNI$, when it recognises the importance of the precautionary principle for both policy makers and voters (who want to judge their performance), and when it recognizes the misleading character of NI for the use in environmental policy making: (i) when the bureau itself presents NI as “income” while it may contain expenditure above the nation’s means, or (ii) when policy makers and voters use NI as a (sole) indicator of welfare.

18.3 *Introduction*

Alongside national income (NI) there are NI minus asyms (NI-A) and environmentally sustainable national income (eSNI), defined by Hueting in 1986 with a recent restatement by Hueting & De Boer (2019b). All figures are required

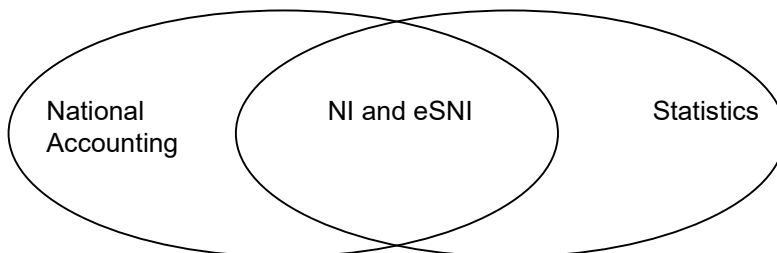
for calculating the distance to environmental sustainability $e\Delta-A = NI-A - eSNI$. A recurring issue is whether eSNI fits the definition of statistics.

- In 1994, then minister for Economic Affairs J.E. (Koos) Andriessen stated that eSNI was “more econometric research than descriptive statistics”.
- His successor G.J. (Hans) Wijers stated in 1996 that eSNI is “not statistics” because “it does not represent actual, directly measurable events”.

Those quotes are of an older date but the issue still surfaces on occasion, and the ministers were actually quoted recently by Oosterhuis et al. (2016) in a report to the World Bank’s WAVES without immediate correction, see below.

In Section 7.4 we stated the difference between national accounting (rules) and statistics (reality). Accountants have a tendency to use spreadsheets and statistical researchers at academia have the tendency to use programs like R.⁸⁰ National income is a result of national accounting, and some rules seem so arbitrary that one may begin to doubt whether it would fit the definition of statistics indeed. This Chapter will argue that figures like NI and eSNI have a home base in national accounting but still belong to statistics, see **Figure 12**. A figure like the national budget deficit might be so much dependent upon arbitrary rules that one might conjecture that it does not reflect some real statistical variable, see Colignatus (2020), but this might also raise the question whether national income can be regarded as a statistic if an underlying factor like the deficit is not. For the present discussion we depart from economic theory, which has a relevant notion of national income, and we consider the idea that national accounting provides a way to measure it, in a manner that fits what is commonly accepted as statistics.

Figure 12. National accounting versus statistics



There may not be a commonly accepted definition of statistics. The distinction between descriptive statistics and inferential statistics is common though. Rijken van Olst (1969abc) (in Dutch) – who wrote his thesis with Jan Tinbergen and who had been head of the CBS department of Business Cycle Analysis and Mathematical Statistics and became professor of statistics and econometrics in Groningen – adopts these conventions, and regards a trend analysis as a “statistical prognosis” since the mere extension to $t + 1$ does not explicitly rely upon expectations about the future. The following uses Mood & Graybill (1963:1): “*We shall describe statistics as the technology of the scientific method.*”

⁸⁰ <https://www.r-project.org/>

eSNI fits the methods that Mood & Graybill and Rijken van Olst identify as belonging to statistics. Thus it fits their definition of statistics. This answer might be acceptable to statisticians.

The statement “eSNI is not statistics” need not refer to whether eSNI is a statistical variable – which it is – but rather to the issue whether an official statistical office would need to calculate it. Looking into this issue would lead too far for this Chapter, and we refer Chapter 15 and e.g. to Colignatus (2009b, 2015) “*The Old Man and the SNI*”, included and updated in this book in Chapter 21. See also Section 11.3.

For this present Chapter it remains useful to respond to the statements by ministers Andriessen and Wijers around 1995, especially when they are referred to in 2016 without immediate correction.

Participants on this issue, and not only the ministers but also officials at CBS and PBL, seem to think that the current situation is one of decision making under certainty, and that NI can be taken at face value as income, as SNA and CBS Statistics Netherlands present it. However, NI is only income in current law and regulations. The issue of the environment turns the policy setting into one of risk management, with an important role for the precautionary principle, and conditions on preferences. With decision making under risk, we find that NI may not be income but expenditure above available means. Information management requires the awareness – that Tinbergen and Hueting have but others apparently do not have – that we are dealing with decision making under uncertainty, and that this affects national accounting too. There are two aspects: (i) *Within statistics*, there is the statistical definition of income given by the methodology of eSNI, (ii) *About statistics*, there is the stewardship by statisticians w.r.t. the use of published figures. When users mistake NI for a (sole) indicator of welfare, then statisticians can now refer to Hueting’s extension to welfare economics on environmental sustainability.

18.4 Definition of statistics by Mood & Graybill 1963

Mood & Graybill (1963:1):

“In order to place this book in its proper perspective, it is necessary to consider first what statistics is. The lay conception of statistics ordinarily includes the collection of large masses of data and the presentation of such data in tables or charts; it may also include the calculation of totals, averages, percentages, and the like. In any case, these more or less routine operations are a part, but only an incidental part, of statistics. Statistics is also concerned with the design of experiments, the design of sample surveys, data reduction and data processing, and many other things.

We shall describe statistics as the technology of the scientific method. Statistics provides tools for making decisions when conditions of uncertainty prevail. These tools may be of quite general application and useful in any field of science – physical, biological, social, etc. They are applicable not only to the scientific world but to the business world and

the world of everyday affairs as well. On the other hand, certain tools may be particularly designed for special fields of research.

Statistics can be divided into two broad classifications: (1) descriptive statistics, which is concerned with summarizing data and describing these data, and (2) inferential statistics, which is concerned with the process of using data to make decisions about the more general case of which these data are a part. The process of making decisions about general situations on the basis of incomplete information that is contained in sample data is hazardous and cannot be done with certainty; probability is a measure of this uncertainty. There are two types of uncertainty with which we must contend: (1) uncertainty due to randomness and (2) uncertainty due to our ignorance of the true state of the system.”

These paragraphs still stand. With Big Data it may sometimes be possible to collect the whole population so that sampling and its methods of inference may become less relevant. The phenomenon of Big Data however does not affect the distinction between statistical description and statistical inference itself.

18.5 Institutional framework

Countries tend to have an institutional distinction between a statistical office that collects the raw data and does statistical elaboration, and a planning bureau that uses the elaborate data.

In the USA there are the Bureau of Economic Analysis (BEA) and the Bureau of Labor Statistics (BLS) versus the Council of Economic Advisers (CEA). In the Netherlands there is CBS Statistics Netherlands versus the Central Planning Bureau (CPB).

We find that both types of institutes use the same methods discussed by Mood & Graybill (1963) and Rijken van Olst (1969abc) but that the statistical offices use *in-sample data* while the planning bureaus typically use *out-of-sample expectations*. Planning bureaus are well-known for the use of models, yet the use of a model is part of the techniques that Mood & Graybill and Rijken van Olst recognise as belong to the toolbox of statistics. At CBS the Keller (1980) model was used for studies on taxes.

18.6 Example of price and volume indices

Statistical offices may publish raw data but tend to publish elaborations upon them. It is not uncommon for statistical offices to provide the public with an estimate of a price index and also inflation as the relative change in the price level. For a statistician it might suffice to present an estimate and not proceed with inference. An example of inferential statistics would be to answer the question whether this year's inflation differs statistically significantly from last year's inflation. Such a question would still be statistics proper.

For a price or volume index we may identify some levels of elaboration, that start after the collection of raw data about various items, say of consumption:

- (a) Parameter free methods like those by Laspeyres or Paasche or Törnqvist. We can also chain Laspeyres volumes and Paasche prices.
- (b) More complex formulas with administrative parameters, e.g. for depreciation.

- (c) Models with error terms, like on hedonic aspects, e.g. $p = f[x, p - u] + u$, in which p might be the ‘observed price index’ according to (a) or (b), and $p - u$ is the ‘true price index’ exclusive of the ‘observation error’ u . Potentially a Big Data model uses the data at a low level. If u is small then there would be no essential difference between p and $p - u$, and modeling must serve other purposes. For example when errors over two periods $u[t-1]$ and $u[t]$ have an opposite sign then the ‘true underlying inflation’ may be affected significantly.

The raw data are at the micro level. The mere arithmetic on these data constitutes a transform that maintains the notion of “data”, yet we should not overlook rules about which is added to what.⁸¹ There is more theory when not all transactions are covered though. While economic agents react to the relative prices in the raw data, an assumption of (b) and (c) is that also something like the “price level” may affect behaviour, for example via real income and a role for money illusion. Methods in (c) conform with statistical inference in Mood & Graybill (1963) and Rijken van Olst (1969c).

18.7 Latent variables

When a model is used on in-sample data then this could generate latent variables for that sample. Above subsection has the example that p would be observed directly under (a) or (b) or (c), and that u and thus also $p - u$ are unobserved, or “observed indirectly”. This is generalised to the notion of latent variables. Bollen (2002:607):

“Unmeasured variables, factors, unobserved variables, constructs, or true scores are just a few of the terms that researchers use to refer to variables in the model that are not present in the data set. Many definitions of latent variables appear implicitly or explicitly. We can distinguish between nonformal and formal definitions.”

18.8 Having no observation versus observing that there is nothing

Authors writing about eSNI and SNA may set up an argument that might seem convincing by verbal expression but we should be wary of the pitfalls of language, and request a development based upon econometrics.

Sherlock Holmes, in “*The Hound of the Baskervilles*” regarded it as significant that the hound did *not* bark. Consider also:

If it didn’t happen then it happened that it didn’t happen.

The crux actually is that a variable originally was not observed but now is included in the list of observed variables.

For this hound, it depends upon convention how a situation is described most efficiently, e.g. in terms of barking or remaining silent. When the situation is described in terms of decibels then the value 0 would be recorded as a fact too, even while 0 means that it didn’t occur. Recording what did not occur remains statistics. When a statistician might desire to only record what actually occurs, and

⁸¹ National income is not merely the arithmetical sum of all income in the raw data, since there are also conventions of bookkeeping about which post goes where, see for example asymmetric bookkeeping in Chapter 12.

finds that 0 means that something did not occur, *so that it cannot be recorded statistically*, then it might be recorded that the hound was x% silent, with a value x that still means not-barking. This measure x would have a range of uncertainty.

However, the crux remains the *complete* observation of a particular topic of interest, and *not omit a relevant variable*. When the topic of interest is economics and the environment then eSNI better is not omitted. When eSNI is included, then it also makes sense to consider the observational properties of both NI and eSNI.

Since the CBS *methodology* for eSNI in 1992, thus for some 25 years, the discussion about it has had much attention for uncertainty and unreliability – rather neglecting the issue of validity⁸² – but it might also be that the discussion got stuck in a pitfall of language.

De Haan, De Boer and Keuning (2001) give an irrational statement. Remarkably, De Boer, who has been supporting Hueting in the implementation of eSNI, did not block this irrationality, see Section 21.9.8. In Hueting & De Boer (2019b:120) he withdraws this as an error and oversight. Many (economic) statisticians might not see this irrationality upon first reading; or, when alerted to it and having acknowledged it, they may still relapse to it at unpredictable moments in a discussion about eSNI. The problematic statement is (my italics):

“The manner of calculating green national incomes such as the eSNI was developed at IVM in collaboration with CBS Statistics Netherlands, on the basis of the work by Hueting [ftnt]. Statistics Netherlands takes the view that this has given a firm implementation to Hueting's ideas, but realizes at the same time that the outcomes are subject to large uncertainties because these are model calculations concerning a *situation that did not actually occur*. The main task of CBS is to *describe reality, as in the NAMEA system*, and, as an independent institute of knowledge, to provide clarification about the concepts, such as the limited value of actual national income as a welfare indicator and the possibilities and limitations of alternatives such as eSNI, and to support model simulations of the past and for the future.”⁸³

If current reality is not environmentally sustainable – *which above quote agrees with* – then the estimated distance $e\Delta-A = NI-A - eSNI$ correctly records, with some range of uncertainty, that it is *not*, and thus records an aspect of empirical reality – *which above quote does not agree with* (for only NAMEA would give it).

The quote thus is an expression of maddening irrationality.

⁸² This book Section 5.5.

⁸³ Dutch: “De berekeningswijze van groene nationale inkomens zoals het dni zijn bij het Instituut voor Milieuvraagstukken ontwikkeld in samenwerking met het CBS, op basis van het werk van Hueting [5]. Het CBS stelt zich op het standpunt dat daarmee een stevige uitwerking is gegeven van Hueting's gedachtegoed, maar realiseert zich tegelijk dat de uitkomsten met grote onzekerheden zijn behept omdat het hier gaat om modelberekeningen van een situatie die zich niet feitelijk heeft voorgedaan. Het CBS heeft vooral als taak om de werkelijkheid te beschrijven zoals in het NAMEA-systeem, om als onafhankelijk kennisinstituut tekst en uitleg te geven over de concepten, zoals over de beperkte waarde van het feitelijk nationaal inkomen als welvaartsindicator en de mogelijkheden en beperkingen van alternatieven zoals het dni, en om ondersteuning te bieden bij modelsimulaties over het verleden en voor de toekomst.”

If X is the situation and Y is not the situation, then $X - Y$ again is the situation with respect to the difference. Thus it is irrational to reject the calculation of Y if you are interested in finding the distance $X - Y$. See section 7.6.

It is apparently only through accepted procedures in econometrics, and awareness how statistics are being used in economic policy making, that such linguistic pitfalls can be steered around.

There is a further development on this line of reasoning that leads to counterfactuals, see **Appendix B**.

Court proceedings on murders would be quite different when the suspects would have had no alternative course of action. Stated differently: it would be a fact *what the options were*. Some might argue that various supposed options were not realistic, and there could be observation error on this indeed.

With the latter analogy we arrive at a different identification of NI and eSNI.

- We can express NI as a weighted sum of the use of the environmental functions at current intensity, expressed in current market prices.
- We can express eSNI as a weighted sum of the norms, in shadow prices.

Thus the comparison of NI and eSNI is like the comparison in a court case between an act and an alternative. Current reality is unsustainable, measured by NI, but *how much unsustainable* is estimated by $e\Delta - A = NI - A - eSNI$.

Finally, we are looking at levels of income NI and eSNI. In above quote, De Haan, De Boer and Keuning (2001) claim with certainty that environmental sustainability did not occur. However, this is not really Hueting's point. His point is that we cannot know the *preferences* about this. The incomes NI and eSNI are true levels of income, conditional to assumptions on those preferences. NI is only income under the SNA assumption of "keeping capital intact" by adopting legal conventions on capital. This assumption has the ease of convention but is not reality per se. In reality preferences might be quite different, and people might prefer to to "keep natural resources intact". Thus, the De Haan, De Boer and Keuning (2001) quote essentially misrepresents the argument given by Hueting, by hiding the uncertainty in what they present as certain and factual.

18.9 Application of these notions to eSNI

Welfare theory points to problems in observation as well. When the market mechanism is distorted and when prices are non-optimal then decisions by consumers and producers may not be truly welfare enhancing. By consequence, when NI is constructed via the method in SNA, also for legal notions of income, then this construction does not satisfy the conditions w.r.t. measuring income related to welfare. Though SNA describes the steps to be taken, SNA is less clear on where those steps deviate w.r.t. the purpose for economic welfare. For welfare theory, the construction in SNA is conditional to the assumption of optimality. We should be careful not to treat the outcome of the SNA process as fitting that assumption.

The situation w.r.t. NI and eSNI relates to what Mood & Graybill (1963) call "(2) *uncertainty due to our ignorance of the true state of the system*." The best way to summarise the situation is that, *for welfare theory*, both NI and eSNI are figures that are *conditional to their different assumptions*. We generate information about

the true state of the system by comparing the outcomes, in particular their path over time. eSNI doesn't replace NI but actually needs it for the comparison.

The theory of eSNI with its alternative concept of income also leads to a particular practical methodology for accounting. At the practical level we have three ways to account for income, NI, NI-A and eSNI, and the interpretation in terms of welfare economics is not relevant for accounting on itself. What is "income" in terms of one definition and account need not be "income" in terms of another definition and account. When a statistician presents NI as income, with reference to the legal regulations on what is reckoned as personal and company income, then this only presents part of reality and it does not clarify that this is not income under the other method of accounting.

For NI and eSNI we have these levels of elaboration:

- (a) NI is basically parameter free, but there might be some administrative parameters, like different rates of depreciation per type of equipment. All however depends upon rules of accounting, see asymmetric bookkeeping.⁸⁴
- (b) Real NI uses indices of prices and volumes (perhaps with parameters).
- (c) The methodology of eSNI uses a model and a definition of environmental sustainability to estimate an in-sample latent or "unobserved" variable.

Aspects of eSNI are:

- (i) Environmental sustainability concerns a long term condition on environmental sustainability but the estimate of the current level of eSNI conforms with the sample period of NI.
- (ii) Only in-sample assumptions are used, like current population and state of technology.
- (iii) The model uses the methods of inferential statistics. There may be discussion within the institutional setup whether eSNI would have to be calculated by a planning agency that is more at home in modeling the economy, rather than a statistical agency, that is more at home in using parameter free techniques. The definition of eSNI however was designed to remain within the confines of statistics proper. It remains useful to distinguish the construction of a *statistical figure* from the construction of *policy scenarios* for the future.
- (iv) On reliability: the estimate for eSNI comes with uncertainty, but from scientific origin. Experience over time will help to reduce this uncertainty. See below.

We can conclude that eSNI fits the definition of statistics in Mood & Graybill (1963) and Rijken van Olst (1969abc).

- eSNI is a latent or "unobserved" variable that can be estimated for a year in the past. We may also say that eSNI can be "observed indirectly".
- *The present discussion thus only concerns properties of eSNI, not whether it is statistics.*
- *Within statistics:* Both NI and eSNI use the same raw data and only have different rules of accounting. At the practical level of income accounting, they are two concepts of income. What is counted as income in one account need not be income in another account.

⁸⁴ See Chapter 12.

- *About statistics:* For policy making there is the perspective of welfare economics: The interpretation of the variables depend upon different assumptions on the unobservable preferences.
- There is an interaction between the accounting rules and economic theory: the estimate of eSNI requires economic theory and econometrics for the creation of the model.⁸⁵
- One might reject decision making under risk and the conditionality of the assumptions on preferences, yet one cannot reject a definition when it is well-defined, while a rejection of an area of application requires argumentation.

We may hope that a statistician does not force NI upon the process of policy making on the environment for which it is invalid, merely because of the existence of SNA. Conceivably, a statistician might reject that the present context is one of decision making under risk, with the conditionality of the assumptions on preferences, and state, alternatively, that SNA merely follows rules of accounting that have become convention by international agreement. In that case, the statistician would not understand the kind of advice that is required, given that the current context of risk. A rejection of decision making under risk would not fit with policy making on the environment. For the field of application for the environment: (i) it are policy makers who tend to mistake NI for a (sole) indicator (perhaps even of welfare) also for environmental policy making, and one would wish that policy makers would be wiser, (ii) but it also is this statistician whose job it is to distinguish income and expenditure, and who wrongly presents NI as income and income only, in which case the figure tends to be correct but not its name.

18.10 Dutch ministers of Economic Affairs state that eSNI is “not statistics”

In his original statement about eSNI, Hueting referred to hypotheses on preferences and methods to calculate eSNI. Hueting’s approach is creative, but once shown, immediately clear to researchers like Jan Tinbergen, who are versed in welfare economics, national accounting and econometrics. Above discussion on latent variables and conditional counterfactuality, not mentioned by Hueting, has only been presented to clarify what others might not have understood, using more recent terms from the literature in statistics. This terminology helps to understand the situation and enhances clarity but is not required for a diagnosis that a statement that eSNI is “not statistics” is wrong.

With this understanding, we now look at the statements by the Dutch economics ministers that eSNI is “not statistics”. Agencies are both CBS Statistics Netherlands and the PBL Netherlands Environmental Assessment Agency.

For CBS, see Chapter 21 on SNA and “measurement without theory” and for a report about the discussion within CBS Statistics Netherlands in 1991-1999 about whether eSNI would be statistics or not, and whether CBS would calculate and publish it itself.

For PBL, Oosterhuis, Van der Esch, Hoogervorst (2016), *“From statistics to policy. The development and application of environmental statistics and environmental accounts in the Netherlands”*, is the contribution by PBL to the World Bank’s programme *“Wealth Accounting and the Valuation of Ecosystem*

⁸⁵ Section 11.3 and Figure 2.

Services" (WAVES). While the authors consulted with CBS Statistics Netherlands, it is remarkable – given the objectives of WAVES w.r.t. economics – that the department of National Accounts at CBS was not the main author of the report.

"*From statistics to policy*" page 21 discusses eSNI (Dutch mDNI). (See **Appendix A** for a distractive complication.) The quote relevant here is:

"The successive ministers of Economic Affairs considered calculation of the SNI not to be a task for CBS. In 1994, then Minister for Economic Affairs Andriessen wrote to the Senate that the SNI project concerned 'more econometric research than descriptive statistics' (Andriessen, 1994). Two years later, his successor Hans Wijers noted in a letter to the House of Representatives that the calculation of SNI (which he called Green National Income) was 'not statistics' because 'it does not represent actual, directly measurable events' (Wijers, 1996). His successor, Annemarie Jorritsma, repeated this five years later in a parliamentary debate (House of Representatives, 2001). She argued that CBS should not conduct and publish such calculations, one reason being the debatable nature of the results. The House of Representatives did not agree with her on this point, and adopted a motion that stated that CBS 'in its capacity as supplier of statistical information, is responsible for Sustainable National Income'."

In this quote we see:

- Minister Andriessen correctly stated that eSNI is not descriptive statistics but econometrics, but omitted that eSNI still is statistics.
- Minister Wijers wrongly suggested that eSNI is "not statistics", and that statistics would only concern directly measurable events.
- Minister Jorritsma apparently repeated both omission and confusion. See elsewhere ⁸⁶ (also **Appendix A**) for the "debatable nature of the results".

PBL should have observed both this omission and confusion in its report to WAVES, and PBL should also have warned the Ministry of Economic Affairs about them. When PBL received advice by CBS on this, we wonder what that advice has been. CBS might have remarked that the ministers misinformed Dutch Parliament indeed but that there remain considerations why CBS doesn't calculate eSNI. It would have been better when such had been clarified in this PBL report, and substantiated on content with adequate referencing, instead of spreading this omission and confusion to the World Bank and its community as if eSNI is "not statistics".

PBL in its report of 2016 also overlooks that Colignatus (2009b, 2015:44) reports that Wijers actually corrected the issue, see here Chapter 21.9.6:

"(b) In 1996, the Minister of the Environment Margreeth de Boer and Minister of Economic Affairs Hans Wijers were misinformed by some of their officials about eSNI, leading to a misinformation of Parliament. (c) When a meeting between Wijers and Hueting resolved this, CPB claimed its monopoly at making models [⁸⁷] and succeeded in getting Wijers and the

⁸⁶ This book Section 11.3.

⁸⁷ Addendum 2019: This might no longer apply for CBS, given its (enhanced) Quango position.

CBS to accept this. A separate project was created with a special subsidy to calculate eSNI, joining CBS, environmental institute RIVM and university group IVM. This group actually used the Keller model but a consequence was that eSNI was moved out of CBS. Also, Hueting now had to clarify the entire issue and the principles of national accounting to the people at IVM, both Frank den Butter as chairman of the overseeing committee and Harmen Verbruggen and the other members in the actual research group”

Dutch Parliament decided that CBS was responsible for eSNI,^{88 89} but the minister of Economic Affairs decided in July 2004 that RIVM (later MNP and PBL) were responsible,⁹⁰ and Parliament apparently accepted that CBS executed this responsibility in 2001-2018 by co-operating with IVM for as long as the government provided funds, as PBL reports in 2016:⁹¹

“The political debate around SNI (and the role of CBS) seems to have died down over the last 10 years. These days, both in the Netherlands and internationally, the generally accepted direction is that of providing additional information and indicators alongside national income to account for the environmental impacts of economic activity, instead of correcting national income for environmental damage (e.g.⁹²). Even so, the question whether the calculation of SNI in addition to standard national income could provide a true analysis of green growth was again raised in the House of Representatives during the debate on ‘Green growth’ in 2013 (House of Representatives, 2013). However, SNI was not explicitly named in the remit of the Temporary Committee on a Broad Definition of Welfare, established in October 2015.”

Comments are:

- (a) Hueting (1974a, 1980:164-165) was already cautious about the notion of “correcting NI” and suggested the approach of using figures alongside each other. It is strange to use Hueting’s own suggestion against his analysis.
- (b) Authors who provide “indicators” (satellite accounts) *alongside of* NI often do not show themselves aware of using eSNI *alongside of* NI.

⁸⁸ Dutch text: from: Tweede Kamer - motie van 6 november 2001

“De Kamer, gehoord de beraadslaging,

- overwegende, dat voortzetting van het project en verbetering van de onderbouwing van het begrip duurzaam nationaal inkomen van groot belang wordt geacht;

- overwegende, dat de Kamer in de toekomst wil kunnen beschikken over reguliere publicaties met betrekking tot een voor milieukosten gecorrigeerd nationaal inkomen;

- overwegende, dat het CBS in zijn hoedanigheid als leverancier van statistische informatie met betrekking tot het duurzaam nationaal inkomen verantwoordelijk is; verzoeft de regering voldoende middelen beschikbaar te stellen om het project voortgang te doen vinden, daarbij CBS en RIVM te betrekken en over de resultaten daarvan de Kamer voor het zomerreces 2002 te informeren, en gaat over tot de orde van de dag.

Bolhuis, Van Wijmen, Augusteijn-Esser, van der Steenhoven”

⁸⁹ <https://zoek.officielebekendmakingen.nl/kst-28000-XIII-30.pdf>

⁹⁰ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

⁹¹ See Somers (2006) for an overview of eSNI in Dutch Parliament.

⁹² http://ec.europa.eu/environment/beyond_gdp/index_en.html

- (c) Unfortunately, these authors at PBL in 2016 do not refer to El Serafy (2014) – here Appendix 53 – for a rejection of the notion that the environment can be handled outside of the system of national accounts (SNA) as a “satellite” only.
- (d) In 2017 CBS Statistics Netherlands became project leader for the Monitor Broad Welfare (MBW) (a pleonasm) and included a reference to Hueting & De Boer (2018, 2019a), though CBS (2018a) still rejects the responsibility of calculating eSNI itself.
- (e) While RIVM had been appointed by the Dutch government to calculate eSNI,⁹³ the department within RIVM that had been assigned this task seems to have been split-off as MNP, and later fused into PBL. When asked, PBL does not provide information which institute would have the responsibility now.

18.11 Conclusions

Conclusions are:

- (1) eSNI fits the definition of statistics by Mood & Graybill (1963) and Rijken van Olst (1969abc).
- (2) The phrase “eSNI is not statistics” thus is false but might actually have another meaning, namely that a national statistical office has reasons not to calculate it. In that case it helps when the reason is stated officially so that there can be a public evaluation on it. Available is the official position of CBS in 1997.⁹⁴ Since 1997 there has been the *proof of concept* in 2000 and now there is Hueting & De Boer (2019). The CBS position requires an update for 2020. This discussion has been too much informally between Hueting and his colleagues at CBS Statistics Netherlands, and better comes out into the open. An important condition is that CBS develops known-how about what eSNI actually is, see Chapter 21 about deficiencies about statements there.
- (3) There likely is a confusion between not having an observation and observing that there is nothing (or “*how much* something does not occur”).
- (4) Hopefully the confusions and misunderstandings identified here will not be repeated again (as if they have not been refuted). Readers with confusions and misunderstandings have a vested interest in not studying what they have developed misgivings about. Hopefully the present discussion has helped to open some minds.

18.12 Appendix A. *Alleingang scenario*

There is a complication w.r.t. an “Alleingang scenario”. Environmental sustainability by definition concerns a global phenomenon. IVM properly calculated eSNI, but called this a “variant”, and subsequently also created another “variant” in which only prices in the Netherlands adapted – whence it can be called the “Alleingang scenario” – while world prices remained the same, as if the global level is no key element of environmental sustainability. Thus IVM also created the confusion and misrepresentation that there would be uncertainty about the definition of eSNI. PBL repeats this uncritically:

⁹³ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

⁹⁴ <http://www.sni-hueting.info/NL/index.html#CBS1997>

“A general equilibrium model of the Dutch economy was developed (the SNI model), but still no clear SNI could be determined. The assumption that a sustainability policy is implemented in other countries in the world, whether or not in a similar form to that in the Netherlands, resulted in particular in large differences in the outcomes.”

This is discussed in “The Old Man and the eSNI”, Section 21.9.12, and see how Verbruggen (2018) in his retirement speech contradicts earlier claims, Section 39.18.

18.13 Appendix B. Observation and conditional and counterfactual

18.13.1 Basic result

The notion of eSNI comes with a better understanding of the context of risk management in environmental policy making. Let $Y[\text{conditions}]$ be a monetary variable that we intend to interpret as income, and let there be four kinds of conditions: (1) preferences can be for environmental sustainability (eS with derived norms) or other, (2) the economic process allows for expression of those preferences or not, (3) we have the real economic process or a model of it, (4) there are the accounting rules of SNA.

- (Standard) $NI = Y[\text{SNA}]$. This is the purely accounting approach, without guidance from economic theory.
- $NI = Y[\text{SNA}] = Y[\text{empirical economic process} = \text{optimal}]$. This approach argues that the SNA has a base in economics, apart from historically grown conventions that are gradually revised to better fit economics. The only reason to regard the outcome as proper income is to assume optimality in the economy.
- If the real economy indeed is optimal then we infer that preferences aren't for environmental sustainability.
- $eSNI = Y[\text{model} = \text{optimal}, \text{preferences} = eS]$. Modeling tends to have optimality.
- We may also infer some X such that $NI = Y[\text{model} = \text{optimal}, \text{preferences} = X]$.
- Even if preferences are not for environmental sustainability, then $e\Delta = NI - eSNI$ still provides useful information for the discussion on the environment.
- If the true preferences are for environmental sustainability, and can be expressed in an optimal economy, and we have the model, then $eSNI = NI$.

For the understanding of the discussion of eSNI it suffices to understand conditionality. Above, we had $NI = Y[\text{conditions for NI}]$ and $eSNI = Y[\text{conditions for eSNI}]$, and this suffices.

Hueting developed his analysis without the term of counterfactual, and this indeed is quite natural. The term of counterfactual however links up with some recent developments in the literature in statistics. NI or eSNI can be said to be counterfactual to each other. The use of the term might help some readers to better understand the statistical properties in this analysis on decision making under risk. If the one gives the true value then the other gives a false value. For a counterfactual, it is not quite relevant that something is false, but rather what would happen if it were true. The following subsections say a bit more about this terminology of conditionality and counterfactuals.

18.13.2 Counterfactual

On the counterfactual, see Pearl (2000). The following suffices for present purposes.

A classic example is a headache and taking an aspirin. When the headache disappears is this because of the aspirin? Had it disappeared without the aspirin?

The past does not only consist of concrete events – headache and taking the aspirin – but also of *relations* between them. Describing the past only by concrete events would give an incomplete picture of this past. Relations are part of reality too, though more complex to observe, and often impossible to observe directly. Some relations of motion may be observed directly when one ball hits another one, but the workings of aspirin are more hidden. We cannot observe directly whether taking the aspirin cured the headache since there may have been other factors. A description of the situation would require the mention of relevant factors that might have caused the disappearance of the headache without taking the aspirin. We express assumed relations (causality) in a model. It is statistics how to deal with this, with Pearl (2000) further clarifying the distinction between correlation, conditional probability (given prevalence) and causality and conditionality on itself.

18.13.3 From false and true to unknown and hypotheses

In the body of this Chapter it was discussed that some authors claimed that NI gave the real economy and that eSNI reflected a sustainable economy that did not exist, and that statistics reflects reality and not some *fata morgana*. It was shown that this reasoning was deficient. For the real economy, it is unknown what the real preferences are. Measurement can only be conditional on assumptions. While the current economy clearly is unsustainable, we can now express, using the term of counterfactual:

- If the true preferences are for environmental sustainability, but the economy does not work optimally to show it, then the identification of the sustainable part via eSNI gives the real level of income, while the part $e\Delta = NI - eSNI$ is falsely called income since it only is expenditure above our means. Then NI in regards of *income* (as it is presented) is counterfactual to eSNI, since it would only be income under the other assumptions of SNA.
- If we assume economic optimality (or stick to conventions in SNA that only make economic sense under such assumption), then NI gives the proper level of income under the rules of SNA, and eSNI is overly cautious (and let future generations suffer the consequences). In that case eSNI still is income but not full income. In regards of *full income* eSNI is counterfactual to NI, since it would only give this full outcome under the other assumption.

18.13.4 Observation, conditionality, counterfactual

The notion of “observation” tends to depend upon context. In the analysis on eSNI there is a distinction between observed raw data and unobserved preferences, and there is (additional) explicit conditionality about what we hypothesise, in order to guide the process of accounting.

By analogy, a MRI-scan is no direct observation of the inside of a human body, and relies upon theory and models upon raw data, but such scan still generates what many people tend to call an “observation”. As long as the scan is reliable the method “works”, which suggests that the relevant issue might concern reliability. eSNI may compare to the use of a MRI-scan in terms of complexity of measurement.

But there is more to it. The analogy of a MRI-scan, discussed in this manner, distracts from the property of eSNI that we are also dealing with *conditions and counterfactuals*. To see this, we must extend the analogy. Given a MRI-scan, there is the second phase of diagnosis: whether the patient has a particular lesion or not. Doctors may still differ in their diagnoses. The diagnostic interpretations again are commonly accepted as “observations” (diagnoses), subject to this observer-reliability (errors in variables). Let us now consider the option that the MRI-scan is supplied with a hypothetical outcome given a particular hypothesis. For example, there might be a scan from some time ago when the patient was considered to be healthy, but there might also be special software.

Let us consider two doctors who discuss their findings:

- One doctor (NI) might propose the diagnosis that the patient is healthy. Implicitly, this refers to properties of what a tumor might have looked like.
- Another doctor (eSNI) sees more cause to suspect a lesion. There is common ground in understanding what this would look like. This other doctor might use special software in this hypothesised MRI machine to create a counterfactual how the scan would have looked in case of health. The difference between the original scan and the counterfactual under the condition of health may clarify to both doctors that there is a suspicious lesion indeed.

We would say that the first scan is an “observation” and that the other is a conditional and a counterfactual (unless the patient really would be healthy). The latter would be no prediction or expectation but the better term would be *hypothesis*. Reasoning about hypotheses uses conditionality.

The first doctor (NI) might use only the original scan, and refer to this as “reality”, and argue not to be in the business of using a MRI machine with this special software. A diagnosis of health would refer to this original scan, as being a “true observation”, while there actually is observer-reliability. It is difficult to reject such an approach. Doctors may indeed have different opinions about what would be the best techniques to use for their patients. For this patient it is fortunate that there is also this other doctor (eSNI).

18.13.5 *Sample and counterfactual*

A statistical sample generates a confidence interval in which the true value lies with a level of confidence. The true value is something that has actually occurred, but it is unknown what it is, and one might use the mean of the confidence interval as an estimate.

A counterfactual differs from a sample, even when it has a confidence interval. The key notion is that there are *conditions* that underlie a counterfactual outcome.

Consider the example of a headache and an aspirin again. Given a particular body of research, a statement of conditionality that would be accepted as

belonging to statistics would be: “Assuming that you hadn’t taken that aspirin then you would be *likely* to still have that headache.”

Assuming a sample of more cases, it would still be an *in-sample* prediction based upon the real observations, and no *out-of-sample* prediction. It would still be a description of the empirical situation – “this is how the world is” – but using inferential statistics (while the predicted case is not counted as an observation of course).

This points to the importance of layers of “observation”: (i) raw data or “ground materials”, (ii) elaborations with descriptive statistics, (iii) elaborations with inferential statistics, like estimates using all of the former. A complex estimate like a MRI-scan can still be regarded as an “observation”. A counterfactual – like on the consequence of not taking the aspirin – will be an inference. At some point the model becomes so robust that some persons grow so confident that they tend to say: “We observe that if you had taken the aspirine then you no longer would have had that headache.” This might either be sloppy, with the loss of distinction between counterfactual and proper observation, or a deliberate extension of the notion of “observation in general” to cases that match the reliability of a MRI-scan.

Part 3. Contribution, and reception at CBS

19. Hueting's contribution in a nutshell

Hueting's contribution can be stated in a nutshell:

Overall: Extending welfare economics for the new scarcity of the environment, creating the concepts of environmental functions and environmentally sustainable national income (eSNI), with the development of a new theory for statistical measurement of national income, namely by using conditionality in measurement of both standard NI and eSNI, in order to respect the precautionary principle and the management of risk on economy and ecology.

Components are:

(1) Integration of economics and ecology by defining the notion of environmental functions, i.e. possible uses, and empirical description of their properties for practical application.

Within this area also:

Identification of *vital* environmental functions. Clarification that the distinction between weak or strong (environmental) sustainability is irrelevant for those vital functions. More obviously, other factors in welfare like work and leisure are secondary to ecological survival.

Recognition of *revealed supply* via elimination costs and *revealed demand* via compensation and damage costs, to allow for standard cost-benefit analysis; yet, also recognising that major costs cannot be adequately measured when such CBA has limited relevance.

(2) Awareness that using national income as a partial indicator of welfare, i.e. a factor in welfare, requires the conditionality of making assumptions on preferences, resulting in (i) both a better understanding of standard NI and (ii) the design of the concept and definition of environmentally sustainable national income (eSNI) as: the maximally attainable level of production, using the technology of the year under review, whereby the vital environmental functions of the not-human-made physical surroundings remain available for future generations. Crucial then is the development over time of $e\Delta = NI - eSNI$.

Within this area also:

Formulating the conditions for an economic model, collecting standards for environmental sustainability, overseeing the actual calculation of an eSNI for the Dutch economy, and explaining what the outcome means.

Finding a practical approach for asymmetric bookkeeping, and identifying $NI \text{ minus asymmetric bookkeeping} = NI-A$, located between NI and eSNI.

(3) Developing this theory and practice upon the old and tested foundations of economics and national accounting, thus enhancing both scope and depth of economics, and thus making for ready acceptance by fellow economists, and thus supporting economic policy makers with key concepts and tools to deal with the very real current risk of global warming and other threats to the economy and environment and ecology.

20. The seminal contribution by Roefie Hueting to economic science: Theory and measurement of environmentally Sustainable National Income

"(...) my concern (... is ...) that the universally accepted compass of economic policy – changes in national income – is giving us the wrong signals about economic success." R. Hueting, 2000

20.1 Abstract

Roefie Hueting's work on environmentally Sustainable National Income (eSNI) appears to constitute a seminal contribution to economic science. Aspects are: (a) Definition with conditionality, precautionary principle and handling of risk. (b) Freedom. (c) Environmental functions. (d) Using a model in statistics. (e) Numerous details. (f) Blockages. (g) Foundation.

20.2 Introduction

Roefie Hueting has been writing on economics and the environment since about 1965. A reconsideration of his work leads to the conclusion is that it has a seminal quality and that Hueting may be counted as one of the major economists of our time – as worthy as each in Mark Blaug (1985)'s list. This paper gives an outline of Hueting's work, and intends to clarify why we are witnessing an important achievement.

Hueting's contributions concern the relationship of the indicators for National Income (NI) and environmentally Sustainable National Income (eSNI) – where it may be observed that it was Hueting who defined that latter concept. It is important to see that Hueting's work concerns the foundations of economics and its subject matter and the application in economic statistics, so that there should be no confusion with economic policy making and future-oriented economic research. Hueting's objective is to provide adequate information to the users of statistical data. These data are generally used in a future-oriented setting but their value lies their statistical quality, notably also in the definition of national income.

After Roefie Hueting's official retirement from Statistics Netherlands (CBS), a symposium was held in his honour in 1999, and the Symposium book appeared in 2001 under editorship of Ekko van Ierland, Jan van der Straaten and Herman Vollebergh. It is the study of this material, in particular, that caused me to write this paper. It is my impression that other readers will arrive at a similar conclusion.

It is useful to remember that Jan Tinbergen (Nobel Prize 1969) has always been a strong supporter of Roefie Hueting's work. He wrote a foreword to Hueting (1974a, 1980), and he once even tried to organise a supportive committee for a prize of the United Nations. We should think about such things indeed when we see what Hueting has accomplished.

20.3 Setting

To understand Huetting's work, it is necessary to recall that national income accounting finds its *raison d'être* in both practical work and social welfare theory. This has been developed in the period 1930-1950 by economists like Jan Tinbergen (NP 1969), Paul Samuelson (NP 1970), Simon Kuznets (NP 1971), John Hicks (NP 1972), James Meade (NP 1977) and Richard Stone (NP 1984). The basic conceptual issue is to compare two points in time and to determine whether welfare has increased or not. Since the Bergson-Samuelson social welfare function (SWF) is not observed, income – that follows from the tangent hyperplane – can be used as a proxy, and observed market prices and their changes can be used to deflate to real values. The basic conceptual challenge thus is not income per se, but the development of welfare. Observed market prices were used because of the assumption of optimality – whence tangency. This conceptual challenge differs from the more mundane objective to use national accounting also for purposes of tax collection and e.g. the budget deficit ratio.

Especially since we are living in democracies, it would seem to be a safe assumption that the current allocation indeed is the optimum decided upon by society. This classical approach to national income accounting however runs into problems when one can suspect that the resources are not used optimally and income is not tangent to the SWF – as would be the case for the environment since the 1950s.

The reaction of 'conventional statistics' to this challenge has been along the lines 'If people don't act up on their beliefs then we cannot measure it'. National Income is recorded at observed prices anyway, while separate indicators are provided on the state of the resources. Huetting's answer has been to hold on to the classical notion and to try to find the alternative optimum point and its tangent. The difference in income then is a measure for the distance of the conventionally measured economy from the environmentally sustainable economy.

An analogy can help. Suppose that a medical doctor has been measuring the blood pressure of a client for some time and has been indicating that things have been OK. However, at some point he notes that the client should do more exercises. The client objects and says that the blood pressure still is OK, as it always was. The doctor then has to explain to the client that the proper concern always had been health in general and that actually more aspects are relevant than just blood pressure. There may have been changes to the arteries such that measured blood pressure no longer is adequate. To help the client to make the switch, the doctor and the client henceforth can use both the blood pressure and the improved health indicator (that could for example be interpreted as the blood pressure corrected for the state of the arteries).

Indeed, modern economic agents and their parliaments and governments have appeared to be rather inconsistent in their opinions and actions on environmental sustainability. They may state that environmental sustainability could be a goal but they don't act in that manner. For example, a 1992 action programme of the European Union advocates "modification of key economic indicators, such as GDP, so as to reflect the value of natural and environmental resources in generating current and future incomes and to account for environmental losses and damage on the basis of assigned monetary values" (quoted from Keuning

(1992:9)). But the EU clearly is not adopting the required measures to achieve environmental sustainability in reality, hence market prices are off track and hence the conventional statistical methods are useless for measurement of an eSNI and for the correction which the EU asks.⁹⁵

In this case the EU *asked* for an estimate, but as a good doctor, Hueting would measure eSNI regardless whether the client asked for it or not. In a sense the doctor is forced to make expert judgement anyway since the client could not be fully informed or might be tempted to make biased estimates e.g. on the amount of exercise required. Hueting's approach clearly causes the question how a Statistical Office can be the judge of social preferences. If our complex social fabric does not generate the proper information, how could statisticians do so ? The answer that Hueting has provided is that statistics basically provides information based on assumptions *in all cases*. The conventional measurement of national income at observed market prices assumes optimality – because otherwise it is not sufficient to decompose between price and volume effects only. The classical measurement requires assumptions about what other conditions would constitute optimality. The statistician thus always provides *conditional information*, and should be clear about those conditions. Hueting also concludes that publishing the two measures simultaneously would be best from an informational point of view since this makes users more aware of the assumed conditions. This would indeed be the valid scientific approach.

National income accounting has appeared to be a sensitive political issue. The client has become preoccupied with the blood pressure count and seems to have forgotten why national income was being measured in the first place. This has seriously complicated Hueting's work but he maintained an admirable integrity. The situation also caused him to be more explicit about why the assumption about current optimality is untenable and why the alternative assumption of environmental sustainability would be an acceptable statistical yardstick.

Specifically, Hueting developed the notion of 'blockages' to show how statistics can deal with the situation. The idea is that environmental sustainability can be defined objectively and could be estimated (by the techniques that he developed). Implied in the concept of 'blockages' is that people would respect the standard of environmental sustainability – even if they nowadays don't (are 'blocked'). The resulting yardstick thus does not impose preferences (a common misconception about Hueting's approach) but provides *conditional information* for the democratic process to be able to decide about actual adoption or not, or the choice of a trajectory towards environmental sustainability.

In policy making circles we can hear the argument that the benefits of calculating eSNI would not outweigh the costs of the exercise. I have collected some data on the actual costs of statistical measurement for NI, the Environmental statistics, NAMEA and eSNI. These costs and the summary table are in the Appendix to this Chapter. When we take the total costs of a national statistical office such as CBS Statistics Netherlands as the yardstick and consider the department-specific costs

⁹⁵ This holds even when the EU would adopt the measures gradually and would gradually approach environmental sustainability: on the path of convergence the traditional statistical methods would be improper. These methods are improper, since they don't use a model to correct market prices.

excluding overhead then the NI costs are 4.2% of its budget and eSNI according to Hueting costs 0.25% – thus a quarter of 1%. For comparison, the Consumer Price Index (CPI) costs are 1.3% of the budget (excluding overhead). The reasons of these low estimates is that we are discussing high level statistical measures. These numbers do not contain all the surveys done and the low level statistics – which are produced anyway because of other reasons. Environmental statistics for example are already produced for reasons of health and agricultural policy. What NI, NAMEA and eSNI do, is ‘only’ integrate the available data. A conclusion is that eSNI indeed is costly, since it does only tell us what we already know, which is that NI is wrong and that the environment is doing badly. But if we want to know by *how much* NI is wrong then the price is only marginal. In that respect this gives a situation where a small expenditure can cause lots of political upheaval, and perhaps this is a better way to understand the situation.

The above explains also how we could proceed to compare Hueting’s eSNI with other indices developed by other economists. There are various such indices like Herman Daly’s “Index of Sustainable Economic Welfare” (ISEW).⁹⁶ Note that this current paper is not intended as a review of the literature on all indices and certainly I would like to avoid the possible misunderstanding that this paper makes a value judgement about these alternatives. The work by other economists on indices on “sustainability” is relevant and deserves attention. It is also difficult to make comparisons when work on such indices has been based partly on the work of Hueting himself. Thus, to be sure, this current paper only intends to explain the contribution of Hueting’s work to economic science. However, the question about comparison arises naturally and an indication remains useful how such a comparison could proceed. Hueting’s eSNI has been grounded from the start in the system of national accounts as the base for national decision making and he regards NI already as a contributing factor for a welfare index while other indices often call this system into question. Hueting tries to compare current NI with environmental sustainability proper and he thus excludes the income distribution and an issue like ‘work at home’ which topics generally are in ISEWs. Hueting’s eSNI thus shares some properties with the alternative measures, but none has all properties, while some add more, and overall there remains a distinct difference.

20.4 Hueting’s contribution

Hueting’s contribution consists at least of the following points.

- (a) The development of the (practical) definition of ‘environmental sustainability’ as a condition for economic performance and the development of the ‘environmentally Sustainable National Income’ as the derived indicator.
Note: ‘Sustainability’ had been longer around as a word and vaguer concept. Hueting & Reijnders (1998b) refer to J.S. Mill 1876 for notions of stationarity. Hueting’s contribution however is the translation to modern economics.
Note: This scientific definition with its use of *conditionality* is clearly distinct from possible acceptance as a policy goal. While environmental sustainability appears to be imprecise since it does not clearly specify which species are crucial or which might become extinct because of natural causes anyway, it

⁹⁶ “Friends of the Earth” at <http://www.foe.co.uk/> allows you to manipulate an ISEW for the UK.

appears that the imprecision is statistically manageable, and that the yardstick can be applied in practice.

Note: eSNI for Holland has been estimated by Verbruggen e.a. (2001).

- (b) The notion that it is freedom rather than income which is the relevant feature for environmental sustainability. The freedom for future generations to use resources that are still available due to sustainable use by earlier generations.

Note: Amartya Sen (NP 1998, "Development as freedom" (1999)) has made the case for 'freedom' forcefully but the idea has been with Hueting all along – and Hueting has both stated its theory and employed it in a practical statistical analysis.

- (c) The development of the concept of 'environmental functions' and the statistical measurement of these. At CBS Statistics Netherlands, Hueting has set a world standard of high quality statistics that uses the results of the natural sciences and biology and integrates those into an economic system.

Note: These environmental functions are related to Von Neumann technologies, where one resource can be relevant for different activities. The standard Von Neumann model is linear but with the natural sciences and biology there are all kinds of non-linearities.

Note: Hueting has been the founding Head of the Dept. for Environmental Statistics, at CBS Statistics Netherlands. He has been the guiding force in setting up their world famous environmental accounts, explicitly calling in for the expertise of the natural sciences and biology. Also the innovation of the NAMEA – *the National Accounting Matrix including Environmental Accounts* as originated by Keuning (1992) which approach is very useful and fortunately also very influential in statistics – has only been possible because of the results created by Hueting and have been created under the supervision of both Keuning and Hueting. The NAMEA though cannot replace the need for an aggregate (partial) indicator based on welfare – see point (g) below. The eSNI calculated by Verbruggen op.cit. has been based on Hueting's work.

- (d) The notion that statistics and statistical observation of the past can be extended by the use of applied general equilibrium models to estimate the distance in the past of the actual path from some optimal path.

Note: This is a major advance compared to the common thought that statistics is 'observation without theory and models'. In the common view observations can be used to develop and test theories, but no more, while now theories and models are shown to be relevant *in* observation as well. There are precursors to this idea, for example in Robert Fogel and Douglas North (NP 1993 "For having renewed research in economic history by applying economic theory and quantitative methods to explain economic and institutional change."). Hueting's advance is that he shows that this type of analysis is a natural part of the work that can be expected of a Statistical Office. Remarkably, Hueting still wishes to avoid a model as much as possible (see footnote 21 on page 37) but accepts it when circumstances force him.

Note: With an appeal to the 'theorem' of Ronald Coase (NP 1991 "For his discovery and clarification of the significance of transaction costs and property rights for the traditional structure and functioning of the economy") one can argue that environmental costs are already included in actual observations

and current national statistics. According to Coase's Theorem, property rights do not affect allocation but only the distribution of income. However, those 'implied environmental costs' are at current prices that do not reflect environmental sustainable use. Thus a model is needed.

- (e) Solving numerous details in actually implementing these issues. Valuation of non-market resources with reconstruction of 'demand and supply'. The difference between 'vertical supply' as an economic condition and vertical standards as an ecological condition. Problems of asymmetric bookkeeping. That environmental use enters as a cost and not as an addition to income so that eSNI is lower than NI.⁹⁷ Choice of the intertemporal welfare function – clarification that only the preferences of the current generation are relevant. Clarification on weak and strong sustainability. Identifying ecological risk factors, including the risks of assumptions on technology. Identification of the various points for sensitivity analysis.

Note: Hueting's treatment of technological growth shows how strikingly 'statistical' his approach is. When an eSNI is being estimated for one year in the past then his method accepts only the technology known in that year since no other techniques have been statistically observed for that year. (Non-renewable resources, such as oil, however are allowed a path for substitution otherwise they could not be used at all. This exception is economically unavoidable and is the exception that proves the rule.) Hueting thus deviates from normal statistics in the use of a model and the issue of 'blockages', but remains a statistician in all respects. For other economists, whose frame of mind on policy making and technology is future-oriented, this is a crucial point to become aware of. To be more precise, Hueting is an economist who adapts economic theory to the new scarcities and then proceeds to develop the statistical theory and practical methods to measure social welfare and national income.

Note: Hueting's (1996) *Three Myths* paper is a nice example of the clarification involved.

- (f) The development of the notion of 'blockages' in the economic process and national decision making.

Note: With reference to Coase's Theorem mentioned above, the blockages thus provide a case where that theorem fails to support a socially optimal situation.

Note: While a scientist easily runs the danger of stepping into the shoes of policy makers Hueting can be admired for never having done so. In some of his texts he enlivens the discussion by telling about his personal motivation for example to become an economist and to deal with the environment but he then clearly distinguishes this personal aside from the information generated for the decision maker. In fact, where other economists might be said to be rather lax with regards to the popular and political misconceptions about the NI

⁹⁷ Keuning (1992:3) seems to contain this misunderstanding: "It can never entail that on balance something is subtracted from NDP, as minimum enjoyment is zero." If environmental input first had a price zero and then becomes scarce with a price, then nominally the new input cost should be subtracted from the earnings attributed to it – while the real consumption point, which is the relevant issue, would be lower. Who loses a resource becomes poorer for it.

indicator, Hueting sets a standard of scientific rigour for the quality of information.

Note: The co-ordination problem and the prisoners' dilemma are well-known in economics. James Buchanan (NP 1986 "For his development of the contractual and constitutional bases of the theory of economic and political decision making.") gives insights in the co-ordination problem, and John Harsanyi, John Nash and Reinhard Selten (NP 1994 "For their pioneering analysis of equilibria in the theory of non-cooperative games.") give insights in issues like the prisoners' dilemma. Hueting's contribution is to show that observation of such market failures can be a correct base for correcting statistical indicators.

- (g) The development of the theory for the above and basing this theory on accepted notions of welfare analysis and the framework of national income accounting, and on Lionel Robbins's definition of economics itself as the allocation of scarce means over competing ends.

Note: It is important that a new contribution to economics can be related to basic theory. Hueting's contributions do not diverge from the main stream but are directly in that main stream. This also makes for their powerful impact.

Note: As said, the notions for national income accounting have been developed by for example Jan Tinbergen (NP 1969) and John Hicks and Kenneth Arrow (NP 1972 "For their pioneering contributions to general economic equilibrium theory and welfare theory."). Important have also been Wassily Leontief (NP 1973 "For the development of the input-output method and for its application to important economic problems.") and Richard Stone (NP 1984 "For having made fundamental contributions to the development of systems of national accounts and hence greatly improved the basis for empirical economic analysis."). Hueting worked in this tradition and his contribution can be seen.

Note: Hueting's eSNI can be found by imposing environmental sustainability conditions upon a model that contains only reaction functions and no social welfare function. These reaction functions however could be integrated, at least in theory, and then give a social welfare function anyway. Alternatively, one assumes a social welfare function and then derives the reaction functions. In both cases, the approximation of welfare by national income becomes superfluous since now the social welfare function has been given. Thus the use of a model undermines the original notion of economic statistics that mere income is used instead of the unobservable SWF. Nevertheless, there is much use in continued use of national income accounting.

20.5 Concluding remarks

Overlooking this list of achievements we become aware of the involvement of so many other people and institutions with Hueting's work. CBS Statistics Netherlands has provided a crucial institutional setting, the Dutch government provided additional research funds and also funded the symposium in honour of Hueting's work. Other researchers joined in at some moment like Jan Tinbergen or provided criticism like Steven Keuning op. cit. or Wilfred Beckerman and Herman Daly and others in the symposium book, which criticism allows us to better

understand the issues. And many more. Yet during all this time, it was Hueting himself who created this list of achievements.

It is useful to remark that this does not mean that all problems have been solved. Much research needs to be done. For example, where the research on eSNI according to Hueting has been done for one country only – Holland – the question now arises for other countries and the world as a whole. There is also the issue of the distribution of the resources of the globe to mankind as a whole, on which Hueting's SWF draws a blank. There also is the question under what conditions societies will be willing or able to actually switch to environmental sustainability.⁹⁸ For example, as more resources will become subject to ownership title, the environment will be included more and more into the normal economy. This however does not mean that the normal NI indicator would eventually become sufficient. Ownership does not imply environmentally sustainable use. However, this means that statisticians face the enormous task of separating the two uses, while society itself has to find ways, if it opts for environmental sustainability, to find mechanisms that make the sustainable use also the optimal choice at the individual level.

But, whatever this new research, it is striking that it will build on all this work. As once stated by Edward Leamer:

“The success of an economist perhaps should be measured by the amount of employment he or she generates for other economists.”

In that respect, Roefie Hueting is likely to have a good score as well.

PM: I have submitted this text to Hueting and he has indicated that, apart from my hyperbole, it gives a fair representation of the content of his work. It is important to note this, since there have been many misunderstandings about what this content actually is. Economists often have not understood the ecological aspects, the ecologists often have not understood the economics, while it also happened that science has been mistaken for politics. In addition, I would like to remark that I have found it an honour and privilege to write this paper, and I would like to thank Hueting for his kind attention and patience.

20.6 Appendix: Cost of calculating eSNI

One frequently heard argument is that it would be too costly to calculate eSNI, or that the benefit of calculating it does not outweigh those costs.

The costs are in **Table 16**. The Annual Report over 1999 by CBS Statistics Netherlands gives total outlays of NLG 316 million, totalling the material costs and about 2300 FTE employees. We peg the exchange rate at the easy value of 1 \$ = 2 NLG, and thus get a total cost of \$70 thousand per FTE. The CBS Work Programme for 2001 provides detailed information per activity. I thank CBS for helping me retrieve all this information. I have averaged data where the Work Programme only gave Min and Max values. The eSNI project by H. Verbruggen

⁹⁸ Here is my own topic of interest, see Colignatus (2000a, 2005, 2011) on stagnation in national decision making, in particular with respect to unemployment. Colignatus (2000b) discusses the SWF regime switch.

c.s. was budgetted at NLG 0.5 million, though it may well be that the researchers also used their own research time. Though dr. Hueting is retired and thus does not 'cost' anything, we count him in at average cost.

Measuring eSNI costs about \$ 390,000, or a quarter of 1% of total CBS outlays. To compare this with other statistics, CPI takes 1.3% and labour statistics take 3.3%.

The National Accounts Department requires 4.2%. This neglects all survey people and lower level statistical work, and just considers the work of integration – as we did for eSNI. A similar work of integration like NAMEA and SAM takes about 0.5% – twice of eSNI.

Given that the \$ 390,000 tell us what we already know, i.e. that NI is wrong and that the environmental situation is bad, the benefit/cost ratio indeed is low. But if you want to have an estimate of *how* wrong and *how* bad, the price does not seem to be so bad.

Table 16. Measurement cost of eSNI compared to the cost of NI, Environment and NAMEA

<i>1999-2001</i>	<i>FTE</i>	<i>\$ million</i>	<i>% of CBS</i>
All Costs / FTE = \$ 70,000	1	0.07	
CBS total	2300	158.00	100.00%
<i>of which</i>			
Labour statistics	76	5.19	3.28%
CPI	31	2.10	1.33%
National Accounts Dept.	96	6.56	4.15%
SAM, SESAME, NAMEA	12	0.82	0.52%
Environment	40	2.75	1.74%
<i>of which eSNI at CBS</i>	1	0.07	0.04%
PM. Idem (eSNI at CBS)	1	0.07	0.04%
PM. dr. R. Hueting	1	0.07	0.04%
eSNI project by Verbruggen	4	0.25	0.16%
eSNI total	6	0.39	0.25%

Sources: (1) CBS Annual Report 1999 and CBS Work Programme 2001, <http://www.cbs.nl>, (2) eSNI project, (3) 1 \$ = 2 NLG

21. *The Old Man and the eSNI.*

A review of advance and adversity in Hueting's research in economic growth and the new scarcity in the environment and environmentally sustainable national income (eSNI)

"If you are not tired, fish,' he said aloud, 'you must be very strange.'"
Hemingway (2004:50), "The Old Man and the Sea"

Acknowledgements^{99 100}

21.1 *Abstract*

Roefie Hueting (1929), 90 years of age in December 2019, has been working on the subject of economics and the environment since around 1965. Seminal results are his notion of environmental functions (WWF, 1969a), his Ph.D. thesis *New Scarcity and Economic Growth. More welfare through less production?* (1974a, 1980), the definition of environmentally sustainable national income (eSNI, 1989b, UNEP-World Bank), the eSNI methodology (CBS Statistics Netherlands, 1992d) and his contributions to the 1999 Hueting Symposium (presentation and rejoinders, 2001(d)). Recently there is Hueting & De Boer (2019b). The figure of *standard* national income NI gives production while the figure of eSNI gives the production level that maintains the availability of the vital environmental functions for future generations. For many economists, the current focus is on climate change but the ecological challenge is much wider and more fundamental, see also the Convention on Biological Diversity, Bonn 2008. The figure for eSNI still isn't included in the system of national accounts (SNA) though the cost of calculating eSNI is only 5 personyears per annum per national statistical office. This means that current statistical reporting on national income and "economic growth" provides incomplete information to policy makers and the general public. With the dictum "What you measure is what you get", we currently get "economic growth" that works against environmental sustainability. This review provides a reflection on advance and adversity in more than 50 years of Hueting's research in a world that only slowly recognizes the global environmental problem. How do governments decide under risk, how do they grow aware of that very risk, what is the role of the national statistical offices in providing information on that risk, especially when that risk concerns survival for large sections of the planet? The reflection provides insights that themselves are useful for our understanding of the political economy of research on issues that are politically sensitive.

⁹⁹ An update in 2019 of Colignatus (2009a) as included in (2009b, 2015).

¹⁰⁰ The author thanks Roefie Hueting, Bart de Boer, Robert Goodland, Salah el Serafy and Henk van Tuinen for valuable comments. Hueting has expressed that the paper reports correctly on his work, which is important to mention since his work is often misrepresented. All errors remain mine.

21.2 Introduction

21.2.1 A topic in political economy

In 2006, the film *An inconvenient truth* by Gore et al. (2006) caught the public's fancy while the UK *Stern Review* (2006) provided an impetus for economic policy making to recognize the problem of climate change. At bottom, it are not these publications but the experiences of abnormal weather patterns and some disasters like the 2005 Katrina hurricane that caused the world to pay attention. In 2007, both the Intergovernmental Panel on Climate Change (IPCC) and Mr. Gore received the Nobel Peace Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change".

Yet, these issues have been known for much longer. Also, the true ecological challenge is much wider and more fundamental and quite a lot larger. Even if climate change is kept within limits then there still remains the proper issue of environmental exhaustion and destruction of the ecological base for large sections of the planet. Braat and Ten Brink (eds) (2008) review the challenges for the Convention on Biological Diversity, but this is only a part of the whole issue, since the issues of e.g. erosion and pollution have a wider impact than only on biodiversity. Tinbergen & Hueting (1991) estimated the challenge of environmental sustainability at around half of world income. A calculation for the Netherlands by Verbruggen et al. (2001) gives approximately the same value. The result will not differ much for other advanced countries. If Joe and Jane Sixpack are to become environmentally sustainable, their income would need to be halved, which implies a reallocation towards activities that are friendly to the environment. The economic challenges for environmental sustainability thus are enormous, and they often are not properly recognized in full for what they are. Indeed, the UK *Stern Review* (2006) arrives at 5% to 20% of GDP albeit only for climate change – which differs importantly from half of income (though see elsewhere for bases NNI and GDP).

Why is this challenge not properly recognized ? Since recognition depends upon information, a major aspect in answering that question concerns the management of information. The question then becomes: how do we deal with the information about our economic activities (that affect the environment) ? To understand the Tinbergen & Hueting (1991) and Verbruggen et al. (2001) estimates we need to consider the national accounts. In economic theory, national income (NI) expresses the annually available production level available for consumption, as a factor within the optimisation of social welfare. Economists have been designing various "green GDPs / indicators" such as MEW, ISEW, Ecological Footprint, Genuine Savings, Genuine Progress Indicator, and the like. Of these indicators, Hueting's concept of environmentally sustainable national income (eSNI) gives the production level, associated with NI, that maintains the availability of the vital environmental functions, i.e. the vital uses of the not-human made physical surroundings, for future generations. The value of those functions is what society is willing to sacrifice to keep them. Of the various indicators only eSNI satisfies the basic condition on the environmental functions. eSNI thus would warrant our attention as the indicator of interest for environmental sustainability. Using Lionel Robbins's Leitmotiv of the allocation of scarce means for competing ends, the

levels of NI and eSNI provide information for deciding on the satisfaction of the ends of production growth and environmental sustainability. With various official statements, research reports or newspaper articles that discuss environmental sustainability, the natural question to ask is: "How far are we from environmental sustainability?" To answer that question we need eSNI, because the difference between NI and eSNI exactly gives that distance $e\Delta = NI - eSNI$, and expresses the economic challenge to achieve environmental sustainability. According to Verbruggen et al. (2001) $eSNI \approx 50\%$ NI, which is the "half of income" mentioned above (and with the base of net national income NNI). And here we arrive at part of the answer to our question on the management of information. In the United Nations System of National Accounts (UN SNA) only NI is listed as a measure while eSNI is not listed. The national statistical offices around the world only publish data on NI but not on eSNI. A well-known dictum is: "You get what you measure." Currently we measure NI and get more NI, but for environmental sustainability we rather should measure eSNI alongside NI and get more environmental sustainability.

The usefulness of eSNI shows less from the absolute level and more from the dynamic development over time, where the unyielding laws of arithmetic come into play. Suppose that, with NI at 100 and eSNI at 50, NI grows by 5% to 105 and eSNI drops from 50 to 49, then it is obvious that such growth is unsustainable. Suppose that policy is adjusted so that eSNI would grow by 5% too, then we get an eSNI of $1.05 * 50 = 52.5$ in terms of the original year. But then the absolute gap has also increased. With NI now at 105 and eSNI now at 52.5 the absolute gap has grown from 50 to 52.5 in terms of the original year. If we want to maintain that absolute gap, eSNI would have to grow twice as fast, at 10%, and if we want to close the gap then eSNI has to grow even faster. In this way, eSNI provides information on the direction and speed of the environmental sustainability of economic development.

We can see that eSNI provides crucial information for monitoring economic policy with respect to environmental survival and the sustainable availability of environmental functions for future generations. The key question in this review is: why is this figure not standardly available as information for national economic decision making?

It is a key question indeed. The planet confronts a huge environmental challenge, with world population rising from 7 towards 9 billion in a few decades to come, and 15 years can mean a difference of 1 billion. Both national income & production growth and their sustainable varieties provide important indicators or factors for economic welfare and guide us in the allocation of resources. If an indicator like eSNI does not make it to the official publications, is not used in policy discussion and is not printed in daily newspapers to inform the general public during national elections, then the general presumption is that this indicator is not necessary. The presumption is that we live in an information society, the world is a village, our scientists and economists are well-trained and have sharp critical minds. "Surely," people think, "if an indicator would be required, we would already use it." Somewhere that presumption however fails. The present review will paint the mixed picture of how that became possible. The true cause in the background for the non-presence of the eSNI indicator might have been human fallibility or a

general belief in “economic growth”. Yet the events reviewed here mark the opportunities, both taken and missed, and it is important to see that key opportunities actually have been missed. It will require a deliberate action to get eSNI into the official publications.

For economics, there appears to be a theoretical crisis at the very roots. Historical forces are at work here. The economists who designed the theory of social welfare and national accounting, economists like Jan Tinbergen, Paul Samuelson, Simon Kuznets, John Hicks, James Meade and Richard Stone, were leaders in their generations and made their presence count in more areas. All received Nobel Prizes. Sir John Hicks once commented that accounting may be the prime contribution of economics to mankind, e.g. see Hicks (1983:365-375). Once the system of national accounting was in place, it became a matter of operational activities and the leading economists of our own time have been inclined to be concerned with other issues. Indeed, Bos (2007) states:

“Among economic researchers there is a worldwide illiteracy in national accounting. A decade ago, national accounting has been dropped as a separate topic of research on the list of the Journal of Economic Literature. The economic researchers skilled in national accounting have become more and more extinct.”

Of this disappearing breed, again only a few noted the relation between the environmental challenge and national accounting. A consequence has been that national accounting does not provide us with a figure of eSNI for policy making. The theoretical crisis in economics is that social welfare theory and national accounting got separated which tends to destroy the very basis of what the whole exercise was intended for – with the figure of NI only used for administrative purposes like determining the tax base and calculating the budget deficit as percentage of GDP, and with the abuse of “economic growth” as if it would be a sound indicator of welfare. (See definitions in Section 9.2 and Chapter 17.)

On this historical stage, this review now considers the work done by Hueting.

It are ethics and morality that deal with survival. The ethical issue features strongly in this discussion. Above figure of eSNI uses data for the small country of the Netherlands, though derived from world data when necessary. However, the proper question is: how can it be that figures for eSNI are lacking for other modern and much larger nations ? In itself it is somewhat striking that the figures for eSNI in the Netherlands did not attract much attention. It seems that RIVM and IVM did not send out press releases. For the whole world it holds: How do intelligent people deal with the risk for their grandchildren that their environment, as evolving mankind has known, might be largely gone ? Blind spots apparently occur not only in economic policy making with respect to our physical surroundings, causing governments around the world to pursue the goal of NI, but there are even blinding mechanisms that make us unwilling to generate the information on eSNI that clarifies what we actually do. Mechanisms that blind us even to risks for survival, the risk of *collapse* and the possible destruction of the ecology that mankind depends upon. The study of this phenomenon is a topic of political economy. Why is it, and, more specifically, how is it, that developed democracies harbour such mechanisms that close their eyes to the issue of ecological survival?

21.2.2 *Making a compass for economic policy on the environment*

The Dutch economist Roefie Hueting (born 1929) has been studying and writing on this issue for more than 50 years and has given a seminal contribution to our understanding of how the environment enters economics and economic theory. Results are his notion of environmental functions (WWF, 1969a), his Ph.D. thesis *New Scarcity and Economic Growth. More welfare through less production?* (1974a, 1980), the definition of environmentally sustainable national income (eSNI, UNEP-World Bank 1989b), the eSNI methodology (CBS Statistics Netherlands, 1992d) and his contributions to the 1999 Hueting Symposium (presentation and rejoinders, 2001(d)). A very useful summary is Hueting (2008). The new book is Hueting & De Boer (2019b). His findings received support from Jan Tinbergen (1903-1944), see Tinbergen & Hueting (1991), where Tinbergen is the Dutch economist who joined Ragnar Frisch in the first Nobel Prize in economics in 1969. Hueting wrote extensively and contributed to various conferences of the United Nations, OECD, the European Union and separate countries such as India and Indonesia. He was awarded the Dutch royal knighthood and in 1994 the UN Global 500 Award. Yet, one of his prime suggestions, to calculate a figure for “environmentally sustainable national income” (eSNI) alongside the standard figure for “national income” (NI), is still not adopted by the international community of national accounting. Only the Dutch government has provided funds for some calculations, for the years 1990, 1995, 2000 and 2005. CBS Statistics Netherlands (2018a) included a rough estimate for 2015 by Hueting & De Boer (2018, 2019a) but refrained from calculating this themselves. Somehow, there it stops. All this is amazing since it would be rather obvious that policy making requires sound information if it is to be effective. In the current situation, various data on the risks of environmental collapse are used, yet only fragmented so, and the issue is to turn these data into information, i.e. by constructing an aggregate measure for the distance to environmental sustainability.

The concept of environmental functions, the possible uses of the not-human made physical surroundings, including eco-systems and life support systems, on which humanity completely depends, is the basis of Hueting’s approach. In the case of (actual or expected) excessive use at the expense of another or the same function, functions have become economic goods by definition. Environmental sustainability then is defined as safeguarding vital functions for future generations.

This review deals with some events of advance and adversity in this research. This paper is targetted to highlighting some key mechanisms.

To properly value this review it is useful that the reader knows a bit more about Hueting’s analysis. Van Ierland et al. (2001), already referred to, also contains a chronology by Goodland (2001). Colignatus (2001) (included here as Chapter 3) gives a short review, and more will transpire further below. A useful source is also Hueting’s website at www.sni-hueting.info.

A key point in Hueting’s theory is that both NI and eSNI are conditional concepts, in other words “what if” figures based upon assumptions. Preferences on the environment and the new scarcity cannot be expressed by the market when that market is left by itself without ideal regulation that truly reflects the preferences – including the complex question how to aggregate preferences when

some prefer environmental sustainability and others don't. NI is conditional on the assumption that the package of goods – produced goods and environmental functions – becoming available in the study year perfectly reflect the preferences of the subjects (which cannot be measured). Thus, NI is conditional on the assumption that all preferences are expressed in the observed data, even though it is not certain that the individual preferences actually are expressed in those data. eSNI is conditional on the assumption of preferences for environmental sustainability. Both indicators provide only information and don't imply a political position on the subject. This conditionality is quite common in scenario studies, and now it is applied to statistics. Nevertheless, NI is commonly misunderstood while eSNI is not generally accepted yet.

How much does it cost to calculate an eSNI ? Let us consider the budget of CBS Statistics Netherlands with 2,500 employees. There are general costs in collecting data. These data are subsequently processed in different specialized departments. Of these high level departments, the Consumer Price Index costs 1.3% and the department of national accounts costs 4.2% of the budget. Calculation of eSNI costs 0.25% or a quarter of 1 percent of the budget. The 0.25% for eSNI is only possible because of the integration of work processes, where the environmental data are already collected for other purposes and where the calculation involves corrections at a relatively high level of aggregation. A cost table is provided in Section 20.6.

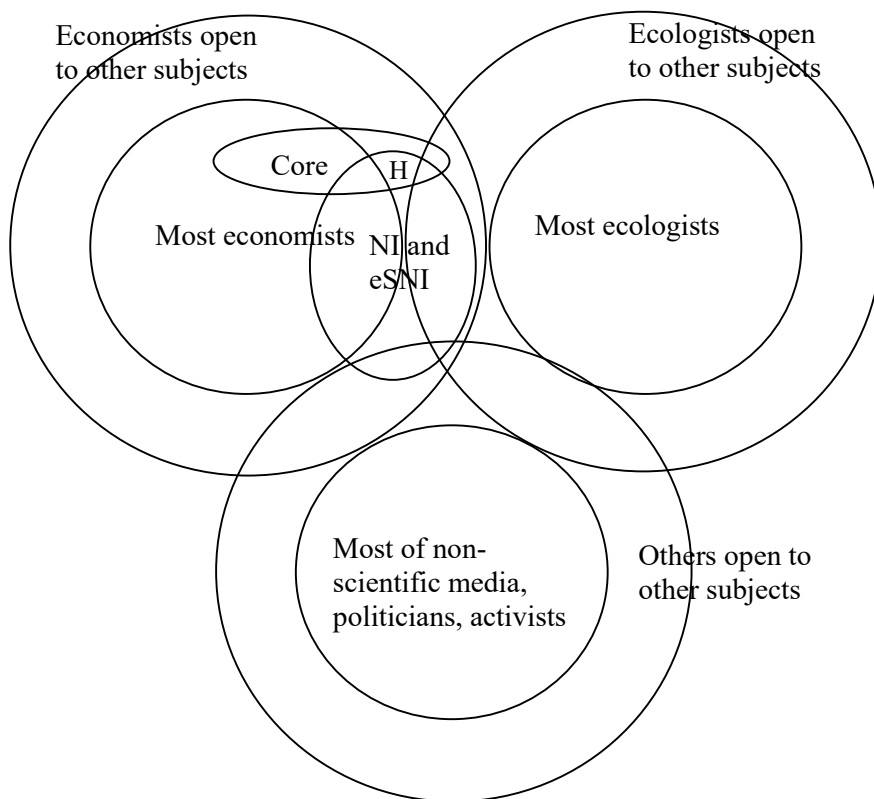
21.2.3 *A guiding diagram*

Figure 13 depicts relationships that are relevant to our discussion. The grey oval gives us economists working in the “core of economics”. Around them there are economists and ecologists, and agents who tend to be none of these, such as media people, politicians and societal activists. It are primarily specialists who understand a decent amount of both economics and ecology. Most economists concentrate on their own subject and similarly for ecologists. Around these majorities there are zones of co-operation. National accounting can be studied with different degrees of openness. Ecologists open to economics but without knowledge of national accounting will miss out on eSNI. An author like Hueting who is an economist open to the subject of ecology and who works in the field of national accounting, clearly will be little understood by others with different positions. Even societal activists who lobby for a better environment are likely not to understand him since he is not an activist but an economist speaking the languages of welfare economics and national accounting. The discussion will stagnate unless bridges of communication are built and unless greater desires arise to understand what eSNI is about.

The diagram may strike the reader as a bit superfluous. Once these different positions are identified, it becomes obvious that there will be miscommunications. However, it is a major step towards comprehension of environmental economics and policy to see that the field is so fragmented as it is. The fragmentation of knowledge may cause perverse effects. To understand the issue of eSNI requires 100% clarity on the subject, and, while many arrive at 90% or even 99%, each researcher misses a different 10% or even 1%, and each 10% or even 1% may be sufficient for the issue to be rejected. For example, many think along the lines

“different assumptions, different eSNIs” but in Hueting’s perception (i) there are different green NI’s but only one eSNI, (ii) within eSNI the uncertainty only causes different estimates but does not invalidate the concept. Points (i) and (ii) provide decision makers with a framework of decision making under risk. The scope for misunderstanding is huge. Subsequently, the diagram will guide and enlighten the discussion below where we can identify actors and where we can explain advance and adversity due to positions.

Figure 13. A diagram of relationships, with a “core” of economics



The “core of economics” is not at the center of “most economists” and even overlaps with the fringe of openness. Hueting (H in the Figure) works on the subject of scarcity and describes the environment as the “new scarcity”, so that his work can be seen as belonging to the “core of economics”. Most economists see it as still on the fringe (and perhaps another fringe than only openness).

With scarcity as the core of economics, only a subgroup studies social welfare and national accounting *and* has some interest in the new scarcity of the environment. This subgroup is fragmented as well. Core subgroup 1 includes Hueting, Tinbergen (deceased) and the author (Colignatus), who support the inclusion of eSNI in the UN system of national accounts (SNA). Core subgroup 2 includes the current London Group of the UN Statistical Division and opposes that inclusion. Core subgroup 3 includes those researchers who are ambiguous or have no clearly voiced opinion. Below we will consider the various positions.

Not included in the diagram are economic paradigms. A new paradigm is “evolutionary economics” that sees itself as different from “neoclassical economics”, and which is altogether something else than “ecological economics”. Though Hueting sees himself involved only with national accounting, he may also be classified as neoclassical, which explains part of the communication gap within economics itself and with the new approaches of our time.

Not included in the diagram is the distinction between the academic world and the national statistical offices. As mentioned, the intellectual gap between these realms has grown large. In the 1930s academics were brought into government service to develop the system of national accounting but somehow the exchange dropped to a minimum once the system was in place. Academics who invent some indicator of economic welfare commonly have students who write theses so that islands of quotations arise, while methods can be copied around the world. Examples are MEW, ISEW, Ecological Footprint, and Genuine Savings. An analysis like eSNI has to blossom in the bureaucratic environment of national statistical offices, which means that it may have little chance to do so and that it neither has an easy link to the outside academia. Clearly, an academic will not quickly write a National Science Foundation (NSF) research application for something that should be done at the national statistical office. Also, an emphasis has grown in the academic journals on econometrics and mathematics such that a conceptual approach basically relying on high school mathematics and a lot of tedious calculation falls out of favour.

Given this fragmentation of knowledge, it may only be the ongoing destruction of the environment and the impact that this has on the economy and human survival that causes us to have some interest in the present subject. Unfortunately, times of crises may also cause people to focus more on their own worries and to listen less to others. Perhaps the moment of imminent danger is the most fruitful for a change in thought.

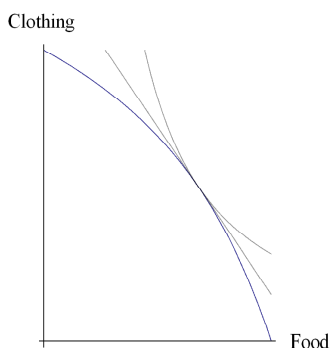
21.2.4 *National accounting*

National accounting integrates ground material into a consistent set of accounts at an aggregate level. Economic analysts and models might use the ground material but would have to create such a consistent set as well, so that there is some advantage when everyone uses the same set.

Though the notion of scarcity applies to all resources, the focus in conventional economics is on activities valued in money to keep matters practical. Nominal values are collected already for tax purposes (“statistics” derives its name from measurement of “state” activities) and one challenge for economic theory is to find the split between price and quantity. A basic issue is to compare two points in time and to determine whether welfare has increased or not (at least as far as welfare is influenced by production). Since the Bergson-Samuelson social welfare function (SWF) cannot be observed, income – that follows from the tangent hyperplane – can be used as a proxy, and observed market prices can be used to deflate to real values. **Figure 14** gives an example with a production possibility frontier (PPF) with food and clothing. An indifference curve of the social welfare function (SWF) selects a point along that frontier. At that point the frontier and curve are tangent and the line of tangency provides the income level and the prices for which food

and clothing are traded. With an improvement in technology, the PPF shifts outward and the SWF selects a new point. How much the SWF has improved cannot be determined since the function is not observable but the shift means that “more” indeed is “better”, and calculations on observable income will generate conventional “economic growth”.

Figure 14. A production possibility frontier (PPF) and a tangent to the social welfare function (SWF)



Thus there are three elements to keep in mind: (i) the basic context is economics but there is an independent historical development of statistics of income accounting, see Sections 1.5 and 11.1, (ii) the challenge for economics concerns not income *per se* but the development of welfare, and it is useful to keep welfare in mind when considering the proxy, (iii) observed market prices are used because of the assumption of optimality – whence tangency. Hueting simply proceeds in this tradition of research and sees what happens when the environment becomes scarce, now or at some future moment, while there are no market prices. Overall, Hueting’s contribution derives its power from accepted notions of welfare analysis and the framework of national accounting, and indeed from Lionel Robbins’ definition of economics itself as the allocation of scarce means over competing ends. However, still keep in mind Section 9.2 on the distinction between statistics and planning.

Throughout the economics profession there is recognition that the interpretation of “national income” as the only factor for welfare tends to break down. This conforms with Hueting’s analysis. Above approach to NI assumes that preferences can be expressed in market prices but we know that the market may be inadequate. Though non-market aspects have been recognized since Pigou if not earlier, such considerations had little influence in the formative years 1930-1950 of national accounting, and only later gained importance. Over the course of years, various researchers became dissatisfied that nonmonetary elements of welfare such as unemployment, labour conditions and the distribution of income were not included in the NI figure. At issue for us, now indeed, is the question how to deal with the non-market aspects of the environment.

There is a distinction between Hueting on eSNI and conventions at statistical offices, as already has been discussed in Section 11.3 (and the reader is advised to read that again). There are two books that provide some guidance here: WFM

de Vries et al. (eds) (1993) and the thesis by Bos (2003). These books mention the challenge of the environment but undervalue Huetting's contribution so they need to be supplemented by his work. See Section 7.9 and Chapter 23.

Bos (2003:25) gives a key insight on the thinking by national accountants (and see as well below on the connection between Huetting and Mishan):

"In the late sixties and the beginning of the seventies, national income was frequently criticised for not being a welfare measure (e.g. Mishan, 1969; an example of an earlier critique is Margolis, 1952). However, the authors of the international guidelines did not intend to provide a measure of economic welfare. For example, Jaszi even regards as one of his principal contributions to have resisted successfully to "the will-o'-the-wisp of forging national output into a measure of economic welfare. I was a minority of one in a company that included such mental giants as Simon Kuznets and John Hicks, and at one point I had to defy a forceful Secretary of Commerce who had instructed the BEA [Bureau of Economic Analysis of the USA] to prepare a measure of welfare" (Jaszi, 1986, p. 411; a similar opinion is expressed by Stone, 1974, and by Stone, 1986, p. 457). According to Okun, "[the] beauty of ... present practice is that no sensible person could seriously mistake the GNP for [a measure of total social welfare]" (Okun, 1971, p. 133)."

The national accountants at the statistical offices see themselves confronted with various economic theories such as Keynesian economics, input-output analysis, neoclassical growth theory, monetary theory, general equilibrium analysis, and (particular instances of) welfare economics – see Bos (1995). Their response has been to choose a multipurpose system with a standard core and supplementary modules depending upon user defined theory. This *economic statistical* core must be distinguished from the *economics* core in **Figure 13**. The approach is "institutional" instead of "analytic", where the institutional approach deliberately maintains distance from any particular economic theory. There is a "Dutch view" to keep that statistical core as small and constant and internationally comparable as possible. Reich (1993:266) summarizes this Dutch view as:

"What is a core ? We mentioned that it is (a) rather close duplicate of the 1968 SNA [;] the Dutch school sees the system which today we call the system of national accounts and which in their terminology is the core, as essentially inflexible in that it serves only one purpose and no other. New systems must be designed to produce information for which the core cannot properly be used. And these are the modules."

Bos (2003) clarifies that the primary data are shaped into some "universal model" of processed data.. These "data" are "for the user". Data are generated, we can do calculations on them, but the figures have no explicitly defined theoretical economic meaning (other than such an "universal model"). For example, the national accounts have a concept of income that matches Keynesian analysis but a general equilibrium approach could impute income from durable consumer goods. (The reader may be advised to read Section 11.3 in parallel with this.)

We may consider whether this present statistical situation was also the historical situation in 1930-1950. Kuznets and Hicks held that national accounting finds its *raison d'être* in welfare theory. Economists like Jan Tinbergen and Richard Stone may have been more practical. Tinbergen (1993:13) mentions: "Demand for them [national accounts] came originally from curiosity about the differences in economic strength among nations." His subsequent discussion extends on the practical applications and not the theoretical interpretation. Nevertheless, Tinbergen (1985) on the optimal social order puts "welfare" in the title and speaks about "counterproduction" where Huetting uses the term "asymmetric entries", so the welfare context is obvious (see Chapter 12). The extensive economic research by Hicks and others has clarified that notions such as 'strength' are theoretically unsatisfying and that a basis in welfare theory is a satisfactory approach. If a notion like income is an economic concept and if economics deals with scarcity then national accounting falls under welfare theory.

However, it cannot be said that such a conclusion must necessarily satisfy everyone. Non-economists may not be convinced by views from economics. Potentially, statisticians (and even economists) trained on SNA may have a position in a statistical institution such that they regard the SNA-manual as the defining document, that also allows them to forget about economic science. See again Section 11.3 and the difference between **Table 6** and **Table 7** on page 106, and then again the distinction between statistics and planning in Section 9.2. It may become an issue of *institutional politics* what view becomes dominant, or an issue how open the statistical office is to science and the social purpose of the statistical figures (and how they are presented).

We may have statisticians writing for their community on SNA (**Table 6**) and economic scientists writing their criticism (**Table 7**), without proper communication, because it is up to people to decide themselves whom they communicate with. See Chapter 25 about the difficult process of communication.

21.2.5 A guiding table

This book refers to the (Bergson) Social Welfare Function (SWF). Perhaps it was an issue in the past that some people narrowed welfare into NI only, but welfare economics never did so itself. For welfare, it would be more accurate to speak about "not-narrowed-welfare" rather than "broad welfare". The term "broadness of welfare" will be taken here as equivalent to welfare itself, so that "broad welfare" is a pleonasm.

Over time, economists have become *more specific* about welfare theory with notions on the environment etcetera that are intended for accounting, such as MEW, ISEW, Ecological Footprint, etcetera. Though it all would basically still be *welfare economics*, the term "broadness" has come into circulation. However, as Huetting & Reijnders (2004a) clarify, "broad indicators" can be misleading for survival because they can give positive signals while environmental sustainability decreases.

Clarity in this discussion can only be achieved by some classification with a small example. Let production consist of f = food and c = clothing. In conventional economics, social welfare only depends upon production, in this case as $SWF[f, c]$ with $NI = p_f f + p_c c$ e.g. in prices of a base year. "Economic growth" is

conventionally linked to the growth of NI. In contrast to conventional economics, a not-narrowed concept of welfare arises when we consider other factors such as d = the income distribution, u = unemployment, r = the rest (labour conditions etcetera) and s = sustainability. In this case we get $SWF[f, c, d, u, r, s] = SWF^*[NI, d, u, r, s]$. Hueting emphasizes not-narrowness, as he distinguishes welfare from NI, and where he relates NI to “production growth” instead of “economic growth”. While Hueting emphasizes non-narrowness he does not want to measure welfare in one indicator, but wants to measure the factors that influence welfare separately. In his practical research he chooses to focus on environmental sustainability, that cannot be substituted with other sources for well-being. The resulting situation might be denoted as $SWF^{**}[eSNI, d, u, r]$. Both NI and eSNI are based upon assumptions concerning preferences. The choice between SWF^* and SWF^{**} , or regime switch, might be represented by a meta-SWF, see Chapter 8, though it is important to distinguish the conditionality of the measurement in Hueting’s approach and the mundane understanding of a regime switch.

Given these relations we can find statements in the literature like “NI is an indicator for welfare” (conventional), “NI does not cover welfare” (not-narrowness phrased as broadness), “NI and eSNI are some of the factors that influence welfare” (Hueting). These statements might be somewhat confusing, but should be clear now.

Intermediate between NI and eSNI, Hueting also defines a “NI without asymmetric entries”. Overall guidance is provided by **Table 17** (and see Chapter 12 for the definition of asymmetric entries).

Table 17. Economic indicators

	<i>National income and Social welfare</i>	
	<i>National income</i>	<i>Welfare</i>
<i>Conventional economics</i>	NI	SWF
<i>No asymmetric entries</i>	NI minus asyms	SWF excl. asyms
<i>Env. Sustainability</i>	eSNI	SWF-S

Legend: The three (partial) indicators NI, NI minus asyms and eSNI and the (other) separate factors (or even indicators of factors) are required to monitor economic development. Asymmetric entries, here abbreviated to “asyms”, mean that loss of environmental functions is not entered in NI, and this is correct because our physical surroundings fall outside of NI, but their restoration and compensation are entered as value added in NI, which is incorrect because they should be entered as costs.

Figure 13 interacts with **Table 17**. We can distinguish researchers interested in theory or not. Over time, economists interested in theory primarily concentrated on not-narrowness. The historical alliance between policy making and economic theory that convened on NI has since eroded, and, while policy making still focussed on NI, the theorists went off to new horizons. A recent development is called “beyond GDP” with often a focus on “happiness”, with roots in much of the

earlier literature (and “happiness” essentially is the same as welfare and utility).¹⁰¹ An important practical point is that national accounting has been operationalized by its theorists and designers in such a manner that it doesn’t seem to require theory, see the discussion about the history of national accounting in Sections 1.5 and 11.1. Statisticians can collect data and can construct aggregates and indices without resort to the finer details of welfare theory. In circles of national accounting, a philosophy has deep roots in “measurement without theory”. Market prices are used, not because of their theoretical content but because they are merely “observed”. That “NI at constant prices grows” has become to be seen as a goal in itself, with vagueness about what is the use of such “constant prices”, and with the criterion “more” rather than “better”, whatever “more” means. Hueting has had to grapple with all these aspects and developments. (One of Hueting’s observations is that national production is closely related to the use of energy, and perhaps this might be an angle to look closer into as well.)

21.2.6 A summary deduction

Hueting, in 1969 as well, focuses on the foundations of economics and the notion of scarcity. His treatment of the economic decision problem can be classified as “welfare economics” but in that sense all economics would be “welfare economics”, and “welfare economics” would be a pleonasm as well.

Hueting’s approach and the discussion that he meets has given rise to our discussion in Sections 11.3 and 11.4. Restating: These points indicate that there is a theoretical crisis in economics that is not discussed clearly as a crisis.

Figure 13 allows an interpretation of “green accounting” *at the level of users* far away from the foundations of SNA, but it also allows for the *need to amend SNA*. It depends upon the openness of mind what dimension the national accountants are willing to recognise. In terms of political economy, there is an institutional setting such that criticism can be rejected by institutionalised misunderstandings.

21.3 The United Nations Intellectual History Project

The present discussion obviously has a focus on Holland but we should not forget about the wider context, also provided by the *United Nations Intellectual History Project*. The book reviews of UNIHP are enlightening.¹⁰² Ocampo (2013) clarifies:¹⁰³

“The creation of a universally acknowledged statistical system and of a general framework guiding the collection and compilation of data according to recognized professional standards both internationally and nationally has been one of the greatest and most unsung successes of the UN organization. (Ward, 2004, p. 2) (...)

As Ward illustrates, another by-product of the cold war during the early years was the focus of the UN on economic rather than social statistics, as the latter were considered politically sensitive. This explains, in his view, the concentration by the UN on the system of national accounts and

¹⁰¹ Addendum: Clark, Frijters and Shields (2008) give a good review, exclusive of environmental sustainability.

¹⁰² <http://www.unhistory.org/reviews/ODSReviewsUNHistory.pdf>

¹⁰³ <http://www.unhistory.org/reviews>

COMTRADE (the system of information of international trade, the roots of which go back to the activities of the League of Nations). (...)

Ward also shows that after the 1972 Stockholm Conference on the Human Environment, the UN Statistical Office started asking countries to collect environmental statistics and it would be the first organisation to develop a system that would integrate all elements of environmental degradation into a comprehensive accounting framework, treating the deterioration of natural resources as depreciation.”

Ward mentions Hueting as one of the statisticians on this stage. He had a flying start including UNStat sending out such invitations. The framework that Ward praises derives much from the work by Hueting and Canadian A.M. Friend, but this is not to imply that Hueting is entirely happy with the result by UNStat / UNSD.

21.4 The period up to “New Scarcity and Economic Growth” 1974

The period up to Hueting’s thesis can be seen as advance. Being an economist at the Ministry of Social Affairs, doing labour market research, Hueting discovers the environment around 1965, a period when world population stood at 3.3 billion. Hueting (1969a) introduces the concept of environmental functions for an international audience. He writes articles for a Dutch economics magazine ESB like Hueting (1967, 1968) and bundles these in *What is nature worth to us?* (Dutch, 1970b). From his first article onwards, Hueting states that the national income (NI) figure is incomplete, as he states it now in Hueting (2008): “National income is the sum total of the values added by man. These are added to the non-human made physical surroundings.”¹⁰⁴ Producing is adding value. Water, air, soil, species and life support systems are not produced by man. So the physical base of human existence falls by definition outside of national income.” Hueting: “Now I am only repeating what I stated around 1965.” (Quotes like these may be personal communications.) These were the years of Meadows et al. (1972), *The limits to growth*.

Tinbergen contacted Hueting on his 1968 ESB article. Eventually, on Tinbergen’s advice to CBS, CBS Statistics Netherlands invited him to come and to correct the national accounts for damage to the environment, and he started there in 1969. Hueting: “The intention was that I would start in the department of National Accounts (NA). However, the head Theo Bouthoorn planned to retire in a few years and did not want new issues in his department. Co-ordinating director Kees Oomens¹⁰⁵ then decided to create a separate unit for environmental statistics. In hindsight it might have been better to be part of the NA department, but anyway we required a base of physical data, and now we had ample opportunity to do so.” Said book of 1970b *What is nature worth to us?* states:

¹⁰⁴ Value added is in money and the physical surroundings have other dimensions. This value added thus stands apart from the not-human-made physical surroundings. Thus the term “they are added to” doesn’t refer to mathematical addition but to inclusion, like on another axis. In Hueting & De Boer (2019b) Hueting provides a reformulation.

¹⁰⁵ For Kees Oomens (1917-2005) see Van Teeffelen (1999) and Van de Ven (2006). Oomens expressed support for eSNI (personal communication to Hueting).

"Since November 1969, he heads the newly established environment unit of the department of statistics of public health at CBS Statistics Netherlands, with the task of quantifying environmental deterioration and subsequently correcting the concept of economic growth."

Jan Tinbergen, Jan Pen and CBS now urged that Hueting put his findings into a thesis. Its genesis was straightforward and it became Hueting (1974a, 1980) *New Scarcity and Economic Growth. More welfare through less production?*. Hueting (also a jazz pianist): "I composed the book as a fugue of 5 voices, economics, ecology, history, social issues, unemployment, all flowing together into in the figure of national income."

21.5 Some conclusions from "New Scarcity and Economic Growth" 1974

The following quotes indicate some highlights on Hueting's findings in 1974:

"The crucial question 'What is nature worth to us?' cannot be answered by means of the instruments available to us. But in my opinion the study has shown that at the same time another question remains unanswered, namely 'What is the worth to us of goods that are produced and consumed at the expense of the environment?'. For when the value of the environment cannot be determined in the conflict between production and the environment, the market price of produced goods may no longer be accepted as an indicator of the economic value of these goods." (p185)

"Corrections to national income (in order to arrive at a series of figures to place *alongside the existing ones* [our italics]) are possible only for losses of function in which the want for the function may be derived from market data." (p186)

"All the information now available suggests that an unchanged continuation of growth of production and of population will almost certainly lead to ecological or climatic disasters or to a collapse of our civilization as a result of the exhaustion of energy and national resources, shortages of food, pollution or lack of space." (p187)

"Environmental deterioration is therefore above all a problem of future generations, for which this generation is responsible. (...) In this situation, which has no precedent in the history of mankind, the level of activities will, in my opinion, have to be limited to such an extent, on the strength of ethical considerations, that the future is given a fair chance." (p187)

"Man's wants are to a considerable extent determined historically and culturally. They are also open to influence to a high degree. (...) If this view is correct, optimism with regard to human happiness is justified, even if the availability of means of satisfying wants decreases." (p188)

"The hope for a livable environment for our children seems best served by optimism regarding human imagination and ingenuity, which are great, and pessimism regarding human institutions, which are slow to react." (p189)

It is important to observe that Hueting's analysis concerns national accounting, no more, no less. There are two elements, one part pure science based upon observed market prices and another part beyond that with the suggestion of an

ethical approach with respect to merit and demerit goods. Only the first is included in national income. It is only after more than a decade in 1986b that Hueting arrives at his “what if” approach to bring environmental sustainability also within the realm of national income. NB. There are authors who interpret the later development of eSNI as reflecting purely a political or ethical choice, and who reject eSNI for this reason. These authors then agree with the Hueting (1974a, 1980) conclusion that politics and ethics are no part of national income, but they miss out on the more developed Hueting (1989b) analysis on the conditionality upon assumptions in national accounting and the “what if” approach designed after 1974a, 1980.

21.6 Reception of “New Scarcity and Economic Growth”

21.6.1 On the positive side

“The thesis was received with hosannas,” Hueting recollects. The hall where he defended his thesis was overcrowded, he received a Cum Laude, later he presented a copy to the Minister of the Environment Irene Vorriink with the national press present, there was an invitation to the Royal Palace where he presented a copy to Prince Bernhard (chair of WWF),¹⁰⁶ and over the next year 5000 copies were sold – which is a sizable number for a small country.

This reception reminds one, see Turner (2005), of the reception in Britain of David Pearce’s “*Blueprint for a green economy*” in 1989 – also a UN Global 500 Award winner.

21.6.2 Six year delay in the publication of the English translation

21.6.2.1. 4.2.1 Manuscript sold to a U.K. publisher

The connection to Prince Bernhard appeared valuable since he was the first president of the World Wildlife Fund, later renamed World Wide Fund for Nature. WWF International financed the English translation of the thesis. The translator Trevor Preston had worked parallel with Hueting so the English version was available a few months after the Dutch version. Sadly, its actual publication was delayed to 1980, for reasons that remain obscure to this day. Elsevier sold the manuscript to Liverpool University Press, for unclear reasons. The editor there had all kinds of objections and didn’t do much. The ordeal lasted six years and it required an intervention by Tinbergen, the Minister of Economic Affairs Hargert Langman, the Minister of Environment Roelof Kruisinga and others, to resolve it. A letter went out to Elsevier stating that the publication was a “case of national interest”. Elseviers bought the manuscript back, and it was published within a few months, in 1980. “The delayed publication was a major setback,” Hueting observes. “I had become a member of various international committees and without the backing of the book people could not understand my argumentation or could not consider it with proper attention. There was no base for discussion and understanding. The book missed the international impact that it could have had. By the time that it became available, there were already other approaches by others that distract from the argument.”

¹⁰⁶ https://nl.wikipedia.org/wiki/Duurzaam_nationaal_inkomen

21.6.2.2. 4.2.2 Mishan's reaction of "nothing new"

In the ordeal with Liverpool University Press, the editor produced a letter from E.J. Mishan whom he had invited to review Hueting's manuscript. Mishan appeared to give a very negative review, stating that Hueting's book contained "nothing new". Hueting rejects that statement and suspects that Mishan did not enjoy his remarks on K.W. Kapp (1950) whom Hueting considers much more comprehensive than Mishan (1967). On Mishan's book Hueting (1974a, 1980:75) states: "As in the case of Kapp – who, strangely enough is not mentioned, any more than Boulding is – the effects on the environment form only a part of the adverse effects of the growth of production discussed. (...) Mishan includes (...) also the influence on our cultural pattern. The later facet, where, in my opinion, he arrives at a number of highly disputable conclusions, will not be discussed here."

The UN, EC, IMF, OECD, World Bank (2003) Handbook on Integrated Environmental and Economic Accounting (SEEA 2003), Section 10 paragraph 199 reads:

"Much of the initiative to look for an alternative path for the economy rather than a different measure of the existing economy came from the work of Hueting in the late 1960's and early 1970's. He introduced the concept of environmental function referred to throughout this manual, explaining how pressure on functions leads to scarcity or competition for these functions. As with any economic good or service, this scarcity gives rise to an economic value due to the opportunity costs involved in their use or appropriation."

Mishan's judgement thus was too quick. Given Mishan's important position in the field at that time this was a major set-back potentially also after publication.

21.6.3 No adoption of the key proposal

Despite the enthusiastic reception of the book in Holland, the key proposal in it – i.e. to create a corrected figure alongside the official figure for national income, namely for asymmetric bookkeeping – was not adopted, neither by policy makers nor by CBS Statistics Netherlands itself. Hueting identifies two causes: "One cause lies with myself. The result of the thesis was that the environment could only be valued partially, for the reason that the preferences express themselves in the market only partially. They show only by expenditures on elimination and compensation, or what I now call the "asymmetric entries". I was afraid for the "pars pro toto effect", i.e. that if a corrected figure was published then people might think that it would be sufficient to consider only this figure. I was leaning to the idea that at least the thesis showed that while there was no figure available for the scarcity of the environment, this also meant that the NI figure is incorrect." The other cause lies on the receiving end. Hueting: "My colleagues at the department of National Accounts didn't see a reason for change. I myself didn't exert as much force as I might have, because of the "pars pro toto effect". The CBS directorate has always been in favour of my research but neither saw a reason to go against the will of the Department of National Accounts."

Now retired CBS adjunct-director and former head of the Department of National Accounts H.K. van Tuinen states in Van Tuinen (1975), in reaction to Hueting and

apparently independently, the “pars pro toto” effect as well, see Section 25.8. He refers to difficulties in empirical applications of welfare economics, therefore rejects adaptation of national income but mentions that environmental functions could be included in a satellite module to the national accounts.

A critical impression by me is that it seems that Hueting was also surprised that his strong and coherent exposition apparently was not convincing by itself – and that he did not know what else to say. We will return to this in subsection 21.9.8 of this Chapter.

21.7 The period from 1980 up to the Brundtland report 1987

In the period since his 1974 thesis, Hueting develops the Dutch environmental statistics, participates in international committees, and writes papers on how to practically resolve the insoluble issue of valuing nature. In 1983, the U.N. General Assembly passed a resolution, speaking about “sustainable development”, and established the World Commission on Environment and Development also known as the Brundtland Commission. In 1987 it published the report “*Our common future*”.

21.7.1 Environmentally Sustainable National Income (eSNI) 1986

In the obituary of Robert Goodland (1939-2013), Herman Daly remembers: “Robert cooperated with Salah El Serafy, Herman Daly, and Roefie Hueting to develop a series of conferences throughout the 1980s on “Greening the UN System of National Accounts.””¹⁰⁷ See also Daly (2001).

Goodland (2001:320) discusses the events:

“In 1983, UNEP, led by Yusuf Ahmad, convened the first international workshop to explore how sustainable national income should be calculated within the whole UN system by modification of traditional SNA. I supported this new and potentially powerful approach and managed later to bring in Salah El Serafy who led the World Bank into Green Accounting. As Hueting was the only person in the world to have been working on adapting the accounts of any nation up to that point, he contributed greatly to what became known as the “UNEP-World Bank Working Group on Environmental Accounting”. The World Bank hosted the second workshop in Washington in 1984, OECD a third workshop in Paris in 1985, and again in Washington in 1986, by which time Environmental Accounting had become institutionalized. This group focused mainly on incorporating the exhaustion and depletion of environment and natural resources in national income, notably in developing countries. (...) The results were published in 1989 in “Environmental Accounting for Sustainable Development”. Progress on Environmental Accounting then slowed down from the early 1990s until the present, and the World Bank Group still relies more on unadjusted national accounts which exclude environmental losses.”

Goodland (2001:320) also records where Hueting’s approach originated:

¹⁰⁷ <https://steadystate.org/remembering-robert-goodland/>

“Much of Hueting’s work originated in developing countries. After having worked on sustainable national income for the Netherlands, Hueting extended his approach to Indonesia. His proposal to approach sustainability for environmental functions was first made during his visit to Jakarta in 1986, on invitation of H.E. Emil Salim, Minister of Population and Environment (Hueting, 1986b). Hueting then broadened his approach while on the team that produced the “Taiwan 2000” study.”

A bit to the side, it may be remarked that Steven Keuning, see below, who helped transform Hueting’s environmental statistics into the NAMEA format for better linkage to the national accounts, was inspired into doing this, because he wrote his thesis about social accounting matrices for Indonesia too.

21.7.2 SNI and eSNI

In his memo for Emil Salim, Hueting (1986b), also presented this year at the UNEP / World Bank workshop, came to realize that the political choice for environmental sustainability was an expression of a preference that could be modeled as a demand curve. What was hitherto unknown and unobserved, now became tangible, and what was insoluble suddenly found an approach in a practical manner. Inspired by the political example, Hueting transferred the notion to what science can do. This led to the Hueting approach to represent the *assumption* of a preference for environmental sustainability by a vertical line, based upon a physical standard which expresses the sustainable burden on the environment. This approach thus includes the *conditional* or “*what if*” calculation: *If* you want environmental sustainability *then* this gives a figure for “environmentally sustainable national income” (eSNI). In 1986 Hueting applies physical standards, and the theoretical presentation of the “vertical demand curve” appears for the first time in 1986b, and publication 1989b.

He uses the term “sustainable national income” but the literature starts to abound with so many different concepts of sustainability, that in 2007 he adds a prefix for the proper kind of sustainability: “environmentally sustainable national income” (eSNI). For a discussion of the various measures arising over time, see Hueting & De Boer (2001a) “*Parable of the carpenter*”, Hueting’s (2001d) “Rejoinders” and Hueting & Reijnders (2004a).

21.7.3 Hueting on the Brundtland report

Hueting’s 1988 paper, presented in New Dehli, rejects the Brundtland report since it combines sustainability with conventional growth of production, while proper environmental sustainability cannot be attained in such manner.

The Baumol effect has the emblematic example that a Beethoven string quartet requires the same input now as 200 years ago. The analysis is a bit mixed when a current string quartet can also sell recordings. The shift in the economy from agriculture to industry to services had already been observed by Sir William Petty, and has recently been documented in the World Bank (2000) “*Beyond economic growth*”. However, the “Hueting effect”, if one may call it that, is that the greater part of productivity growth by far is generated by precisely those activities that burden the environment most, see Hueting (1981bc). The core of productivity growth (in current methods of measurement) is generated by the agricultural and

industrial base, and this explains the impact of “economic growth” on the environment. Hueting prefers “production growth” for the relative change in NI since economic welfare would not be so narrow. Production growth tends to reduce environmental sustainability, while growth in economic welfare would probably benefit from reallocating activities (that reduce NI growth).

21.8 *The nuclear option 1970-1992*

The book by Richard Douthwaite (1992) received a rather harsh review: “It is hard to believe that any such writer, journalist, speaker and ‘professional Economist’ could make such a bad job of writing about something we all know to be true. (...) I fear most readers will not get past chapter one. The problem? Well, when Richard is talking economics his use of Statistics is quite bewildering. He reminds me of some very bad lecturers at University who knew their topic inside out but just couldn’t communicate it to students.”¹⁰⁸

We skip the general purposes of Douthwaite’s book, and our current interest concerns only the quotes about Hueting, since these provide some historical information as known in 1992.

Douthwaite (1992) refers to Hueting 20 years earlier:

“With examples like these in mind, a Dutch economist, Roefie Hueting has argued for the past twenty years that people in developed countries might be better off if they produced less. Hueting [ftnt] thinks that at least seven factors play a role in determining the quality of life, only one of which is equivalent to Pigou’s ‘economic welfare’.” (p20)¹⁰⁹
“Perhaps, to use a phrase of Roefie Hueting’s, the lighthouse on which we have been taking our bearings was built in the wrong place.” (p30)

Douthwaite (1992:223-241) is a chapter called “The Dutch dilemma”.

“Few people have so far reached the conclusion that all growth should stop and that the country will have to adjust to a declining GNP. Someone who has been saying this since the mid-sixties is Roefie Hueting, head of the environmental statistics section of the Central Bureau of Statistics in The Hague, whose ideas we discussed in chapter 1. Hueting incurred considerable unpopularity in the seventies and early eighties, even among members of the Green movement. ‘They were telling people you could preserve the environment and have growth as well, and didn’t like my questioning that,’ he says. ‘I was despised in Holland. Bitter personal attacks were made on me by my colleagues. I hate people who say we have to grow to generate the resources to save the environment. 80 to 90 per cent of economists say that and, since they are not dumb, they must be liars.’”

¹⁰⁸ <http://www.post-carbon-living.com/blog/index.php/2008/04/11/richard-douthwaite-the-growth-illusion-how-economic-growth-has-enriched-the-few-impoverished-the-many-and-endangered-the-planet/>

¹⁰⁹ Observe that Lionel Robbins turned economics in the study of scarcity, whence what Pigou calls ‘economic welfare’ rather would be consumption, and that Hueting uses “economic welfare” for the utility function of consumption and other factors.

The latter is simplistic, see Aronson (1992) on cognitive dissonance, and Colignatus (1996b) for the application of social psychology within institutional economics. Hueting isn't simplistic, and the quoted statement is unfortunate.

"[Hueting's] anger has its roots in 1974, when he was invited to join a group of scientists opposed to the construction of three nuclear stations. 'I saw that it was pointless to be opposed to nuclear energy without developing an alternative to conventional sources of power as well, because these have equally harmful effects such as acid rain,' he says. 'Even if you managed to cut emissions from conventional sources by half, within twenty-three years the situation would be as bad again if the economy grew at 3 per cent.' In 1973 the group split over Hueting's argument that continued economic growth was incompatible with environmental protection and the Hueting faction stalked off and set up the Centre for Energy Saving. (...)"

The latter became CE Delft that produced the CE-scenario alongside a "growth scenario".

"The two models created an almost identical number of jobs. The growth scenario, however, produced six times the air pollution, a drastic deterioration of the environment, and a continued loss of plant and animal species. And in spite of these costs, the available income per citizen was only 11 per cent greater than for the environmental model, because a high proportion of the increased national income had to go to pay the interest on the investment it had taken to bring it about."

"Hueting thought that he had proved his case and wanted to present the results to an OECD conference. Since the Dutch government had paid for the work, he asked them to submit it (a private individual cannot do so directly) but was turned down. 'They said they would not do so because they did not agree with my findings. That's a position I can accept,' he says. But when he asked the umbrella group representing most Dutch environmental organizations to submit it instead, both the group's referees turned the paper down as an inadequate piece of work."

"If the paper had been submitted to the OECD in all probability it would have been forgotten. As it was, I was determined to prove the referees wrong and I got it published in no less than nine learned journals around the world - completely unchanged,' he says. He also presented the paper in person at The Other Economic Summit (TOES) in London in 1984."

"It's not that I'm against growth. I'm entirely in favour of people having three cars and five houses if they want them, provided they can do so without hurting the environment, but unfortunately they can't. There is nothing incompatible between creating employment and preserving the environment - in fact, saving the environment creates a lot of jobs. The problem is the conflict between production and the environment. (...)"

"So what are the snags? From the point of view of the planners, only that the numbers affected by noise and smells were not cut further - they had set themselves a 70-90 per cent reduction target for both. All the other

cuts were close to the levels they felt ought to be achieved. But for environmentalists, the promised carbon dioxide reduction left a lot to be desired. 'We need a 60 to 90 per cent cut just to stabilize the atmospheric carbon dioxide concentration,' says Lucas Reijnders. 'We can't be more accurate, because we still don't know enough about how the natural sinks for the gas behave. Even if we achieved that reduction now, we'll still get at least a degree Celsius warming.' (Other scientists put the warming to which the world is already committed at twice that figure.)" (...)

While this Section shows Hueting in a role as adviser for policy directed at the future, this Chapter focuses on his role as statistician.

21.9 *The period from 1991 up to the Hueting Symposium 1999*

21.9.1 *Tinbergen & Hueting 1991*

In an important step, Hueting maintains the support by Jan Tinbergen (1903-1994). In a joint article, Tinbergen & Hueting (1991) for UNCED a.k.a. the World Summit on Sustainable Development (WSSD) in Rio 1992 present the Hueting approach of the "what if" calculation by eSNI:

"Standard setting was also considered, but the questions of what standards were to be set by whom could not be answered at that time. This situation has now changed. Especially after the 1987 Brundtland Report, politicians and organizations worldwide declared themselves in favour of sustainable use of the environment. This preference, voiced by society, opens up the possibility of basing a calculation on standards for sustainable use of environmental functions instead of (unknown) individual preferences. Therefore, the following procedure is proposed for correcting GNP for environmental losses (Hueting 1986b, 1989b)." ¹¹⁰

The authors arrive at a rough estimate that world eSNI is about 50% of world income, which estimate is corroborated by later findings (using the base of NNI).

21.9.2 *The methodology of eSNI 1992*

When Hueting, Bosch & De Boer (1992d) presented their "*Methodology for the Calculation of Sustainable National Income*", the then CBS Statistics Netherlands director-general A. Abrahamse sent the report to secretary-general Maurice Strong for the Conference on Environment and Development (UNCED), also known as the *Earth Summit*, at Rio de Janeiro 1992, and to Dutch minister of environment Hans Alders and minister of development Jan Pronk ¹¹¹ to support this at UNCED. The World Bank and the US National Governors' Association and EPA paid attention to it. The newspaper report by Henk Donkers (1992) reads as if it could have been written yesterday. The same actually holds for Marlise Simons (1990) in the New York Times, see Goodland (2001:323-325).

¹¹⁰ This phrasing might invite confusion. Statisticians *derive* standards from the scientific literature. Policy makers *set* standards for the economy.

¹¹¹ Now chair of the Foundation for eSNI. See www.sni-hueting.info.

21.9.3 Retirement 1994 and advisorship

In 1994 Hueting turns 65 and retires from CBS Statistics Netherlands. The directorate appoints him to an advisorship, and he keeps his office and Hueting works almost as if still employed. This continues till October 2000.

21.9.4 Thesis by R.S. (Dolf) de Groot 1994

De Groot (b. 1955) studied biology with a specialisation in ecology, and became interested in “*the development of a methodology for assessing the ecological and socio-economic importance of natural ecosystems*”, thesis De Groot (1994:379). Inspired by three studies including the Hueting (1974a, 1980) thesis, he started in 1981 on the evaluation of (Hueting’s) environmental functions, with a book on this in 1992, apparently parallel to Hueting’s development of eSNI and potentially for a while without communication. De Groot helped set up a Wageningen center on climate change in 1991. Based upon this 1992 book, he presented his 1994 thesis in “agricultural and environmental sciences” with the title “*Evaluation of Environmental Functions as a Tool in Planning, Management and Decision making*”.¹¹² This thesis only refers to Hueting (1974a, 1980) and neither to Tinbergen & Hueting (1991) nor the 1992d methodology on eSNI. Hueting was on the thesis commission to advise on economics. In 2019 he recalls that he rejected De Groot’s use of economics (e.g. a hectare of Waddensea was taken a factor 10 more valuable than a hectare of tropical forest) but in 1994 he let it pass as De Groot’s own responsibility (see below).

De Groot later collaborated with Costanza et al. (1997) who do not refer to Hueting, and who refer to environmental functions as natural capital and “ecosystem services”, see Sections 7.10 and 21.9.10. It remains useful to emphasize that De Groot is a biologist by training who ventures upon economics, and that his early references to Hueting’s thesis do not imply that he has properly studied economics and eSNI. Hueting rejects his understanding of economics, and links some errors by Costanza et al. (1997) to the misconceptions by De Groot. De Groot’s collaboration with Costanza does not imply a collaboration with economists, see that section. Nowadays, De Groot claims expertise on “environmental economics”,¹¹³ but see Section 21.9.10 for the origin of that journal in thermodynamics.

De Groot was also coordinating lead author in the UN-supported Millennium Ecosystem Assessment and the study “*The Economics of Ecosystems and Biodiversity*” (TEEB) (2018).¹¹⁴ The latter studies are again cited by researchers in the Netherlands who do not refer to Hueting’s work, so that we get a niche of non-economists referring to non-economists about economic issues.

To check upon the weak basis in economics, the following quotes from the thesis might help.

“An important element in this thesis is the linking of ecological concepts with economic theories and evaluation methods. Since my scientific background is in (landscape)ecology, this thesis should not be interpreted

¹¹² <http://edepot.wur.nl/211708>

¹¹³ <https://www.narcis.nl/person/RecordID/PRS1254497>

¹¹⁴ <http://www.teebweb.org/>

as an attempt to give a “state of the art” of economic and monetary evaluation procedures of the natural environment. The main purpose is to provide the ecological basis for a much needed dialogue between ecologists and economists in order to structurally integrate environmental constraints in economic evaluation and accounting procedures. To become familiar with economic theory and evaluation methods, I spent much time reading economic literature and personal discussions with economists (notably Dr. Henk Folmer, Dr. Roefie Hueting, Dr. David Pearce, and Dr. Peter Stokoe), and I should like to thank them all here for their help with reviewing the economic sections in this thesis. Of course, if any errors did remain in the text this is my sole responsibility.” (p ii)

“I owe special thanks to Dr. Hueting who invested much time and energy in reviewing sections of the book. My ignorance in his field of expertise may at times have driven him to despair. Yet, I hope that our discussions on the links between ecology and economics have been useful to him and the others too, and that they may serve as a model of a constructive dialogue between ecologists and economists, the need for which is emphasised in several chapters of this book. If, in spite of our mutual efforts, some errors do remain in the final tekst, this is my sole responsibility.” (p iv on chapters 3 and 5)

For the definition of environmental functions, De Groot refers to his own work instead of Hueting (1974, 1980) (p x and 95). One might say that Hueting is more involved, but at least De Groot p95 provides accuracy: ¹¹⁵

“The ecological assessment (chapters B-2/A-2) is entirely based on the concept of environmental functions which is defined as ‘the capacity of natural processes and components to provide goods and services that contribute to human welfare, directly and indirectly’ (de Groot, 1987).”

The current cv by De Groot states, and check the risk of a niche of non-economists referring to non-economists about economic issues, while it would be important that ecologists and economists collaborate.

“Rudolf de Groot is associate professor in integrated ecosystem assessment and management with the Environmental Systems Analysis Group of Wageningen University, the Netherlands. He is a landscape ecologist by training and has worked for over 25 years on ecological-economic analysis of the impact of land use and climate change on ecosystem services as a tool for sustainable planning and management. De Groot published over 100 scientific papers, including two books, and was involved as coordinating lead author in the UN-supported Millennium Ecosystem Assessment and the recently published TEEB study. He is editor-in-chief of the international journal Biodiversity Science, Ecosystem

¹¹⁵ For example, Hueting: “Now, one difficulty is that some vital functions of the environment are not appreciated by people because they do not know how important these functions are to life on earth (including human life). Consequently, the functions do not fully coincide with usefulness; in part they coincide with the objective value in use.”

We will refer to De Groot again at some later developments. Observe that Wageningen University has close links to the Dutch Ministry of Agriculture, for example on “research required by law”.¹¹⁷ Researchers there also developed close links with PBL. Thus, when there is misunderstanding at some core, it may spread.

21.9.5 *Hueting as quintessential CBS*

From this review it transpires that Hueting is quintessential CBS, in that his focus is on the combination of relevant theory and practicality of results, all targeted at providing information only. Society is confronted by important policy choices, and science and statistics can play a key role by providing the relevant information.

When Hueting and CBS go separate ways then institutions tend to make bigger waves but the onlooker can observe that something is amiss. When CBS Statistics Netherlands advises the Dutch government on statistics on economic developments, one can imagine that policy makers somewhat regard this as a “report card” on their performance. One would not want that students are in the position to write their own report cards. Thus there are safeguards for the independence of CBS Statistics Netherlands. Still, managers and top advisers at CBS must feel comfortable with their advice. When the academia are silent or negative about eSNI then CBS stands alone, and then requires a strong internal conviction itself that eSNI is a necessary indicator to adopt. In this period Hueting (b. 1929) was close to retirement in 1994 and CBS Statistics Netherlands did not manage its internal affairs well.

Alternatively, we might also look at the Dutch institutional setup. Next to CBS Statistics Netherlands, there are also the Central Planning Bureau (CPB) and the the PBL Netherlands Environmental Assessment Agency (formerly MNP and a part of RIVM).

21.9.6 *CBS and CPB*

In Holland, there exists a specialization of tasks between CBS Statistics Netherlands that provides the statistics, necessarily for the past, and the Central Planning Bureau (CPB) that provides projections for policy making, necessarily for the future. Tinbergen actually helped create that distinction by moving his planning section from CBS to create the new CPB in 1945, just after WW II. Hueting worked at CBS and the present author has worked at CPB.

Hueting’s position at CBS has always suffered from the fact that “future generations” sounds like “the future” and not “the past”. The generation currently alive has an influence with regards to future generations and thus by necessity has a paternalistic preference, for good or for bad. Those future generations aren’t present yet and cannot express their preferences. Using that paternalistic preference we can consistently define “environmental sustainability” using only the current generation. However, some authors don’t seem to understand this and

¹¹⁶ <https://www.thesolutionsjournal.com/author/rudolf-de-groot/>

¹¹⁷ <https://www.wur.nl/nl/Onderzoek-Resultaten/Wettelijke-Onderzoekstaken.htm>

they consider it confusing that a statistical office would investigate preferences of future generations. eSNI however relies on assumptions on individual preferences of those currently alive.

In the Dutch set-up, Hueting's concept seemed to run opposite to the two different institutional paradigms. Perhaps he should have moved from CBS to CPB, to project environmentally sustainable paths for the future and include some "base values" for the past as a side product. As it happened CPB did not understand or agree with Hueting's approach anyway. Various economists at CPB comprehend the notions of national accounting, but not all people at CPB understand all of it. At CBS Hueting had ample contact with colleagues and there was more scope for discussion but with CPB these moments were essentially limited. Around 1983 CPB abolished its own section on the environment (Passenier (1994:298)) while Hans den Hartog, member of the CPB directorate and a good contact for Hueting, suddenly died in 1992, at 58 years of age. Hueting and Den Hartog worked together on the first publications by CBS and CPB on the environment, see CBS (1972) and CPB (1972). The long run study CPB (1992) for 1990-2015 also considers the environment.

The Hueting et al. (1992d) methodology for the calculation of eSNI basically uses statistical averages for the estimate. This met with criticism that behaviour would be affected by environmental sustainability measures and price changes, and that this required a model. Though CBS already had a model created by Wouter Keller (1980), CPB claimed that model making was its province as well and that CBS should stay out of that realm.¹¹⁸

The dispute between CBS and CPB was strong, see Appendix 52 below. (a) In 1993, there was an incident concerning an article by Hueting for economics magazine ESB. (b) In 1996, the Minister of the Environment Margreeth de Boer and Minister of Economic Affairs Hans Wijers were misinformed by some of their officials about eSNI, leading to a misinformation of Parliament. (c) When a meeting between Wijers and Hueting resolved this, CPB claimed its monopoly at making models and succeeded in getting Wijers and the CBS to accept this. A separate project was created with a special subsidy to calculate eSNI, joining CBS, environmental institute RIVM and university group IVM. This group actually used the Keller model but a consequence was that eSNI was moved out of CBS. Also, Hueting now had to clarify the entire issue and the principles of national accounting to the people at IVM, both Frank den Butter as chairman of the overseeing committee and Harmen Verbruggen and the other members in the actual research group. See Chapter 39 for the complications in this.

In this process, internal doubts at CBS were key. The setup for eSNI was only on paper, it was experimental and based upon new theory. A first rough calculation was done by the National Accounts Dept. with an input-output model, but, still, it was experimental. At CBS itself, some rejected the use of a model as

¹¹⁸ Around 1996 institutes of government would hire external consultants – like Nyfer on the Betuwe railroad track – so that CPB was put into the position of having to explain what would be wrong about the approaches and models used by those external consultants. The present author (Colignatus) has a recollection that the cabinet gave CPB a monopoly within the government for the use of national economic models – but I have lost the reference. However, now that CBS has become an independent body (Quango), it would not be subject to such cabinet-directive.

well. The directorate of CBS did not wish to rock the boat and required general support, which it did not get. In a way the criticism that a model would be required may have been a blessing in disguise since eventually that model was created, increasing the robustness of the measure. The Dutch institutional deadlock was worked around and the number of people involved was enlarged. Nevertheless, had there been international support then the directorate of CBS might have taken a stronger position. Below, we will first consider the internal discussion at CBS and then look at the international situation.

21.9.7 *Jan-Pieter Smits 1997*

In 1997, Smits did not work at CBS Statistics Netherlands yet. The paper Smits (1997) considers environmental restrictions to historical economic development. Smits identifies three methods of valuation of the environment: market prices, contingent valuation, and prevention & elimination. For the latter he refers to Hueting (1974a, 1980) and Tinbergen & Hueting (1991). He adopts the T&H criticism of market prices and contingent valuation. For the T&H approach, he points to a valuation dilemma as expressed in a paper by Aaheim & Nyborg in RoIW. In cases where prevention of damage is very much cheaper than cleaning up afterwards, it seems unclear how this must be valued, either by the low cost of prevention or by the high cost of repair. Smits acknowledges the criticism “for a large part” and leaves it at that. However, he does not take the statistical point of view that when damage can be observed, then it cannot be prevented no more, and thus must be eliminated. The Aaheim & Nyborg paper is rather a non-issue, with the distinction between statistics and policy making, and as policy makers looking at the future would tend to prefer the lower costs of prevention. More about Smits’ work in Section 21.11.1 and Chapter 28.

21.9.8 *Inside CBS Statistics Netherlands 1991-1999*

In 1994 Hueting reaches the age of 65 and retires from CBS but remains adviser, keeps his office and in practice works like before. Jan Tinbergen passed away in 1994, at 91 years of age, so could no longer support Hueting. In the years around Hueting’s retirement, the then head of the Department of National Accounts Steven Keuning formulates a more conventional view on the national accounts and the environment, Keuning (1992), and finds support for this with the CBS directorate – fitting with Van Tuinen (1975). This effectively creates the CBS position that differs from Hueting’s position. The statistics generated by Hueting’s Department of Environmental Statistics are translated into satellite accounts, similar to the social accounting matrices in the Keuning (1995, 1996) Ph. D. thesis. The transformation is done under joint responsibility by Hueting and Keuning, which is not reflected in the list of authors. Keuning also participates in the London Group of the U.N. Statistics Division (www.unstat.org now UNSD) that is instrumental in national accounting and the environment. A reference for this period is De Haan and Keuning (1996) on the NAMEA. De Haan has been chairman of the London Group. When the London Group meets on occasion at CBS in Voorburg, Hueting is not invited to participate, causing the spectacle of different paradigms working on different floors. The present author and Keuning were fellow students in the 1973 enrollment class in econometrics at the University

of Groningen and the reader should take into account that relations have always been friendly. The author only learned about these events a while after Hueting's retirement. More on Keuning (1996) is in Chapter 24.

21.9.8.1. *The onset of SEEA*

The work done at CBS Statistics Netherlands appears to have had an impact on international environmental economic accounting. Looking back in 2006, Robert Smith (2006) reports on the SEEA 2003:

"The preparation of the System of Environmental and Economic Accounts 2003 marks an important milestone in the world of official statistics. Just as the development of the original guidelines for national accounting in the 1950s was the first step toward today's robust, internationally comparable economic statistics, the System of Environmental and Economic Accounts 2003 offers hope to bring order and comparability to environmental statistics."

UNStat has installed the Committee of Experts on Environmental Accounting (UNCEEa) to guide SEEA to the same status as SNA and to oversee implementation. Both eSNI and NAMEA are part of SEEA 2003. Hecht (2007:7-8) in her short historical review correctly observes:

"The Netherlands was also a leader in the development and adoption of environmental accounting. Dutch interest in this area originated with the work of Roefie Hueting, who developed and sought to implement a measure of sustainable national income that would take into account the degradation and depletion of environmental assets resulting from economic activity. Although his approach was not implemented at that time, his work led the national income accountants to develop the national accounts matrix including environmental accounts (NAMEA), which builds on portions of the national income accounts by adding physical data on pollutant emissions by sector. The NAMEA approach has been adopted by Eurostat, implemented in many other European countries, and integrated into the environmental accounting procedures developed under developing it several decades earlier. (...) Despite its limitations, it is a valuable framework for organizing economic data about the environment, and is an essential input into the analyses desired by economists and environmentalists."

21.9.8.2. *A statement on "politics"*

In the CBS Occasional Paper Keuning (1992:8) states: "It is clear that defining standards is a *political* task and not something which should be left to statisticians or environmental institutes." Keuning (1996) ¹¹⁹ expresses a personal opinion in a journal of science commentary. See Chapter 24 for more issues, and let us now concentrate on its interpretation of *conditional information* as "politics":

"The National Income can not be equated to national welfare. This is still insufficiently realised. (...) The most expressed wish however is the

¹¹⁹ dnprepo.ub.rug.nl/5362/1/SenD_1996_09_p479_Keuning.pdf

construction of a so-called Green National Income. Regardless of how sympathetic this thought may seem at first sight, in practice such calculations would mean that statisticians sit on the politicians' chairs. For example, if it is assumed that the current environmental policy reflects exactly the preference of our population for a clean environment, the Green National Income is roughly equal to the real National Income. However, a different preference for a clean environment is not measurable with undisputed exactness, while the calculation of a Green National Income strongly depends on an assumption about the price that one would have wanted to pay for a clean environment." (p479)

"Another way of describing welfare is based upon an absolute preference for sustainability. Such a figure is sometimes called a sustainable national income (DNI). (...) An additional problem with the construction of such an indicator is that it is often argued that sustainability is a subjective concept (WRR, CPB). In that case, statisticians would actually sit on the politician's seats if they set sustainability limits. In any case, it is clear that the figure is strongly influenced by the sustainability limits that are assumed." ¹²⁰ (p482)

Comments: (i) It depends upon definitions. Keuning speculates on a definition: "x is a green national income" = "x is an expression of current preferences on the environment". This however is not what Hueting proposes. This speculation changes the topic of discussion. Since nobody at this point seriously proposes such x definition it is confusing to mention it, though Keuning may well be trying to clarify the situation by pointing to various possible approaches. (ii) With *conditionality* on assumptions on preferences, statisticians provide information, and in no way sit on politicians' chairs. Keuning does not explain the conditionality, and very likely does not recognise the approach. (iii) Keuning refers to WRR and CPB but does not state that he himself may have the same view. In all cases he should have mentioned Hueting's reply to this criticism. Hueting & Reijnders (1998b) is a paper to review the situation, of later date, but the reply had been given before this paper by Keuning. The environmental standards are not *set* by the statisticians but *derived* from the scientific literature. This has been the approach from the beginning of the *Methodology* in 1992 and it is curious that this wasn't been seen by statisticians who ought to be able to recognise what other statisticians do.

21.9.8.3. eSNI and NAMEA

The key point to observe is that Dr. Hueting apparently did not succeed in convincing his younger colleague Dr. Keuning of the value of eSNI so that Keuning preferred NAMEA. *The Economist* (1998) reported:

"Steven Keuning, head of the Dutch national accounts department, points out that the entire attempt to attach cash values to environmental goods and bads is a bit nonsensical. The reason is that, had the environment been priced in the way that statisticians might value it, people would have

¹²⁰ My translation.

behaved differently. The valuation exercise, he says, postulates a situation that could never have existed. (...) The lobby for crafting separate environmental measures that avoid monetary valuations has been bolstered by Eurostat's copious research money, and by Mr Keuning's impressive presentational skills. The lobby for green GDP and valuation has its headquarters in the World Bank, and draws its main support from developing countries and from environmentalists."

The newspaper opposes NAMEA to environmentalists at the World Bank and seems to neglect, perhaps not in background research but at least in its publication, the alternative of eSNI present at CBS itself. Hueting rejects the quote that eSNI is a "valuation exercise". Also, he agrees that eSNI is fictitious, and based upon a model, but emphasizes that NI is fictitious as well. NI is only informative if you postulate that there is optimality and that there are no preferences for environmental sustainability (which leaves you to explain that governments express such preferences but perhaps don't really mean to).

Peter Stauvermann in 2002-2007 did the NWO project 410-42-017 *"The CBS's role in taking nature into account"*.¹²¹ Stauvermann (2006) agrees with Keuning's point of view:

"The exercise should be carried out if the public is interested in such numbers, but it should not be published by statistical offices, because one important characteristic of the SNA is, that its numbers are not based on ideologies and political ideas. (...) This conclusion coincides with the decision of the CBS regarding the question how to account for the environment. Nowadays the NAMEA is part of the official statistics of the Netherlands and the SNI was rejected as an accounting tool. The SNI was calculated by the IVM (Free University of Amsterdam) as a political indicator. In some sense the developments regarding green accounting on the Dutch and international level were very similar. In the Netherlands a commission of economists was founded to decide about the most preferable accounting system. On the international level the London Group, which consists of national accountants from different countries, was selected to solve the same problem. Both groups came to the result that it is preferable to adopt the NAMEA instead of a GNI or SNI."

Addendum: In an email to Hueting in 2009, Stauvermann corrects this statement and states that he adopts Hueting's position.

Note that Keuning participated in the CBS decision and in Eurostat and in the London Group. It may be that international participants let themselves be guided by Keuning's view on eSNI instead of studying the original author Hueting. His arguments won the day, in succession at CBS and the London Group (though need not be convincing to us). Stauvermann (2006) neglects that both NI and eSNI are based upon assumptions and both are "what if" figures, and that both are equally non-political.

¹²¹ <https://web.archive.org/web/20181226112836/https://www.nwo.nl/en/research-and-results/research-projects/i/70/21970.html>

21.9.8.4. *What is not generally known*

Hueting takes a different position. At a conference in The Hague, he openly expressed his annoyance at some manipulation and censorship:

“Steven Keuning, (...) as head of the Department of National Accounts of the CBS, has written a number of articles where he first presented eSNI in a wrong manner and then attacked it, whereby he arrives at sometimes bizarre conclusions that turn the case upside down. One of those articles appeared in the CBS book “The value added of the national accounts”. I have refuted the arguments by Keuning and some other authors for the CBS *Liber Amicorum* for Henk van Tuinen (...). That article has been refused without stating a reason, an event without precedent that boils down to censorship. That article is now (...on the internet [Hueting (2003b)]...).” Hueting (2006) ¹²²

A newspaper report by Robles (1997) gives an excellent review of the period, for Dutch readers, but does not mention those details.

21.9.8.5. *The key question*

Let us return to the question whether a national statistical office or the United Nations SNA “should” include eSNI alongside NI. Hueting has expressed his judgement that the trident of NI, NI-A and eSNI (see **Table 17**) are best published by the national statistical office, but has agreed, in practice, since it would not have been feasible otherwise, that eSNI was calculated in a project group outside of CBS but with help of CBS. A joint presentation of all figures might only happen though if they are provided by the same institute. In 2006, the Dutch national government planning department for the environment MNP (now PBL) reported in the same edition both that the environmental pressure had been reduced and that the gap between NI and eSNI had increased – see MNP (2006) – so it seems that they don’t understand eSNI. Thus, it remains useful to consider the arguments that originally caused Hueting to regard eSNI as part of the system of national accounts (SNA).

Consideration of these arguments causes an element of repetition. In **Figure 13** and **Table 17** and the discussion around them, this article already summarized the various relevant angles, and hence one might suspect or hope that the argument would be crystal clear by now. The argument can also be enlivened by referring to the proverbial lemmings. When lemmings run into the sea and drown by thousands, scientists can record how many steps are taken and in what direction, and they can measure the distance and time to the sea, without any qualms that such measurements would reflect a political choice in any way. Such measurements neither imply that the lemmings, arriving at the edge of the sea, will indeed get into the water. Scientists can calculate a probability for how many will cross a line and tumble in. However, when it concerns mankind and a far distance from the environmentally sustainable path, these scientists seem to lose their composure. They only measure steps and refuse to calculate the distance and time to the sea. The true cause may be that they are not quite open to the

¹²² <http://www.sni-hueting.info/NL/Ter%20overpeinzing%20op%20het%20wilde%20water.pdf>

ecological conclusion, are not located in the zone of co-operation, and thus really don't see the sea, and are not reliably aware of the problem. Under what conditions will they open up to the scientific findings of ecologists ?

This question can be reformulated: what does it *mean* to national accountants that the calculated figure of eSNI is about 50% of NI and that the absolute gap is perhaps not closing fast enough ?

In the introduction we saw that national accountants have insulated themselves against these questions. In their view there is a core of accounts that is available for all theories and there are modules depending upon the user. Their approach is institutional and not analytically bound to any particular economic theory. Environmental sustainability is just one possible application. We also discussed that this approach neglects that environmental sustainability applies at the foundations of economics so that the statistical approach is not sensitive to levels of discussion (see Section 21.2.6). The following arguments have to be evaluated at the level of the foundations of economics and it is not adequate to respond to them with arguments concerning higher level economic theories.

With the advantages and disadvantages of repetition:

- (1) **Objectivity.** The eSNI figure (sales slips plus model) is as objective as NI (sales slips only). It requires a model but that can be realistic and reflect the state of the art in econometrics. eSNI is not a number based upon ideologies and political ideas but derives from the objective notion of environmental sustainability. eSNI provides information about a possible policy objective that is widely being discussed and can be found in official statements. The only "force" exerted is by such statements and not by the information provided by eSNI. (Chapter 18.)
- (2) **Uncertainty.** Environmental issues and the state of preferences are clouded with uncertainty. Economics has ways to deal with uncertainty – which is the crux of what our science contributes to decision making. For example, the Central Planning Bureau (1992) study for the period 1990-2015 gave scenario's for possible developments. It is not uncommon but actually standard that economic studies deal with large uncertainties. The distinction between NI and eSNI is a way to tackle large uncertainties. It would be curious to reject eSNI because of uncertainties involved while neglecting the invalidity of NI for environmental sustainability, see Section 5.5.
- (3) **Social welfare.** Because of a lack of a demand curve the shadow prices of the environmental functions cannot be determined. This means that the correct prices for commodities that are produced and consumed at the expense of those functions are equally unknown – while standard national income presupposes such prices. This information deficit can only be solved by making assumptions about the preferences. One of the many possible assumptions is that the agents have a preference for environmental sustainability. Another possible assumption is that the economy now is on an optimal path. Under the assumption of current optimality the observed market prices are correct, and under the assumption of preferences for environmental sustainability the prices of eSNI are correct. Since we don't know what the real preferences are it follows that the social welfare interpretation of eSNI is as fictitious as the interpretation of NI. For NI we don't need a model but NI still is

only interesting because in the conventional view it approximates social welfare or forms a factor for it. Otherwise it would not make much sense to split the nominal tax data into price and quantity components. But if NI is thought to relate to preferences, and if society has expressed a preference for environmental sustainability, but NI does not express this environmental sustainability, then SNA cannot maintain that this NI figure really represents what it intends to measure, at least in terms of welfare economics, and the whole exercise becomes pointless for welfare economics. Thus, the economists involved in national accounting might rather hand back their jobs to the government, reporting that the government is giving inconsistent signals if it states that environmental sustainability is in the SWF but it does not really act on that, and doesn't even support the calculation of its indicator.

- (4) **Scientific assumptions.** Both NI and eSNI depend upon assumptions. Economists Tinbergen, Samuelson, Kuznets, Hicks, Meade and Stone created an edifice of national accounting that now employs millions of people around the world (including those working at companies sending their data to the national accounting offices) which edifice was based upon assumptions, but those assumptions may no longer apply nowadays. National accounting has turned into some ritual, with little meaning since society has become rather schizophrenic on its preferences. The national accounts have become "measurement without theory", or "measurement according to the manual", which may be fine at the operational level, but is a distinct loss for economic science and our understanding of the world. See sections 11.3 and 11.4 for this conceptual crisis that is not spoken about.
- (5) **Information.** Many governments have expressed an interest in environmental sustainability. But they have not instructed the statistical offices to calculate an eSNI. To what extent can a scientist "understand" the situation and become "pro-active" ? A key point is risk. Environmental sustainability itself involves a notion of risk and it is measured with uncertainty. There is a role for science here. Conditionality ("what if") is a way to deal with risk. At least one economist involved in national accounting indeed decided to do some calculations. Nothing in Hueting's work "forces" society to choose for environmental sustainability. This was decent scientific work, and nothing should stop other scientists from proceeding in the same manner. Alternatively, scientists can lack interest in studying this subject and then let politicians decide in darkness without the proper information. Then perhaps Parliaments should resolve the issue by explicitly instructing national statistical offices to include eSNI alongside NI. Anyhow, we can acknowledge that there is room for scientific interest and responsibility.

21.9.8.6. *The CBS rejection of calculating eSNI itself*

It is useful to reconsider some papers produced at CBS Statistics Netherlands in the light of Hueting's 2006 remark on maltreatment. CBS (1997) gives the official statement at that time why it does not calculate eSNI, see Section 15.3. After the year 2000 with the *proof of concept*, as discussed in Chapter 4, we would expect a revised official statement, but there is none. There are some publications that

throw light on the matter. The reader would tend to benefit from Chapters 16 – 18 and 25 that were written in parallel while updating this Chapter / paper.

21.9.8.6.1. Van Tuinen

H.K. van Tuinen, retired in 2003, was head of National Accounts, director of Social Statistics and deputy director-general of CBS Statistics Netherlands. Hueting has received support by Van Tuinen over the years but apparently it has not been possible to maintain eSNI within CBS Statistics Netherlands, since the actual calculation in 1998-2008 was done by external IVM.

Because of the key role by Van Tuinen, Chapter 25 has been centered around his paper Van Tuinen (2009).

21.9.8.6.2. De Boer

Within CBS, Hueting apparently does not get full support by an economist. Van Tuinen is an economist and Keuning an econometrician but they have their misgivings. Within CBS De Boer provides support to eSNI, and his cv is, see Hueting & De Boer (2019b:12):

“Ir. Bart de Boer (1947) graduated in electrotechnical engineering and specialised in automatic control engineering and environmental management at Technical University Twente 1973. He remained at TU Twente as researcher, worked on systems analysis of water quality management at Gelderland Province in 1974-1978 and returned to TU Twente till 1982. Subsequently he was with DHV Consulting Engineers, joined CBS Statistics Netherlands in 1991-2005, and then moved to CE Delft till 2007, remaining active on topics related to environmental sustainability. De Boer provided for essential steps for the calculation of eSNI, with support in deriving environmental sustainability standards and application in optimal control theory.”

Over the years, De Boer has built up much knowledge about the economics of eSNI but it appears that he is not as perceptive as an economist would tend to be of erroneous reasoning about eSNI and its calculation and its role for economic policy making. In De Haan, De Boer & Keuning (2001) he accepts that it is not the task of CBS to calculate eSNI itself, see Section 18.8. With respect to the Alleingang scenario he does not file a strong protest, see Section 21.9.12, and he doesn't mention this protest in this 2001 article. He supports Hueting but appears incapable at such crucial moments to help identify and clarify misunderstandings about eSNI that derive from misconceptions about economic theory and about the role of statistics for economic policy making.

21.9.8.6.3. Keuning

One of the considerations by Keuning (1992:9) is:

“Contrary to the de-facto measurement which is applied in conventional national accounts, the construction of an adjusted NDP or National Income is *not accounting but modelbuilding*. [Footnote: This was the core of Eurostat's comments on an early draft of the section on environmental accounting in the next SNA. (...). End footnote.] If the (substantial) costs

subtracted in these approaches had been charged in reality, we would have lived in a totally different world and it is quite naive to assume that all economic subjects would have swallowed these costs without an adjustment of their behaviour. In fact, environmentalists often argue for certain protection measures just because of their dynamic substitution and supply effects. This implies, obviously that the negative effects of such measures on NDP are probably less than the simple computations of “Eco-Domestic Product” or “sustainable national income” would suggest. (...) Anyhow, these consequences can only be approximated with the help of a formal model. Replacing GDP by a figure which is an erratic combination of a statistic and the outcome of an (implicit) model thus amounts to throwing out the baby with the bath-water.”

These considerations restate the basic specialisation of jobs between CBS and CPB. They can be evaluated in the following way, again at risk of repetition:

- (i) See the five points mentioned on the former pages.
- (ii) At any moment in the past, the economy is environmentally sustainable or not. At issue is to measure that situation in the past. This gives an account of where society would have preferred to have been, given the assumed preference for environmental sustainability.
- (iii) Use of a model is not in itself “wrong”. When CPB gives a projection for the next year, with a model that represents the best insights at this moment, then that model with its relationships might also be used for assumed behaviour in a past year.
- (iv) There can be uncertainty about the assumptions required to properly estimate environmental sustainability but those can be handled. It is feasible to include eSNI in SNA.
- (v) It is *accounting* to record that the model (a) is state of the art, (b) reproduces NI, (c) produces eSNI when environmental sustainability is imposed.
- (vi) In the model, behaviour indeed changes to arrive at environmental sustainability. That namely is the purpose. But as such it does not invalidate the estimate for environmental sustainability.
- (vii) The distance between NI and eSNI of necessity is a simple subtraction, but that does not imply that the theory and model are that simple.
- (viii) While NI is directly observed in the sense of counting sales slips, eSNI as a model based figure is still a “statistic” in the mathematical statistical sense of the word. A doctor can directly listen to a chest, which is lean on theory, and a CT scan involves much more theory, but both methods would still be considered “observation”, since there is no implication that the patient “should stop smoking”. The combination of NI and eSNI is not in itself “erratic” and does not imply “throwing out the baby with the bath-water” but actually supplements information. The eSNI figure will still be based upon the environmental data collected by CBS, subsequently upon the NAMEA based upon those, if that is regarded as the baby.
- (ix) This discussion suffers from connotations related to the term “(national) accounting”. In one realm of our life we wish to see accountants who only record data, like processing sales slips for example. It is important to have

that record. In the present discussion this function however detracts from the focus. At issue is the *intention* of the term and the body of economic theory behind it. In conventional economics NI is intended as a proxy to social welfare, and the theoretical emphasis is on welfare and not on national income seen as the net result of those sales slips. See Chapter 18 on the relation to the definition of statistics.

Hueting (2003b) states, in a paper intended for the *Liber Amicorum* for Henk van Tuinen but that thus was censored for that publication (see the quote in subsection 21.9.8.4 above):

“Steven Keuning gives in his contribution to the CBS book “The Value Added of National Accounting” [1993] first a completely wrong review of eSNI. Upon this he subsequently bases six objections that all six are off the mark. But the most bizarre objection is: “This may lead to misleading policies: in the event of enormous damage which can be prevented or restored inexpensively, one is not encouraged to apply this measure precisely because it does little to improve ‘green income’.” In that one sentence Steven overlooks three essential aspects of eSNI. (i) The measures are arranged by increasing cost per unit avoided environmental burden (...). (ii) Whether environmental damage is enormous is determined by the preferences (...) From this it follows (iii): the lower the costs the higher (not the lower) the eSNI, the smaller (not the larger) the distance to sustainability and the bigger (not the smaller) the encouragement to take a measure.”

A key article for a wider audience is Keuning (1996). Based upon this article, a Member of Parliament, Ferd Crone, stated in Parliament that an eSNI is impossible. When Hueting contacted Crone and asked why, he replied: “I find this such a pity. I thought that Steven also wrote on behalf of CBS and thus also on your behalf.” This reaction is imprecise since the Keuning article explicitly states that it was written as a personal opinion. Eventually, the misunderstanding was ironed out and Parliament, including Crone, supported a subsidy for the calculation of eSNI. Yet, somehow, possibly by this course of events, the optimal solution that eSNI would be calculated by CBS, became unattainable.

21.9.8.7. *A costly choice*

The internal CBS process can currently only be seen from the vantage point of today, for example with the availability of the Van Ierland et al. (2001) book. It is a rather frequent confusion to think that the conditionality on the assumption of environmental sustainability would be a political choice. This confusion played a role in the discussion between Hueting & De Boer and their colleague Steven Keuning, at CBS Statistics Netherlands. While Hueting at CBS had directed the development of the environmental statistics for the Netherlands and had helped doing so at UNSD / UNSTAT and UN SEEA 2004, Keuning wanted to include these in the CBS NAMEA, and Hueting helped him doing so. Eventually Keuning proceeded in advancing the satellite accounts at UN SEEA and blocking inclusion of eSNI in the SNA. See also El Serafy (2014) – here Appendix 53.

The statements by Keuning do not differ from so many other international authors. Admittedly, international statisticians might have relied on Keuning's reports on eSNI rather than consulting the original work by Hueting, just like *The Economist* newspaper, cited above.

When the 1999 Hueting Symposium was held, Hueting (2003b) recalls: "Steven congratulated me (...) and said: "We don't differ in theory but in politics." To this day I still do not understand what he meant by that." To the present author it suggests that Keuning thought that eSNI was based upon political choice and that he wanted to keep it out of CBS Statistics Netherlands. Above we saw that Keuning missed some points in Hueting's analysis but this of course still allows him to think that he didn't miss anything. The argumentation provided by Hueting has convinced the present author that eSNI actually is not a political choice but a conditional statistical figure, just like NI is conditional to its assumptions. Yet, it is difficult for one scientist to decide that another scientist ought to be convinced as well. It is not uncommon in science that theorists working on the same subject have strongly different approaches while onlookers cannot understand why that is so.

Figure 13 clarifies the misunderstanding. It is tempting to diagnose Keuning as a "majority economist" less "open to the ecology", and not located in the "zone of co-operation". However, Keuning in this period, like Hueting, works in the core of economics, studies social welfare (SESAME) and national accounting, and, with NAMEA, he clearly is open to issues of ecology. To catch the distinctions we need some subgroups. We can distinguish two dichotomies. First of those who support or do not support eSNI. Secondly of those who accept or do not accept its theory. Hueting is in core subgroup 1, Keuning is in core subgroup 2 who does not support eSNI and does not accept its theory. Retired CBS Director and former head of the Department of National Accounts Van Tuinen (1975, 1993, 2008, 2009) supports research on eSNI but does not accept its theory since he adheres to the '(dominant) Dutch view' of seeing eSNI as an application and not as a reorientation at the foundations of economics. **Figure 13** importantly helps to clarify that the following question may be key. Hueting is not only "open to the ecology" but also "open to the risk of ecological collapse". Hueting (1974a, 1980) refers to the finding by E.P. Odum that ecological collapse cannot be predicted and can be observed only when it is too late. This causes Hueting's essential insight that national accounting in our times has become an issue of risk information management. It may well be that his colleagues were not open to this very point and still leaned to a belief in "economic growth". In other words, for economists in general, the key question becomes whether they are open to the current ecological risk. As explained in the introduction, this notion of 'being open to the ecological risk' is tantamount to 'being open to adjustment of the foundations of economics' and is tantamount to, at least for national accountants, 'being open to adjustment of the core of national accounts'.

Since the original design of eSNI, 2019-1986 = 33 years have passed. The historical circumstances show an increase in world population by 2.7 billion, i.e. from 4.8 to 7.5 billion. It is unfortunate that there has been a delay of that duration with eSNI. But of course, there already was the Tinbergen & Hueting (1991) article that governments could have reacted to, perhaps the NAMEA was the best

approach anyway to start with internationally, and, we must also consider the role of the “ecological economists”.

21.9.9 Breakthrough at CBS in support for symposium and calculation

The period 1994-2000 saw a happy configuration of the stars. Henk van Tuinen at CBS, who was supportive of Hueting's work, became member of its board. There came an appeal from society to CBS Statistics Netherlands to spend attention to Hueting's work now that he had retired. Dutch Minister of Economic Affairs G.J. (Hans) Wijers was misinformed by his staff and then misinformed Dutch parliament, but he appeared willing to talk to Hueting, and then decided to have a calculation of eSNI. Dr. Jan Terlouw, former Minister of Economic Affairs, chaired a Committee of Recommendation for a Hueting Symposium. With Van Tuinen's support, the Symposium was engaged, and IVM at VU Amsterdam was asked to calculate eSNI for the Netherlands. A steering committee was appointed that included officials of the Ministry of Economic Affairs, the Ministry of Environment, RIVM, CPB, CBS Statistics Netherlands, Frank den Butter (VU), Ekko van Ierland (WU), Lucas Reijnders (UvA), Jan Willem Velthuis (SEO, UvA). This resulted in Verbruggen (ed) (2000), Verbruggen et al. (2001) and Dellink & Hofkes (2008). This took quite some input from Hueting and De Boer too, though Hueting had retired in 1994 while Hueting and De Boer in the IVM studies after 2000 were treated as advisers and not as co-authors.

21.9.10 eSNI and ecological economics

Hueting worked primarily in the community of economic statistics and national accounts, at CBS Statistics Netherlands and the international conferences related to these. He opened CBS Statistics Netherlands to the physical and ecological sciences because of the prerequisites of sound environmental statistics. His contacts with academia and the journals were limited and his position was not of an academic, writing for journals. The economic journals may have been less interested in his topic of integrating the environment into the national accounts. Events brought Hueting in contact with birds of different feathers, which eventually became a community of researchers around the journal *Ecological Economics*, which published a major series of Hueting's work. ¹²³ Røpke (2004:310):

¹²³ For reference, the following statements have been copied from the April 30 2008 website of the International Society for Ecological Economics (ISEE) at <http://www.ecoeco.org/index.php> (a) “To promote understanding between economists and ecologists in the development of a sustainable world.” (b) “ISEE is a not-for-profit, member-governed, organization dedicated to advancing understanding of the relationships among ecological, social, and economic systems for the mutual well-being of nature and people.” (c) “Ecological economics exists because a hundred years of disciplinary specialization in scientific inquiry has left us unable to understand or to manage the interactions between the human and environmental components of our world. While none would dispute the insights that disciplinary specialization has brought, many now recognize that it has also turned out to be our Achilles heel. In an interconnected evolving world, reductionist science has pushed out the envelope of knowledge in many different directions, but it has left us bereft of ideas as to how to formulate and solve problems that stem from the interactions between humans and the natural world. How is human behaviour connected to changes in hydrological, nutrient or carbon cycles? What are the feedbacks between the social and natural systems, and how do these influence the services we get from ecosystems? Ecological economics as a field attempts to answer questions such as these.”

“Most of the precursors were inspired by thermodynamics to rethink both natural and social processes in new terms”

These researchers were not necessarily trained in economics and even less trained in national accounting. To this amalgam of researchers, Hueting must have been as different a bird as to common economists.

While Hueting had been a founding member of the journal *Ecological Economics* the article Hueting, Bosch, De Boer (1995c) was rejected with curious comments, Hueting left the editorial team, and the paper was published at IDPAD(2). Readers may stop for a while to wonder why such a paper might not be published by EE.

The collection of articles Costanza (ed) (1997) “The Development of Ecological Economics” does not contain an article by Hueting, but contains an article by R.S. de Groot on valuation of environmental functions.

Costanza (2003), in his short review of the “early history of ecological economics”, mentions Hueting, but Röpke (2004), who amplifies this history and who interviewed Costanza amongst others, does not refer to Hueting’s work and contribution to the field of “ecological economics”. Costanza et al. (2004) in a citation analysis don’t mention Hueting. From the cited works 92 were selected by Costanza et al. based upon their personal judgement of what was influential. Apparently, Hueting’s publications have had little effect in this community. Costanza et al. did not explicitly object to the methodology of eSNI but their neglect constitutes an implicit objection.

In contrast to this, Costanza et al. (1997), “*The value of the world’s ecosystem services and natural capital*”, an article in the journal *Nature* – with 3rd author R.S. de Groot mentioned in Section 21.9.4 – caught the fancy of the time, with citations in daily newspapers around the globe, and indeed with hundreds of citations in *Ecological Economics*. That journal spent a separate edition 25(1) to it. Included there are important criticisms by trained economists Hueting et al. (1998a) and El Serafy (1998).

Leaving those aside for a moment, it is important, for reference, to restate the strong criticism by Pearce (1998):

“(...) the article by Costanza and his coauthors is deeply flawed. (...) Economists’ frustration at seeing their contributions abused is therefore understandable. Getting it right has to matter. While *Nature* and the authors of the “value of everything” have got the publicity they quite reasonably sought, they have done so at the cost of some damage to the integrity of the science they attempted to use.”

This criticism is repeated by Pearce, Hamilton and Atkinson (2001):

“The most celebrated recent study that tries to value global ecosystem functions is that by Costanza et al. (1997).” (p213) “Essentially, a methodology developed for valuation at the margin has been applied to a context where it is not applicable.” (p215) “It follows that there is no economic interpretation of virtually all the aggregate numbers in Costanza et al. (1997).” (p215).

The criticism by El Serafy (1998:26) is that the *Nature* article uses “ecosystem services” and does not refer to Hueting’s “environmental functions”, yet it is possible that El Serafy does not properly distinguish state and flow here, see the Section 7.10 on terminology:

“On the evidence of the language (...), and in the light of the environmental literature, one might venture the guess that the authors’ service is really a function, and their function is really a service (...) Such an interpretation would conform with the standard (Hueting, 1980) definition of an environmental function (...) Hueting is nowhere mentioned in the article, nor his terminology followed.”

Thus the “ecological economists” are not quite “economists”. While Hueting has done his best to incorporate other sciences in his work – i.e. to use as the data to proceed with – it appears that Costanza missed out on the basics of economics and national accounting. For reference, professor Costanza started out with an MA in architecture and urban planning and had his Ph. D. in systems ecology with a minor in economics. Seen from this angle, this research community on their part has failed in synthesizing economics and ecological science, hence “ecological economics” is only a label but not necessarily convincing in content. One would wish that their studies would have been more directed towards economics. Note that the two disciplines of ecology and national accounting are not competitive but co-supportive, as different dimensions rather than opposites. Hence, both angles are important. The best approach is to express both ideas. Nevertheless, the difference in approach between Costanza and Hueting was not reported in *Nature*.

Hueting recalls a workshop “Valuation Methods for Green National Accounting: a Practical Guide”, organized by The World Bank, the U.N. Statistical Office and the journal *Ecological Economics*, in Washington, D.C., March 1996. There Hueting presented his “Parable of the carpenter”:

“But I am worried about the existence of more than ten different methods in the literature of ecological economics for the valuation of environmental losses, with outcomes that differ by a factor of ten or a hundred or more. As far as I know, there is nothing similar in the beta sciences. I predict that, as long as this situation continues to exist, politicians and the public will react by saying: “What are we supposed to do with these outcomes, for heaven’s sake?”. I will therefore try to provide a solution to this problem with the aid of the parable of the carpenter.” (1996, published as Hueting & De Boer (2001a))

Hueting recalls that Costanza was not amused. The article was rejected for publication by EE. Likely, Costanza et al. were already starting with the *Nature* article while this parable was critical of their methods.

We may also observe that Costanza is a leading figure in the world of “ecological economics”:

“Daly says about Costanza: “He is extremely good at working and organizing. . . I continued to help out, but the entrepreneurship of the journal was really his”. With Costanza, ecological economics got an

entrepreneur who really knew how to manage in the highly competitive academic world.” Røpke (2004:311)

Given this leading position it is especially unfortunate that Costanza saw no reason to reflect and publish on Hueting’s results. Hueting’s work actually invalidates Costanza’s work on “valuing nature” yet it is quite ignored by him.

Currently, there is the initiative of the “Encyclopedia of Earth”, see <http://www.eoearth.org/>:

“(…) there are many resources for environmental content, but there is no central repository of authoritative information that meets the needs of diverse user communities. Our goal is to make the *Encyclopedia of Earth* the largest reliable information resource on the environment in history.”

Dr. Costanza has been Topic Editor there for ecological economics, and a search on “Hueting”, done on April 30 2008, provides only two citations, taking from the earlier book “*An Introduction to Ecological Economics*”, edited by Costanza et al.. For the present author this is quite surprising, given the contribution of Hueting to our understanding of the economics of the environment.

Both the *Nature* article and this EoE cause one to raise one’s eyebrows. When writing in 2008 a conclusion was that Hueting has hardly had any impact in this field of “ecological economics”, while, on the other hand, his concept of environmental function and design of environmental statistics are widely used in the United Nations SEEA – and in fact by Costanza et al. (1997).

It may also be noted that Hueting’s position requires connections to the world of official national accounting and its economic theory. Alternative approaches, such as MEW, ISEW, Ecological Footprint, Genuine Progress Indicator, Genuine Savings and indeed the Costanza et al. (1997) figure arose from the world of the academia and are relatively easy to implement. Indeed, while eSNI has had only the slow development at one unique place, such other indicators are readily copied by various research groups all over the world. The proliferation fills the scientific journals, rather detached from policy making, and the main effect seems that some research finding tickles a political body to generate more funds for more research. These alternative approaches, and the *Nature* article in particular, have drawn attention by researchers and the general public away from eSNI.

Had Costanza et al. (1997) expressed international support for Hueting’s contribution to economic theory and statistical practice, then the situation would also have been easier for CBS Statistics Netherlands. Now, CBS was confronted with an outside world that for perhaps 99.9% did not understand what Hueting’s work meant.

21.9.11 The Hueting Symposium 1999 and book of 2001

The 1999 Hueting Symposium came about with subsidies from CBS Statistics Netherlands, various Ministries and Provinces, and the Committee of Recommendation was chaired by dr. Jan Terlouw, former Minister of Economic Affairs. The occasion was held at the Royal Academy of Arts and Sciences in Amsterdam and the papers were edited by Ekko van Ierland, Jan van der Straaten and Herman Vollebergh (2001). The book constitutes an important document since it contains (1) a clear review of the theory by Hueting and Bart de Boer, (2) a

calculation by Harmen Verbruggen et al. (3) opposing views, (4) rejoinders by Hueting that clarify the various misunderstandings. Hueting's rejoinders are especially enlightening.

For example, Pearce, Hamilton and Atkinson (2001) repeat the frequent criticism that Hueting replaces economics with politics. In their view Hueting requires the government to impose a level that defines environmental sustainability and they rightly criticize this because of unreliability and political aspects. Hueting's rejoinder is that he does no such thing, and he provides a great number of quotes from his publications in which indeed the opposite of that PHA claim is stated. His eSNI is conditional, "*if ... then ...*". The level and kind of use of nature that defines environmental sustainability is established in the realm of the natural sciences, and economics only takes those as datum to calculate eSNI. This is just a calculation and not an actual imposition. The conditionality includes both the correctness of the sustainable levels of the environmental functions and the existence of preferences for environmental sustainability. To the present author it is a mystery indeed why such intelligent economists PHA fail to observe this difference between a conditional and an unconditional. Here, Pearce et al. mix "government" with "science". For Pearce, see Chapters 30 and 43.

As another example, Paul Ekins (2001) has a fine chapter and at first the reader can be amazed that Hueting (2001d) has so many comments on it, but then it appears that those are mostly of a technical nature, while Hueting also appears to be fallible, when he on page 340 criticises Ekins on page 128 on "uncritically" mentioning a factor 4 or 10 on technical progress, while Ekins clearly points to uncertainty. One surmises that the scope for agreement is large again.

It is remarkable that Hueting's rejoinder on p 375-376 to the chapter by Verbruggen et al. does not mention his criticism w.r.t. the Alleingang scenario, see Section 21.9.12. Curiously, Hueting (p367) also expresses acceptance of the second-best (or Stockholm Syndrome) position which he has been put into:

"[Harmen and Frank] both understand all too well that when the SNI research was transferred away from Statistics Netherlands, after thirty years, it was not the happiest day of my life. (...) Harmen, Frank and others have explained to me that, for obvious reasons, transfer of the research was in fact a blessing in disguise. I believe them and reiterate their words here."

21.9.12 *The Alleingang scenario and the competitive position*

Writing this in 2019, it is relevant to report at the outset that Verbruggen (2018) in his retirement speech contradicts his claims of 2000, see Section 39.18. Thus, when we discuss such claims of 2000, it may be that his argument in 2000 was deliberate nonsense to start with. The following was basically written before the discovery of the 2018 contradiction.

Environmental sustainability per definition pertains to the entire world. eSNI is mainly about global problems such as biodiversity and climate. Standards for the Netherlands are therefore basically derived from global standards.

The summary by Verbruggen (ed) (2000:173) is a misrepresentation:

“the sustainability standards are applied all over the world in order to prevent a reallocation of environmental pressure among countries. This of course, affects international trade relations”

This reasoning is at odds with eSNI. Environmental sustainability by implication holds for the whole world, and this global scale is *not* “in order to prevent a reallocation”. This misrepresentation requires deconstruction.

IVM developed a model for the Netherlands, starting with Keller (1980). They did not have a model for the world.

The present author is reminded of his own involvement at CPB in the 1980s, when the “Europe 1992” proposals had to be evaluated, see CPB (1989). Available was the newly constructed Athena model with sectors of the Dutch economy, and there was no matching model for Europe and the world. A workable solution was found by feeding the model results on prices back into the model as foreign price developments, so that the impact on the competitive position was neutralised. Obviously this came with uncertainty but it would have been plain wrong to assume that only Dutch prices would adapt.

Verbruggen (ed) (2000:174-175) explains how IVM handled the problem when it did not have a world model. Comments with criticism are in footnotes:

“To calculate a SNI for a particular country, assumptions have to be made with respect to policies in the rest of the world. This is especially relevant for a small and open economy such as the Netherlands, as a unilateral sustainability policy ¹²⁴ ¹²⁵ could cause an international reallocation of relatively environment-intensive production activities. To do away with that unwanted effect, ¹²⁶ it has to be assumed that similar sustainability standards are applied all over the world, taking due account of local differences in environmental conditions. However, it is not feasible to estimate the resulting cost and changes in relative prices in other countries. ¹²⁷ So, additional assumptions ¹²⁸ have to be formulated with respect to relative price changes on the world market and the impact on import and export flows to and from the Netherlands. Two alternative assumptions come to the fore. (...) In the first alternative, it is assumed that relative prices on the world market do not change. (...) ¹²⁹ Second, it can be assumed that per sector the share of imports in total domestic

¹²⁴ Unilateral = Alleingang = “Exclusively The Netherlands” = Exclusively-NL

¹²⁵ eSNI concerns statistics and IVM turns this into a policy scenario.

¹²⁶ The standards hold for the whole world because of the *definition* of environmental sustainability, not to “do away” with an effect on the Dutch competitive position.

¹²⁷ It is feasible to gauge world price developments by taking them as similar as the ones following from application of the model for The Netherlands. IVM doesn’t have a world model, but this is not the only meaning of “feasibility”.

¹²⁸ This presents the situation as having two phases, like in a policy scenario exercise, while actually only one assumption suffices, namely eSNI, as in a statistical exercise. Perhaps technically these added points might be called “assumptions”, but logically it is an inference, that from the assumption of eSNI, environmental sustainability holds for the whole world, whence world prices adapt, whence it is inconsistent to “assume” that world prices can remain the same.

¹²⁹ This “assumption” falls from the sky. IVM does not present a reasoning why such an “assumption” has any economic logic or merit. It is also an illogical “assumption” since it presents the unilateral policy that is to be avoided. The “assumption” in fact implements this Alleingang.

demand, and the share of export in total domestic production, remain constant compared to the base situation. In economic terms this boils down to the assumption that in reaction to world-wide sustainability policies, all production processes in foreign sectors go through a similar process of adjustment as in the Netherlands. Or again in other words, it is then implicitly assumed that changes in relative prices in other countries and in the Netherlands are equal.¹³⁰ The SNI will be calculated for both foreign-trade assumptions. It will be clear that the latter assumption of constant import and export shares comes closest to Hueting's methodology.¹³¹ (..)"

Verbruggen (ed) (2000:178) states:

"Because no decisive preference can be given to one of the two assumption[s] on foreign trade as well as on the use of old or equilibrium prices, 4 SNI variants will be calculated. Of the following variants, variant 2b is most in line with Hueting's methodology."

Since the objective is to present *Hueting's eSNI*, and Hueting has *defined* eSNI in such manner that fits 2b, then why does IVM calls this as a *preference* for a particular outcome ?

The "results" that Verbruggen (ed) (2000) subsequently presents on those 4 "variants" are burdened with tables with meaningless figures that distract from the purpose of the exercise, and that are a waste of research funds and the attention of readers.

How could this happen ? (i) Who knows why, may say so. (ii) A conjecture is that the researches at IVM had little experience with international modeling, were daunted by the task, invented these options, and stuck to the 4 variants as their anchor because it proved to them that they were indeed experts at international modeling. Amazingly, they rejected Hueting's protest, even while the project concerned his definition. Their position was "the sustainability standards *are* applied all over the world". Their implication was that Hueting apparently had designed an inadequate definition, and it had required the insight at IVM to discover that eSNI supposedly required a "hidden assumption" on the international prices. IVM must have been so proud about its "discovery" of a "weak point" in Hueting's definition that they stopped listening to Hueting's protest.

Remarkably, IVM had stated that it wanted to avoid a unilateral scenario, but the assumption of both fixed world prices and changing Dutch prices implied such a

¹³⁰ This is the valid *inference* from both the notion of environmental sustainability and the lack of a model for the world economy.

¹³¹ The stated objective of the Verbruggen (ed) (2000) study was to calculate eSNI according to the definition by Hueting. The value found with changing prices is "closest" to this definition, since the objective was to discover how those prices change. Thus, why not stick to this ? The other figure doesn't fit the definition, since maintaining constant prices clearly is inconsistent with environmental sustainability, so why present it ? It doesn't fit the notion of a sensitivity analysis, since a pseudo-eSNI doesn't say anything about eSNI proper.

scenario, and they did not notice. Even in 2019 they refuse to answer to this criticism.¹³²

Remarkably, (i) the steering committee went along with the conceptual error, (ii) reports in economic journals did not notice it, and also (iii) Dutch parliament was more shocked about the risks on the Dutch competitive position than about the implications about environmental sustainability.

Van Tuinen was delegated from CBS to be member of the steering committee. He regards the Alleingang scenario as nonsense (personal communication). He specifically recalls that the scenario wasn't requested as the main alternative to eSNI proper, which is as it has been presented later on, but that it instead was requested for "additional information" only, and that he saw no reason to object to additional information. Retrospectively he calls it naive of himself to agree on this request, given how IVM decided to put so much emphasis on the nonsense. De Boer substituted for Van Tuinen at various meetings and sometimes was recorded as "auditor" rather than "member", perhaps since De Boer also provided operational assistance on environmental data and standards. Hueting voiced a protest against the scenario and this was duly reported by De Boer but apparently the other members of the steering committee were not open to the message that CBS considered the scenario to be nonsense. In hindsight, CBS should have written an explicit letter to the other members in the steering committee that the Alleingang scenario was nonsense, which would have led to a discussion with the researchers of IVM who considered it a wonderful invention of their own. This discussion then would have been settled with the combined input of all parties involved in the steering committee in 2000, while we now see this drawn-out confusion and misrepresentation from 2000-2019.

To summarise: IVM made one study that properly imposed the standards on the world, including the Netherlands. However, IVM called this a "variant" ("scenario") and also made another "variant" ("scenario") that imposed the standards on the Netherlands only. This can be called the "Alleingang scenario" but is better understood as a misconception and misrepresentation of the definition of eSNI, and generating a pseudo-eSNI. The researchers at IVM had been asked to calculate eSNI, and indeed performed this calculation, but this alternative did not fit the definition of eSNI, and they still labeled this policy scenario as eSNI. eSNI is a statistical figure, while for policy scenarios we would use expectations regarding NI. The eSNI figure produced by this Alleingang scenario is a pseudo-eSNI figure because it does not satisfy the assumption of environmental sustainability, since such sustainability is only conceivable when it applies to the world as a whole. This was a waste of research funds. The Alleingang scenario was enlarged with details like the stepwise changes in value added per sector and shifts in taxation, and such, that would provide useful information about eSNI, but now this report generated inadequate data that applied to some pseudo-eSNI.

¹³² One of the researchers in personal communication states the the "error range" as shown by the Alleingang scenario would be indicative of the overall error range because of the uncertainty of standards and model. However, this is only a suggestion, since IVM did no proper sensitivity analysis on standards and model. Thus the misrepresentation by the Alleingang scenario is defended by something which they did not do and should have done. The researcher who replied in this way simply fails to see or doesn't want to admit that this is intellectually incongruous.

In the Alleingang scenario, the Dutch economy Dutch NI suffered from international competition. The economy can still import at world current prices, which mediates the impact upon the economy. The combined effect was that national income in the Alleingang scenario is lower than current NI but still higher than eSNI. When the report was presented to Dutch Parliament, it made parliamentarians wary about the competitive position, drawing away attention on the issue of environmental sustainability. The parliamentarians tended to focus on the risk of an Alleingang on environmental sustainability. Instead, the true message of a proper calculation of eSNI is that when all countries target environmental sustainability, then no country needs to fear about their competitive position, and we are in a win-win situation for the future generations of the planet, see Section 7.15.

UN SEEA 2003 Section 11.170 contains this misunderstanding by Verbruggen et al. (2001). Recently Oosterhuis et al. (2016:21) at PBL Netherlands Environmental Assessment Agency has it as well, see Section 21.11.8.

Remarkably, Verbruggen (2018) in his retirement speech contradicts his claims of 2000, see Section 39.18. Alerted to this contradiction the IVM-team still does not want to retract the misrepresenting Alleingang scenario.

21.10 *The period from 2001 up to 2008*

21.10.1 *End of the advisorship in 2000*

In October 2000, the CBS directorate has received the Verbruggen (ed) (2000) report, and considers what to do next. CBS still feels like supporting eSNI but does not want to commit to it. They decide to end Hueting's advisorship. Hueting receives the special CBS medal and the directorate helps to install a PC with internet link at his home. "It felt like being fired," he confesses nevertheless.

The directorate's decision also implied that Bart de Boer, Hueting's collaborator at CBS Statistics Netherlands, is reassigned to increasingly different activities. Eventually it is decided by CBS that the research on eSNI is moved out of CBS, to become dependent upon external funds. This made De Boer decide in 2005 to move to CE Delft to stay with the research and those funds. De Boer moves, but the (promised) external funds never materialized (see below).

21.10.2 *World Bank seminar in 2001*

The calculation of eSNI by Verbruggen et al. and the Hueting Symposium provide an impetus for a World Bank seminar in 2001 where Minister Jan Pronk presents the first copy of the Symposium book to WB President James Wolfensohn. A report with a lively discussion can be found in Hueting & De Boer (2019b). Other seminars were held at the UNCED / WSSD in the Johannesburg Earth Summit 2002 and at the OECD 2003. For Holland, the ESB dossier publications Van der Lecq (ed) (2001, 2005) must be mentioned.

21.10.3 *National strategy by the Dutch government, Johannesburg 2002*

After Rio 1992, the United Nations decided that each nation developed a national strategy for sustainable development. In preparation for Johannesburg 2002, the Dutch government made a report on the Exploration of a National

Strategy, see Ministry of VROM (2002), with a preface by Jan Pronk, co-ordinating minister for sustainable development.

There is the kernel of the "capital approach" as propagated by the World Bank, as discussed in Section 7.10.

"In this context, sustainable development tends to be described as the proper management of stocks, such as human capital, the stock of raw materials or the stock of biodiversity. [fnt 8]" (p12) The footnote is: "8 The term potency or stock can also be read as "capital" or "wealth". In this Exploration, the terms are used according to those that are most in line with the regular use of language for that subject. (...)" (p15) Subsequently, the report page 89 has a longer discussion about stocks.

However, in the report section 7.3 on co-ordination there is mention of eSNI:

"In addition to the aforementioned set of indicators that cover the various components of either the entire assessment framework or selected themes, there is also work in The Netherlands on composite indicators at a higher level of aggregation. An example of this is the sustainable national income (SNI). This figure represents the national income, adjusted for the environmental damage caused by the not yet sustainable character of the Dutch economy. This figure has the advantage of making a link between economic growth and its impact on the environment, in a monetized form. The disadvantage is that the name only partially covers the content since it says nothing about the state of the social pillar. Moreover, this is an experimental calculation model with assumptions that are still controversial and in which mainly long-term changes can be measured. Further research is being conducted by the IVM of the Free University in Amsterdam. In Appendix 2, attention is paid to the DNI separately." (p71)

The Appendix on 132 mentions eSNI as an indicator, referring to Van Ierland et al. (eds) (2001). This research by IVM only concerned calculation for a year of measurement. This was also the basis for Pronk to commission a subsidy for wider research on eSNI, apart from its five-annual calculation, see Section 21.10.9. Problematic in above statement however is:

- (1) For the other indicators that the report mentions there is no other "co-ordination framework" than presenting the indicators and let policy makers judge for themselves what the make of them, so that the statement on eSNI understates the practicality of comparing NI and eSNI.
- (2) Originally, the notion of sustainability concerned national finance but the Brundtland report introduced a stronger emphasis on the evaluation of economic growth and the environment. It was for this reason on the environment that Hueting adopted the term "sustainable national income". Later the notion of sustainability was weakened with other factors, whence Hueting started using "environmentally sustainable national income". It is curious to criticise eSNI for not including social aspects when the focus is on vital environmental functions and ecological survival. It is curious to hear such criticism from the Ministry of the Environment.

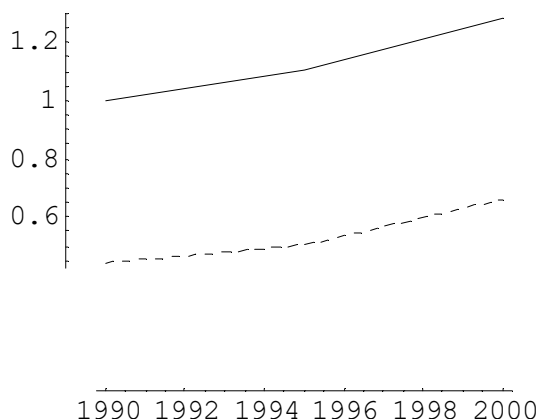
- (3) It is too simple to say that “experimental calculation model with assumptions that are still controversial”. Be specific on what would be controversial. The environmental standards have been derived from the scientific literature and the model has some history of use. The methodology was presented by Hueting in 1992d and it can only be labeled “experimental” in 2002 when insufficient funds have been created. It is a curious national strategy not to make available the relevant information for policy making.

21.10.4 Dutch NNI and eSNNI 1990-2000

Hofkes, Gerlagh and Linderhof (2004) construct estimates for 1995 and 2000, and perform a decomposition analysis for the trend 1990-2000. The results are depicted in **Figure 15**. It must be observed that these published values of eSNI have not drawn attention in Dutch Parliament or the media, but it is unknown whether there was a press-release.

Let us consider Net NI, constant trade shares, new equilibrium prices.¹³³ Over the period, Dutch NNI rose by 28% or 2.5% annually on average. eSNNI rose from 44% in 1990 to 52% in 2000, relative to NNI of each separate year, which can be seen as somewhat of a success. In constant values of 1990, eSNNI started at 44% and rose to 66% of 1990 NNI, thus grew 4% annually. Actually, the effort has not resulted in a reduction of the absolute gap. In 1990 the gap was $100\% - 44\% = 56\%$ and in 2000 the gap was $100\% - 66\% + 28\% = 62\%$, and thus widened by 6% points, in terms of 1990 values.

Figure 15. Dutch NNI (line) and eSNNI (dashed), 1990-2000, 1990 = 1



21.10.5 CBS: theses 2003 and 2004 and project 2006

In Groningen 1973, Steven Keuning and Thomas Colignatus were fellow first year students in econometrics, and eventually Bert Steenge was one of the teachers in mathematical economics. A common link is on input-output analysis. Steenge later became professor at Universities Twente and Groningen, and collaborated in Keuning & Steenge (1999) on NAMEA. Steenge became

¹³³ The eSNNI taken here is the proper indicator. Hofkes, Gerlagh and Linderhof (2004) also consider an Alleingang scenario that creates a pseudo-eSNNI that is not supported by Hueting.

supervisor for two theses that are relevant for our subject, Frits Bos (2003) and Mark de Haan (2004), and there is a project with Peter Stauvermann (2006).

See elsewhere on Stauvermann and Chapter 23 for the thesis by Bos. Mark de Haan at CBS is in 2019 head of the sectoral accounts at the CBS department of National Accounts. The thesis by De Haan (2004) refers to Hueting (1974a, 1980) and Hueting & De Boer (2001b) but does not refer to Hueting (1981b) or Tinbergen and Hueting (1991) or the CBS *Methodology of eSNI*, Hueting et al. (1992d) appendix 3, who had already presented the same conclusion about the following, that De Haan (2004:1) incorrectly presents as a new finding:

“My first official job at Statistics Netherlands was to provide the NAMEA with real numbers. Obviously this work was carried out in close co-operation with colleagues from the environmental statistics department. The first pilot results presented in 1993 contained rather old data but nevertheless reached the headlines of many newspapers in the Netherlands. It was not shown before that in the Netherlands a larger part of environmental pressures was generated in only a restricted number of relatively small industries in terms of value added and employment. It was very challenging to explain to a wide audience what we had done and what messages may be derived from it.”

De Haan (2004) on NAMEA doesn't seem to be aware that Keuning mainly relabeled the work that Hueting had done originally. OECD (2004) shows the peculiar phenomenon of De Haan for CBS presenting the NAMEA approach and Hueting in retirement presenting eSNI, in collaboration with De Boer still at CBS.

De Haan (2004:197) rejects a correction for asymmetric bookkeeping – see Chapter 12 – that he calls “defensive expenditures”. (i) He confuses the setting of scientific standards with politics. Politicians decide upon national preferences and not what constitutes information. (ii) The reference to traffic accidents is distractive when the topic concerns environment and national accounting.

“Depending on certain assumptions, on welfare-theoretic grounds defensive expenditures could be considered as not genuinely welfare enhancing since they are supposed to compensate the negative externalities of production and consumption activities. Defensive expenditure may relate to environmental externalities but also to other undesirable side effects, e.g. traffic accidents, health effects related to work or living conditions. It has been argued that expenditures on these compensating measures should not add to gross domestic product but instead should be accounted for as the costs of production. (...) One may conclude that, generally, assessing the social welfare related benefits and demerits of these various consumer items cannot be side-stepped from political judgements.”

21.10.6 *The Stern Review 2006*

The Stern Review (2006), “The economics of climate change”, is a momentous publication. It concentrates on global warming and also has a different methodology, so its results differ from the 50% found for eSNI:

“(…) the Review estimates that if we don’t act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – can be limited to around 1% of global GDP each year.” (p xv)

The Review recognizes the issue of sustainability but chooses not to adopt it. Sustainability is defined and discussed on page 48 in the report. Importantly, it is accepted:

“(…) it seems quite clear that, at the basic level, the global environment and ecological system, which provides us with life support functions such as stable and tolerable climatic conditions, cannot be substituted.” (p 48)

However, in the next sentence, attention is limited to the greenhouse gases.

On p548, it is discussed that countries might take measures to become “more sustainable”. However, sustainability is rather a dichotomous concept, i.e. a path is or isn’t sustainable. The distance to sustainability can be reduced, but keep in mind that this may still be unsustainable.

The Review contains no reference to Hueting’s work and this may contribute to its risky underestimate of the wider ecological challenge.

21.10.7 *A missed chance for Germany and Eurostat*

Hueting showed the present author an email by Walter Radermacher, the former President of the German statistical office (Statistisches Bundesamt) and in 2008 the General Director of Eurostat:

“Especially I do not think that target setting can in any way be done “objective” by the scientific community. On the contrary, in my opinion it is a core task to the societal and political discussion process.” (Email by Radermacher to Hueting, 2007)

This repeats the misinterpretation that Pearce et al. (2001) have voiced as well, that Hueting’s work would be politics or ethics instead of objective statistics, while the latter should be obvious from his work, see the Hueting (2001d) rejoinder to Pearce et al.. Hueting observes that Radermacher’s email apparently was intended as a closing statement, an explanation of disinterest, and hence not an opening statement that started an enquiry. It is awkward to be sent a statement of disinterest that misrepresents your position. See Chapter 46.

21.10.8 *Assumption on preferences versus political position (IVM)*

Hueting & Bosch (1991e) in Kuik & Verbruggen (eds) (1991) is one of two texts in which it is stated that the Brundtland Report indicated that the world would have

chosen for environmental sustainability. This statement perhaps might be read as that the world made a political choice, and that Hueting & Bosch followed this. However, in the *methodology*, Hueting, Bosch & De Boer (1992d), and in other publications, it is clearly stated that the calculation of eSNI is *conditional on the assumption* of environmental sustainability. This is duly noted by Kuik (2006):

“In a word, whether or not we want to become “sustainable” is not known. Hueting therefore makes assumptions on preferences. He strictly separates the “objective” concept of sustainability (the indefinite availability of environmental functions) from the question whether or not society really wants to achieve such sustainability (Hueting and Reijnders, 1998).”

However, this is not seen by Hofkes & Verbruggen (2008:80), who refer to (1991e) and then argue that eSNI fixes preferences for sustainability “unshakably”, and that this fixture blocks “an integral evaluation of (costs of) environmental changes and other economic variables”. Their reference to only (1991e) is needlessly selective and at risk of misrepresenting the proper theory of eSNI as stated in the whole body of the work on it. Remarkably, Verbruggen et al. (2001:277) state, conform Hueting’s analysis: “Other assumptions about individual and social environmental preferences would result in different green national incomes, not in an SNI.” Thus, the “unshakability” is misplaced too. There are more misconceptions in Oosterhuis (ed) (2008) “*Aan schaarste geen gebrek*”, see De Boer, Hueting & Sigmond (2008). Editor Frans Oosterhuis also advises Dutch government at PBL, see Section 21.11.8.

21.10.9 *A mysterious disappearance of a crucial subsidy*

The calculations by Verbruggen et al. (2001) that were finished in 1999 were discussed in the appropriate commission in Dutch Parliament. In that discussion, Parliament passed a motion for continued research and Jan Pronk, Minister of the Environment 1998-2002, also speaking for the Minister of Economic Affairs, promised continued funding (i) for model improvements and (ii) for eSNI estimates for other countries. Subsequently there were funds (iii) for more for Holland.

Hofkes et al. (2004) was a trend-report on eSNI, commissioned by RIVM, and reported on by RIVM (2004:21). In July 2004, the minister of Economic Affairs Laurens Jan Brinkhorst and environmental secretary Pieter van Geel informed the House ¹³⁴ ¹³⁵ that future calculations for Holland would be financed by RIVM (of which the relevant department became MNP and later merged into PBL Netherlands Environmental Assessment Agency ¹³⁶). Dellink & Hofkes (2008) is the final calculation for eSNI 2005, commissioned by MNP / PBL. There are no reports since then, and it is not clear what has happened with further funding. Hueting in April 2008:

“In Autumn 2007, I attended the EU conference “Beyond GDP” in Brussels and encountered Kees Vijverberg, the official at the Ministry of

¹³⁴ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

¹³⁵ <http://www.sni-hueting.info/NL/Anderen/2006-05-24-Somers-TK-mDNI.pdf>

¹³⁶ <https://www.pbl.nl/en/>

the Environment who deals with eSNI. He said to me: “Well, Roefie, you can see that you missed the international connection.” My reply was: “Only because the subsidy that has been promised to Parliament for urgent improvements in the model and for calculations for more countries never has been paid out so that eSNI was killed four years ago.” He replied: “No, not at all, that money had been included in the research fund for the Environmental Assessment Agency (MNP).” I replied: “But you advised negatively for the request for subsidy by SMOM for the eSNI.” That request was by the CE project team for eSNI. The official: “In my judgement the MNP had already received money for that.” I asked the management of the MNP whether their allocation had included this condition on eSNI. The answer was “No”.¹³⁷

We see a distinction between (iii) regular calculation with the already developed model of 2001, (i) improvements on this model, and (ii) application to other countries. While the first was executed till 2008 and then curiously stopped, the other subsidy has not yet materialized. Bart de Boer moved from CBS to CE Delft in anticipation of receiving this subsidy but it was a shock (and break of pension) when the subsidy did not arrive. Taking stock in 2018, we see some 16 years of delay in research, including the impact that results would have had in those years. To be fair, CBS Statistics Netherlands could have starting doing this when the *Methodology* was presented in 1992.

This situation currently causes that various ministers (well, two ministries, when the ministers have left) have not kept their promise to Dutch Parliament.

21.11 The period from 2009 up to 2018

21.11.1 Monitor on sustainable development 2009 (MDN 2009)

In 2009, the joint Dutch official scientific advisory agencies CBS Statistics Netherlands, CPB Central Planning Bureau, SCP Social Cultural Planning Bureau, PBL Netherlands Environmental Assessment Agency (formerly MNP or part of RIVM) presented CBS et al. (2009a), “*Monitor Duurzaam Nederland 2009*” (MDN 2009), a monitor for “sustainable development”. Project leaders were Rutger Hoekstra (Chapter 27) and Jan-Pieter Smits (Section 21.9.7, Chapter 28) and their supervisor was Peter van de Ven (Chapter 26). Errors made by them individually can also be seen in the MDN 2009.

There are curious errors:

- (a) CBS et al. (2009a) refer only to Hueting (1974a, 1980) and assign the notion of eSNI to that publication. This is incorrect since the proper references are Hueting (1989b), Tinbergen & Hueting (1991) and Hueting and De Boer (2001b).
- (b) CBS et al. (2009a) take “sustainability” as a general concept also including social processes while the original problem was “(environmental) sustainability”. It is remarkable that ecological survival is treated as equivalent to happiness on work and leisure.

¹³⁷ <http://www.sni-hueting.info/NL/Documentatie/2008-01-03-Brief-aan-Pronk-Wijffels-bekort.pdf>

- (c) CBS et al. (2009a) adopt various indicators and reject the idea of a single indicator but still maintain standard NI as a key indicator for “economic” evaluations.
- (d) They do not explicitly state but suggest that eSNI would come with the claim to replace all other indicators, which is false and which never had been claimed for eSNI. This is irrational beyond science.
- (e) They do not recognise or properly quote the original authors (i) that eSNI has been intended to be used as an indicator alongside NI and the other indicators, and (ii) that the actual proposal concerns $e\Delta = NI - eSNI$ as an environmental indicator.
- (f) In 2009 there still was the latest report by Dellink & Hofkes (2008), but it was not included in this MDN “monitor”.
- (g) When Hueting protested – in particular on the curious reference to Van den Bergh and point (c) – there was no reply on content, and the reply is embarrassing to science.^{138 139}
- (h) Later that year, on October 15 2009, there was a symposium to evaluate the MDN 2009. There is no text by Hueting and likely he was not informed about the symposium and its report.

At first sight it is laudable that this monitor shows a wide scope for relevant topics, and that the scientific advisory agencies co-operate. In the past there was some division e.g. between CBS on the past and CPB on forecasts given CBS data. Under request of the Cabinet there is a joint endeavour in 2009. But is this MDN 2009 really the result that an economic scientist can support? The standard list of objectives of economic policy was: full employment, “economic growth”, price stability, external stability, fair equality of income and wealth. Later the environment was added, giving the notion of “sustainable economic growth”. Obviously, it was never stated that other objectives were irrelevant or that only such aggregates sufficed. Nevertheless, CBS et al. (2009a) is a radical step from accepted wisdom by eliminating inflation and external balance (perhaps both because of Europe) while distinguishing global warming and biodiversity as *separate* issues instead of combining them in environmental sustainability.

CBS, CPB, MNP, SCP (2009a:28) “*Monitor Duurzaam Nederland 2009*” (MDN 2009) or CBS et al. (2009a) still misrepresent eSNI, while referring to Van den Bergh (2005, 2006/2007) (see Chapter 35) and stating that the eSNI assumptions would be “debatable”, (i) as if such consideration by Van den Bergh would be sufficient evidence to reject the eSNI approach, (ii) while neglecting that eSNI advises to use the best knowledge that science can offer, (iii) while it also is rather uncommunicative and unhelpful to issue a general statement without becoming specific, and to complain about quality when funds for further research disappear mysteriously and none of these monitoring institutes investigates what is happening here. There might be some socio-dynamics here, that if CBS would support further research on eSNI, as Van Tuinen (2009) proposes, and enquires where the disappearing subsidy has gone, that others ask: “Why doesn’t CBS finance this itself?”

¹³⁸ <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CBS.pdf>

¹³⁹ <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CPB.pdf>

The CBS et al. (2009a) report by itself clarifies that there apparently still are huge misunderstandings amongst our economic colleagues and that those can only be resolved by a study of the original writings by the original authors. This does not only hold for Holland but for the economic community at large.

The project leaders for the monitor were Rutger Hoekstra and Jan-Pieter Smits, both at CBS.

- On Hoekstra (Chapter 27): Some economists propose to abolish GDP, see Van den Bergh (2006). Hoekstra did a thesis under his supervision at VU, then was at CBS, and in 2019 published a book “*Replacing GDP by 2030*”. This is a curious proposition. GDP is not the issue, since production can be a component of welfare, and GDP is required for the distance $e\Delta - A = NI - A - eSNi$. Why would one wish to replace this ? It is obviously fine to look into all kinds of welfare, but it is curious when economists, and Hoekstra joins a crowd, cannot think straight on environmental sustainability and ecological survival (and this is even stranger for an environmental economist).
- On Smits (Section 21.9.7, Chapter 28): Smits is no economist by training and started as a historian at VU with a specialisation in economics and social history. He subsequently moved to Angus Maddison's growth project in Groningen. He got involved at CBS, and his work for the *Conference of European Statisticians* (CES) earned him a professorship at Technical University Eindhoven (TUE). There is no indication whether Smits understands economics as an economist would (or would have to), and subsequently whether he would really be capable to see the value of Hueting's work for economic analysis, the theory of economic welfare and its measurement in statistics, and thus national accounting. Yet it appears that he finds eSNi more relevant in 2018 than in collaboration with Hoekstra in 2009, see Section 21.11.11.

On October 15 the Ministries that commissioned the MDN organised a symposium to review it. The report of the symposium CBS et al. (2009b) contains a presentation by Peter van de Ven, then CBS head of the department of National Accounts, who repeats above misrepresentation, see Chapter 26, and an “evaluation from science” by Opschoor (compiler), Van Doorne-Huiskes (professor in sociology), Van Egmond, Verbruggen (2009), see Chapter 40. There is no text by Hueting, and likely he was not alerted to the symposium and its report. In the symposium report the “experts” give a remarkable recommendation for eSNi (p10): ¹⁴⁰

“The Sustainable (or Environmentally Sustainable) National Income by Hueting is pushed aside perhaps too very quickly in the MDN report (p. 28). Calculating the eSNi for different years offers interesting scientific

¹⁴⁰ Dutch: “Het Duurzaam (of Milieuduurzaam) Nationaal Inkomen van Hueting wordt in het MDN rapport (p. 28) wel erg snel terzijde geschoven. Berekening van het DNI voor verschillende jaren biedt interessante wetenschappelijke inzichten, die ook enige beleidsrelevantie hebben. Zo blijkt uit die berekeningen onder andere de invloed van de groei van de Nederlandse economie op de omvang van de milieuvervuiling, wat het tempo en de kosten van (schone) technologische ontwikkeling zijn, en kan er een ecologische handelsbalans worden geconstrueerd. Dat alles natuurlijk binnen het kader van het model en de daarbij gemaakte vooronderstellingen.”

insights, which also have some policy relevance. The calculations show, among other things, the influence of the growth of the Dutch economy on the extent of environmental pollution, the pace and costs of (clean) technological development, while an ecological trade balance can be constructed. All of course within the framework of the model and the assumptions made.”

Comments: (i) The quote does not protest against the misrepresentation and fallacy by which eSNI has been removed. The upshot of their “evaluation” is: the argumentation could have been better but it is okay to remove eSNI. (ii) The symposium in the Fall of 2009 shows no discussion or reference to the protest by Hueting himself in the Spring of 2009.¹⁴¹ ¹⁴² (iii) The list of references (p18-19) does not mention Tinbergen & Hueting (1991) or anything by Hueting. Only something about eSNI might be found perhaps mainly if one follows up the 4 references by VU researchers themselves, which may contain misrepresentation. eSNI can be found in Ministry of VROM (2002) (Johannesburg) that is referred to, but if you do not know so then you would have to look through all the references. This is a key example of the VU manner of referring as discussed in Section 9.5.

The “evaluation from science by Opschoor (compilation) et al. (2009) is quite problematic, and deserves discussion in a separate Chapter 40.

21.11.2 eSNI and cost benefit analysis 2012

Hofkes & Verbruggen (2012) argued that eSNI would not be of much use for national accounting but still might find useful employment for cost-benefit analysis (CBA). Hueting & De Boer (2014) explained that eSNI derived from CBA. Hueting’s thesis had already clarified that the tools of conventional CBA are highly uncertain for the issue of environmental sustainability.

21.11.3 The journal “Ecosystem Services”

Section 7.10 discussed terminology and Section 0 highlighted the issue with a Von Neumann model. Section 21.9.4 discussed that Hueting was on the thesis commission of the thesis by De Groot. Section 21.9.10 related about “ecological economics”.

Some ecological researchers founded the journal “Ecosystem Services”, and De Groot and Leon Braat became the chief editors, see Braat & De Groot (2012).

“The aims of the journal are:

- (1) To improve our understanding of the dynamics, benefits and social and economic values of ecosystem services,
- (2) To provide insight in the consequences of policies and management for ecosystem services with special attention on sustainability issues,
- (3) To integrate the fragmented knowledge on ecosystem services, synergies and trade-offs, currently found in a wide field of specialist disciplines and journals.
- (4) To support and promote a dialogue between science and policy, providing empirical evidence to decision makers in the field of ecosystem

¹⁴¹ <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CBS.pdf>

¹⁴² <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CPB.pdf>

services assessment and valuation and support its mainstreaming into economic and land-use management policies.”

We see an aspiration at economics while these ecologists have a problematic background in economics. De Groot has said background with his thesis. Braat has a major in ecology and a minor in environmental economics, and a 1992 thesis in environmental economics at VU with Hans Opschoor and Peter Nijkamp. Opschoor wrote his thesis on the same subject as Hueting and in the same year 1974, and apparently has never quite fully accepted Hueting’s work, see page 420 and Chapter 38 on page 457. We cannot exclude the possibility that Braat got a biased report about Hueting’s work from the start.

Braat & De Groot (2012) have an early reference to Hueting 1970 in Dutch and not 1969 in English. Braat (2014a) describes a history of the notion of “ecosystem services” that includes David Pearce and R.S. (Dolf) de Groot but doesn’t mention Hueting. In a presentation Braat (2014b, minute 8:20-9:30) clarifies:

"(...) When Dolf [de Groot] and I started in the eighties on this [topic], actually in the late seventies, the term that was used for ecosystem services - before Paul Ehrlich launched the term ["ecosystem services"] - was "functions of the natural environment" or "functions of nature", but we meant the same. When TEEB [The Economics of Ecosystems and Biodiversity, 2010] came out and the ecosystem services concept had been evolved, then we had to find a place for the concept of a function. Now there was [such a place] in ecology, because the textbooks already had a term "function" which was strictly ecological. [¹⁴³] So, we got rid of our old language, and said: What we mean is the flow of activities within the ecosystem, when we say "function". If that flow of energy or matter is used by people and interacted with by people then we are talking about "services". So, the services became a sort of linking pin to the ecological world and the economic social world. [¹⁴⁴] (...)"

I asked Braat for an example how an ecologist, who has received the explanation about the difference between “ecological function” and “environmental function”, would become confused by the term “environmental function”. Braat did not give such an example.

Hueting (1969, 1974a, 1980) already provided for the “linking pin” between economics and ecology. It is rather a high price to hinder access to his work, by not adopting his definition of environmental function, with such a weak excuse, and then adopt new terminology that creates a blockage and causes the impression as if there might be a difference. There is no good reason not to use

¹⁴³ For example, ants that allow plants to grow better, without necessarily any consequences for humanity.

¹⁴⁴ The word “became” might suggest that the result is new but Braat (personal communication) only intends to express an existing understanding about this linking pin. See Hueting (1974, 1980) for a historical review of this understanding. Hueting (1969, 1974, 1980) is innovative for economics by providing a stricter definition of environmental functions (namely: possible uses by people) and linking those functions to scarcity, and thus showing beyond doubt that scarce environmental functions *by definition* belong to the subject matter of economics.

the term “ecosystem services” but then it is advisable to use both terms interchangeably, so that their identical meaning is clear.

When the book by Hueting & De Boer (2019) was offered for a book review to the journal “Ecosystem Services”, this was not accepted (yet). Some sort of compromise was found that a “communication” was offered to the journal. Such a communication by an economist is not the same as a book review by an established author in ecology. Braat allowed that I (an economist) would find an ecologist (in a field which I have no connections in), and rejected the option that the editors would search for a reviewer, with the implied suggestions that there is more than an issue in terminology, and that the book would not be relevant for professional researchers in this field of “ecosystem services”: “(...) we do not want to put this [task] on any of our Associate Editors, as they are all still working full time. As to the content, only a small part of the book deals with ecosystem services, so it would not make sense for our journal to review this book.” (June 30 2019). But the book deals with eSNI and eΔ, and the latter are the costs of using the ecosystem services. This rejection is clearly in conflict with the stated purposes of the journal. Potentially Braat would have to actually read the book before he would understand such. On the distinction between environmental function (possible uses) (state, stock) and their actual use (“ecosystem services”) (flow), Braat suggested that Hueting was only interested in the first, which is a curious thing to say since eSNI is based upon actual use. Braat (June 18) states that the journal wants “moving from the “neo-classical economic approach to environmental pollution issues” to the ecological economic approach to ecosystem services”. This might reflect his background training at VU on pollution but misreads Hueting’s empirical neoclassical approach, that generates models that are subjected to econometric testing, both on environmental functions and their use (“ecosystem services”).

21.11.4 Conference of European Statisticians (CES) 2013

Hueting’s work on the environment made CBS Statistics Netherlands a leading agent in the international development on greening the accounts. Scores of colleagues at CBS have followed in his wake, gaining international prominence too, though remarkably while mismanaging eSNI. We already mentioned the London Group. In 2009, the Conference of European Statisticians (CES) set up a joint UNECE – Eurostat – OECD *Task Force* to develop recommendations to harmonise the different ways for measuring sustainable development. Rutger Hoekstra and Jan-Pieter Smits of CBS shared the position of Chair and Editor of the Task Force.

Hoekstra and Smits had been and were co-responsible for the “Monitor on Sustainability” (Dutch MDN) for the Netherlands, published in 2009, 2011, 2014, 2017, that misrepresented and on content neglected Hueting’s eSNI. Hoekstra moved to KPMG, and Smits became project leader for the “Monitor on Broad Welfare” (MBW) in 2018 that refers to eSNI, see below. Remarkably eSNI isn’t in the MDN where it belongs, and it is in MBW (pleonasm) that it considers distractive for environmental sustainability. Minister Wiebes (2018) refers to the CES. CES (2013:11) states:

“In the 1970s, a number of initiatives aimed to “correct” National Accounts aggregates for environmental and other non-market factors. These initiatives included the Measure of Economic Well-being (MEW) developed by Nordhaus and Tobin (1973) and the Sustainable National Income (SNI) measure proposed by Hueting (1974).” [1974a, 1980]

SNI is mentioned again in Annex II on page 122, with reference to Gerlagh et al. (2002). With respect to our topic of interest, CES (2013) is rather sloppy in summaries and referencing. For example, Keuning, De Haan and NAMEA are not discussed but occur in the list of references. The editors might have thought that researchers of CES would be well versed in the topic so that referencing is secondary.

An alternative possibility is that the editors make errors of summary and reference that a researcher would not make who had really read the works. The following might seem nitpicking yet the point and evidence is that these researchers at CBS apparently did not quite study Hueting’s work.

- (i) In the list of references, Hueting (1974a, 1980) and Gerlagh et al. (2002) are not included, so they are referred to in the discussion but actually not in the list.
- (ii) Tinbergen & Hueting (1991, 1992) is in the list of references, but is mentioned nowhere in the discussion. Thus readers of the discussion may not notice the support by Tinbergen. The CES statisticians may have heard about his Nobel Prize in economics, but it is better explained to the younger generation by actually discussing this that Tinbergen started at CBS and helped create national accounting. It can also be mentioned that Tinbergen hired Kees Oomens (1917-2005), see Van Teeffelen (1999) and Van de Ven (2006). Oomens supported eSNI too (personal communication by Hueting).
- (iii) Hueting (1974a) is in Dutch, while the English publication is in 1980, and one would include both references.
- (iv) Hueting (1974a, 1980) does not propose eSNI, as CES states, but still argues that there is no solution.
- (v) eSNI was defined by Hueting (1986b) and later. A fine reference would have been Tinbergen and Hueting (1991), see point (ii).
- (vi) A summary of De Haan (2004) and De Haan and Keuning (1996) on NAMEA would have been proper, including mention that this work was also based upon earlier work by Hueting. This work by Hueting, alongside Canadian statistics, was quite instrumental for the UN to create the environmental accounts, that all are using now.

When CBS Statistics Netherlands itself does not understand eSNI, does not care, and is incapable of explaining it to the Conference of European Statisticians (CES), then it should not surprise that CES does not spend much time on it. CES does a recommendation to UN, EU and OECD but the first recommendation would be to study a topic before you report about it.

21.11.5 Assumption on preferences versus subjectivity (colloquium)

At a colloquium in 2013 at the Dutch Ministry of Economic Affairs, at the occasion of the retirement of Roeland Bosch, Hans Opschoor stated (as recorded in the report, my translation):

“He (Opschoor) understands that according to Hueting the valuation of the availability or the loss of environmental functions is impossible in most cases, but that monetarisation *is* possible under one or some assumptions of preferences. However, politicians and the public have different conceptions about sustainability. When you ask around you get different answers. He himself has the impression that many people find a rise in temperature of more than 2 degrees Celsius quite acceptable. This makes environmental sustainability a subjective concept.”¹⁴⁵

Hueting’s answer at the colloquium was, and can be repeated here (my translation):

“As stated many times before, you don’t know whether or not there are preferences for the present and future availability of environmental functions, because you cannot measure them in most cases. However such a preference is rather probable, because of the following postulate that has not been challenged yet: (1) humans derive a part of the meaning of their existence from the company of others, (2) these others include in any case their children and grandchildren, and (3) the prospect of a safer future is therefore a normal human need, and dimming of this prospect has a negative effect on welfare (Hueting 1987d). Environmentally sustainability is an objective concept and is defined as the condition that satisfies physical standards of sustainability. These standards are determined scientifically. When, for example, as in the sixties, fish are dying massively, then you don’t ask politicians or the public what has to be done, but you ask this from a biologist or chemical engineer specialised in water management. When you are ill then you go to the medical doctor and not to a politician, do you ? He refers to the articles that he wrote with Lucas Reijnders.”¹⁴⁶

In that discussion, Bart de Boer and Henk van Tuinen recalled that also experts acknowledge margins of uncertainty in empirical estimates, also on standards for sustainability. Recognition of such margins is important. Yet eSNI would highlight the margin of uncertainty on economic welfare w.r.t. the standard measure of national income itself.

¹⁴⁵ Translated from “Appendix 4. Kort verslag van het colloquium “Hoe meten we groene groei?” op 3 juni 2013 bij het Ministerie van Economische Zaken”, see www.sni-hueting.info

¹⁴⁶ “Sustainability is an objective concept”, *Ecological Economics*, 27(2) (1998b), 139-147, Dutch: “Duurzaamheid is een objectief begrip”, *Economisch Statistische Berichten*, 4057 (1996), 425-427; “Uncertainty and sustainability”, *Ecological Economics*, 29(1) (1999), 9-11, Dutch: “Duurzaamheid en preferenties”, *Economisch Statistische Berichten*, 4062 (1996), 537-539.

21.11.6 Wageningen and PBL on the capital approach

Leon Braat, biologist R.S. (Dolf) de Groot, rural land planner Joep Dirkx and ecologist Bart de Knegt are at Wageningen University. As said, this university has close links to the Dutch Ministry of Agriculture, for example on “research required by law”.¹⁴⁷ Researchers also developed close links with PBL. The “capital” and “ecosystems” approach (see Section 7.10) found its way into:

- (i) Monitor Duurzaam Nederland (2009) discussed in Section 21.11.1 and subsequently the CES in Section 21.11.4.
- (ii) the PBL publication on “natural capital”,¹⁴⁸ notably Dirkx & De Knegt (2014), who are again two non-economists writing about capital. Remarkably, they consistently refer to “Constanza” for two different publications by Costanza. Apparently they do not check whether Costanza et al. (1997) met with criticism.
- (iii) the Dutch relations to “The Economics of Ecosystems and Biodiversity” (TEEB) study by the United Nations,¹⁴⁹ (“The Economics of Ecosystems and Biodiversity (TEEB) is a global initiative focused on “making nature’s values visible”. Its principal objective is to mainstream the values of biodiversity and ecosystem services into decision-making at all levels. It aims to achieve this goal by following a structured approach to valuation that helps decision-makers recognize the wide range of benefits provided by ecosystems and biodiversity, demonstrate their values in economic terms and, where appropriate, capture those values in decision-making.”). (There is also a link to UN SEEA EEA (Experimental Ecosystem Accounting).¹⁵⁰)
- (iv) the Esmeralda research by the European Union.¹⁵¹ (“The mapping approach proposed will integrate biophysical, social and economic assessment techniques.”)

21.11.7 RIVM-MNP-PBL 1988-2008, MDN 2009, money creation 2016, other

Food technology engineer Klaas van Egmond (1946) was director on the environment at RIVM in 1988-2004 and became director of the new Dutch environmental planning bureau MNP in 2004-2008, which in 2008 fused with what now is PBL, The Netherlands Environmental Assessment Agency.¹⁵² Van Egmond was professor in Utrecht since 1995. After the financial crisis 2007+ he was co-founder of the “Sustainable Finance Lab” (SFL) there in 2011. As non-economist he expounded on economics. In 2017 he advanced a theory on Shakespeare and $\pi \approx 22/7 = 3.14...$ ^{153 154} which was deconstructed by a skeptic journalist.¹⁵⁵

¹⁴⁷ <https://www.wur.nl/nl/Onderzoek-Resultaten/Wettelijke-Onderzoekstaken.htm>

¹⁴⁸ <https://themasites.pbl.nl/natuurlijk-kapitaal-nederland/natural-capital-netherlands>

¹⁴⁹ <http://www.teebweb.org/>

¹⁵⁰ <https://seea.un.org/home/Natural%20Capital%20Accounting>

¹⁵¹ <http://www.esmeralda-project.eu/>

¹⁵² <https://www.pbl.nl/en/>

¹⁵³ <http://www.klaasvanegmond.nl/wp-content/uploads/2017/10/Shakespeare-as-metaphor-squaring-the-circle.pdf>

¹⁵⁴ <http://www.studiumgeneralebreda.nl/2019/05/01/18-mei-2019-klaas-van-egmond-homo-universalis/>

¹⁵⁵ <https://kloptdatwel.nl/2020/02/17/klaas-van-egmond-identificeert-shakespeare-als-het-getal-pi/>

Theoretical chemist H.J.M. (Bert) de Vries was in these working environments in 1990-2013 too, and was professor in “Global Change and Energy” in Utrecht in 2003-2013. De Vries wrote the textbook “Sustainability Science”.¹⁵⁶

21.11.7.1. *Removing eSNI from the MDN 2009*

See Section 21.11.1 and Chapter 40 concerning the removal of eSNI from the Dutch sustainability monitor, with Van Egmond’s participation in Opschoor (compilation) et al. (2009). It is also useful to observe that Van Egmond here collaborates with two economists.

21.11.7.2. *Killing eSNI*

Section 21.10.9 above discusses the mysterious disappearance of a crucial subsidy. Subsequently, eSNI was only calculated till 2008, with the final year of observation 2005 and with no results for 2010 and 2015. It is one thing not to include eSNI in the MDN but it is another thing to stop calculating it at all (especially when ministers and parliament have instructed you to calculate it). Given the following email by Van Egmond to Colignatus of November 18 2015, it seems most likely that Van Egmond and RIVM-MNP-PBL killed the actual calculation of eSNI, without informing the Ministries, Parliament and Hueting.¹⁵⁷

“After many years we have all become convinced that it [eSNI] will not work. In the eSNI, the national income is corrected¹⁵⁸ for environmental damage in particular. The current climate discussion makes it clear that we can not agree on what we call harm and how bad it is, let alone that we can monetarise it in a scientifically justified way. For example, did you ever try to figure out what the damage in euros is of a NO₂ concentration that is 50% above the norm? So this is not at all a trick in the rule-book of economic specialists, but rather the complex connection with toxicology, epidemiology, materials science, biodiversity, ecology (carrying capacity studies ecosystems). Fortunately, those people do overcome their specialist fields.” (my translation)

Points to observe are:

- (1) The “we have all” likely refers to the October 15 2009 evaluation of the MDN 2009, indicated in Section 21.11.1 and with discussion of a report in Chapter 40. Given the absence of a text by Hueting on this report, we can infer that Van Egmond did not communicate his criticism to Hueting (15 years in retirement). Van Egmond’s reaction to eSNI has rather been silence about his rejection of eSNI. He has been burking the existence and information about eSNI while it would be relevant for others. This does not fit the attitude of a scientist that he claims to be. It does not fit his job description at RIVM and MNP / PBL. One cannot present the MDN 2009 as an *evaluation of eSNI*, and this neither holds for this report by Opschoor et al. (2009). If eSNI were to be dismissed, then it would have required proper evaluation, and one cannot

¹⁵⁶ <http://www.sustainabilityscience.eu/>

¹⁵⁷ There is a pending request at PBL to provide information about the official motivation.

¹⁵⁸ There is no correction of NI, but NI and eSNI are used alongside each other. However, it is common language to say the eSNI “corrects” NI.

- avoid the impression that the authors involved here knew that eSNI did not get this proper evaluation, but was removed in such rather sneaky manner. Why ? There is no need to speculate, and it suffices to observe that a decent effort at evaluation of eSNI would have gotten the attention of Hueting and Parliament.
- (2) Van Egmond's statement "that we can not agree on what we call harm and how bad it is" stands in problematic contradiction to the statement "Fortunately, those people do overcome their specialist fields." Now what is it ? If such specialists can derive standards from the literature then why not use those in an economic model ? Van Egmond's main worry seems to be the use by economists.
 - (3) Van Egmond puts various aspects into one question: the micro observations of impacts on the environment and on human health like the WHO dose-response studies, the derivation of environmental standards in the format that can be used for an economic model, and a run with the model for the wider economic impact. It took a group of people over many years to arrive at an estimate of eSNI. It is too simple to refer to such a micro case as if it would prove a point.
 - (4) eSNI is a statistical concept and not for contingency analysis. The latter is likely best done for a year in the future so that there is no confusion with statistics.
 - (5) Van Egmond excludes economists. Hueting who in 2015 had been working on environmental sustainability for some 45 years, is still excluded because he is seen as an economist. With this bias, Van Egmond neglects that Hueting as founding head of the environmental department at CBS Statistics Netherlands made sure that the complex connections were well taken care of, by hiring natural scientists. Van Egmond's bias against economists is shocking, given that Hueting's work is precisely in the field that Van Egmond claims expertise in at both RIVM and MNP and as professor on sustainability, unless Van Egmond would hold that sustainability has no economic aspect, that the field of "environmental economics" is an aberration, and that it suffices to have a multidisciplinary approach with the exclusion of economics – so that management is not needed, while economics is the science of management.
 - (6) Van Egmond's rejection of eSNI apparently is no new insight. We conclude that precisely the environmental agency of the Netherlands has been blocking a fundamental instrument for environmental assessment, likely since 2002 on the quality upgrade and inclusion of more countries, and definitely since 2008 for the calculation of eSNI 2010 and 2015. (Hueting & De Boer (2018, 2019a) give their own rough estimate for 2015.)
 - (7) Van Egmond kept silent and actually His statement "that we can not agree on what we call harm and how bad it is" stands in remarkable contrast to his October 29 2019 article in "de Volkskrant" that claims that such limits were already clear in 1972: ¹⁵⁹

¹⁵⁹ Dutch: "In 1972 was door wetenschapper Dennis Meadows en de Club van Rome al aangegeven hoe we nu, een kleine vijftig jaar later, tegen de fysieke 'grenzen aan de groei' zouden aanlopen. (...)En nu is het dan zover. De voorspelde klimaatverandering is een voor iedereen waarneembaar feit geworden. (...) Bijna vijftig jaar na de 'grenzen aan de groei' weten

"In 1972, scientist Dennis Meadows and the Club of Rome had already indicated how, almost fifty years later, we would come up against the physical "limits to growth". (...) And now the moment has come. The predicted climate change has become an observable fact for everyone. (...) Almost fifty years after the "limits to growth", we know quite precisely where those limits are and how to deal with them. The only thing missing is political courage and leadership."

The problem is rather one of scientific integrity. We can only infer that Van Egmond must be quite confused. His statements make only a modicus of sense if we presume a world view in which only engineers have the key to knowledge and that sees economists as part of the problem. With his bleak regard of economists, Van Egmond did not mind collaborating with two environmental economists in removing eSNI from the MDN 2009 however. Perhaps he is correct that at least some economists are part of the problem.

21.11.7.3. *Discussing money creation without studying economics*

Van Egmond's email to Colignatus was in the context of another issue in economics. In 2015, Van Egmond and De Vries presented an argument on money creation.^{160 161} Van Egmond also provided testimony to Dutch Parliament on October 14 2015, that 1.5% real growth with a constant price level would give a benefit to government by money creation of 1.5% of GDP. Dutch nominal GDP is about EUR 600 bn and 1.5% is EUR 9 bn. Fisher's equation of exchange $GDP = P Y = M V$ gives $(1 + g) P Y = (1 + g) M V$. With constant prices but also constant velocity, 1.5% real growth of GDP means that the stock of money can rise with 1.5% as well. We have $M = GDP / V$, so that the value of velocity is important too. A cavalier interpretation is that Van Egmond and De Vries assume that $V = 1$ but in reality $V \approx 2$, so the creation of money likely is EUR 4.5 bn rather than EUR 9 bn. Their claim thus is widely wrong. These authors also neglect that this seigniorage is already used to (partly) pay for the transaction costs in the payment system, so that if the government would nationalise seigniorage then the payment system must be financed in another way, potentially raising costs for customers.

Not seeing this difference between $V = 1$ and $V \approx 2$ shows a crucial lack of economic understanding of the very topic that one claims to study, and it is rather shocking that this wasn't noticed immediately by the other members of the "Sustainable Finance Lab". Van Egmond responds (communication November 18 2015):

"(...) I appreciate (... the ...) comment on content. I have created confusion indeed with the assumption that the velocity = 1 (...). Though we think to be able to justify this assumption based upon our calculations, caution is required indeed."

we vrij precies waar die grenzen liggen en hoe we daar mee om moeten gaan. Het enige waar het nog aan ontbreekt is politieke moed en leiderschap."

¹⁶⁰ <https://burgerinitiatiefonsgeld.nu/positionpaper-vanegmond.pdf>

¹⁶¹ ESB 100 (4721), Nov 5 2015, p642-645

This statement is curious. Velocity of money in the Eurozone is around 2 and a fact does not change when you do calculations to justify another assumption contrary to reality.

Van Egmond clarifies that he wrote his article and presented himself to Dutch Parliament as an environmental scientist and not as an economist (communication November 24 2015). In fact he presented himself as professor on environment and sustainability speaking for himself, though as an academic. However he did not clarify to his readers and Dutch Parliament (i) "I am no economist", and (ii) that for him "sustainability" apparently is a concept that can do without economics.

In 2016, Van Egmond presented his economic fallacies in a consumer programme Radar TV.¹⁶² First he criticised bankers for selling the idea of continued economic growth (that would finance mortgages), and then he presented his own fallacy of "positive money" that would guarantee continued economic growth. My conclusion in 2016 was that Van Egmond is a danger for his & the environment.¹⁶³

21.11.7.4. Discredited economists and control of money

In 2016 Van Egmond and De Vries hold that the world financial crisis has discredited economists. Mainstream economists would still fail to see the true cause: money creation by private banks would destabilise society and the environment, and money creation should be in the hands of governments for social purposes.

"And because there is hardly any scientific interaction between economics and the financial system, the undersigned environmental experts [Van Egmond and De Vries] have ventured into this no-man's-land and have investigated this interaction. Indeed, it were natural scientists who, more than 40 years ago in their report to the Club of Rome, have foreseen the current tensions between declining resources and growing world population."¹⁶⁴

This claim is false, see many authors in the past including Huetting starting in 1967, and see also the Nobel Prize 2018 for Nordhaus. For economists, the development of economic production or real value added is an indicator for physical developments, as also engineers would regard physics. A criticism on the Club of Rome model was that it didn't account for prices and substitutions.

The claim though is somewhat true because Donella and Dennis Meadows et al. indeed provided a numerical estimate for the speed of these developments. A major problem is rather that governments do not listen.

In 2017 Van Egmond's position is described as:

"He relates the exhaustion of the Earth directly to the architecture of the current money system: "Whoever has control over the money controls the economy and society." According to Van Egmond, we can not trust that

¹⁶² <https://boycottholland.wordpress.com/2016/01/18/dirk-bezemer-disinforms-radar-tv/>

¹⁶³ <https://boycottholland.wordpress.com/?s=Egmond>

¹⁶⁴ <https://www.nrc.nl/nieuws/2015/05/08/niet-de-bank-maar-de-staat-hoort-het-geld-te-sc-1493167-a261824>

the climate goals of Paris will be met, as long as this money system does not change.”¹⁶⁵

Thus, Van Egmond currently focuses on money creation as relevant for the transition path towards (environmental) sustainability. There is a huge literature in economics on money creation and Van Egmond's position lacks credibility because of his obvious and shown lack of competence. He doesn't use money creation as an argument against eSNI but he still regards eSNI as failing as an indicator for environmental sustainability, and he does not focus on discussing its presumed drawbacks, even while Hueting has provided him with a clarification on his misunderstandings.

21.11.7.5. *In sum*

Van Egmond was off-track on eSNI for many years and now is off-track on money, in both cases because he apparently has little knowledge about economics, even while he speaks about economic issues and proclaims the importance of multidisciplinary. Most shocking is his burking of eSNI and likely its actual blocking of it. Most likely, the best way for others to begin to understand what has been happening here is to look at Chapter 40 below.

21.11.8 *PBL Netherlands Environmental Assessment Agency 2016*

PBL is the PBL Netherlands Environmental Assessment Agency.

Oosterhuis, Van der Esch, Hoogervorst (2016), *"From statistics to policy. The development and application of environmental statistics and environmental accounts in the Netherlands"*, is the PBL contribution to the World Bank's programme *"Wealth Accounting and the Valuation of Ecosystem Services"* (WAVES). While the authors consulted with CBS Statistics Netherlands (namely those responsible for the CBS Statistics Netherlands (2015), "Green growth in the Netherlands" report, discussed in Section 7.17), it is remarkable that the department of National Accounts at CBS was not the main author of the report, given the objectives of WAVES.

Oosterhuis and Hoogervorst are economists. We mentioned Oosterhuis (ed) (2008) *"Aan schaarste geen gebrek"* in Section 21.10.8, where he is at IVM too.

"From statistics to policy" page 21 discusses eSNI (Dutch mDNI). Chapter 18 above discusses this too. There are two points of attention here:

- PBL uncritically repeats – see page 156 above for the quote of the PBL document – the confusion and misrepresentation at IVM on the Alleingang scenario, as if the global level is no key element of environmental sustainability, which was discussed in Section 21.9.12.
- There are the quotes of three Dutch ministers of Economic Affairs that these PBL authors do not correct, see Chapter 18 above.
- PBL doesn't mention that the minister of Economic Affairs and secretary of the Environment instructed RIVM-MNP-PBL to calculate eSNI and report on it.¹⁶⁶

¹⁶⁵ <https://www.ftm.nl/artikelen/ons-geld-presenteert-oplossing-voor-feodaal-geldsysteem?share=1>

¹⁶⁶ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

The presentation of eSNI by PBL is unbalanced, while the report has been sent to the World Bank, and its community of researchers.

21.11.9 Temporary committee of Parliament on “broad welfare” 2016

Dutch Parliament installed a Temporary Committee to look at extension of the indicators for welfare, calling this “broad welfare” (a pleonasm).¹⁶⁷ ¹⁶⁸ They heard Hueting and the report Grashoff et al. (2016) has only short mention. Hoekstra of CBS was adviser to the committee, and in their Recommendation 3 on page 7 he finds full support for the misrepresentation that has been given by the Conference of European Statisticians:

“The Committee calls on national statistical institutes and international organizations to give concrete shape to their CES-recommendations on measuring sustainable development in their publications and instruments on broad welfare. The new Monitor for Broad Welfare must of course also follow the CES-recommendations. The Committee urges Statistics Netherlands to continue to promote international harmonization.”

21.11.10 Non-existence at a CBS-professorship at TUE 2016

CBS Statistics Netherlands finances the “Quantification of Sustainability” chair at Eindhoven University of Technology (TUE), with the appointment of professor Jan-Pieter Smits, with his oration Smits (2016).¹⁶⁹ A result is already the book by Lintsen, Veraart, Smits and Grin (2018).¹⁷⁰ Hueting and his work are mentioned neither in the oration nor in the book, while Smits in the first chapter nevertheless discusses sustainability and the environment.

For the MDN and CES, as discussed in Section 21.11.4, Smits mentioned eSNI, and referred to the thesis by Hueting (that doesn’t contain eSNI) but even this is lacking here.

Smits only refers to the “capital approach” initiated by the World Bank, see Section 7.10, and adopted by him and MDN, then CES, then MBW. His lack of reference to Hueting suggests that Smits is unaware that (i) there is no difference between Hueting and the World Bank on using the fundamental economic notions of capital and income accounting, (ii) there is a real practical difference on the calculation of eSNI as one of the indicators. One cannot argue that “eSNI needs not be mentioned because it would not fit the capital approach” because it does fit the same analytical structure. One cannot argue that “eSNI needs no mention because it would not be an indicator” because it is an indicator. When you discuss the very same topic, then science requires that you mention eSNI and then you are free to give an argument why it would not be adequate for your purposes. This is further discussed in Chapter 0.

Contact between Smits and Hueting and De Boer since 2009 was only sporadically. Smits did not take the opportunity to discuss eSNI at a deeper analytical level, with criticism and replies. Hueting and De Boer suggested a repeat at CBS of the colloquium held in 2013 at the Ministry of EZ, but Smits

¹⁶⁷ <https://www.tweedekamer.nl/nieuws/kamernieuws/debat-over-breed-welvaartsbegrip>

¹⁶⁸ <https://www.youtube.com/watch?v=iD2RJqbsqa4&feature=youtu.be>

¹⁶⁹ https://pure.tue.nl/ws/files/91607849/Rede_Jan_Pieter_Smits_LR_26_01_2018.pdf

¹⁷⁰ <https://link.springer.com/book/10.1007%2F978-3-319-76696-6>

rejected this. He acknowledged that researchers at CBS no longer knew what eSNI was but he did not state a reason to reject such colloquium.

21.11.11 Ministry of Economic Affairs and Climate 2017

After the Dutch parliamentary election of 2016 and the formation of a coalition government, the Ministry of Economic Affairs was rebaptised in 2017 into the Ministry of Economic Affairs and Climate. Much of the impetus for policy making derives from changing weather patterns. The “OECD Environmental Outlook to 2050: The Consequences of Inaction”¹⁷¹ are a reminder too. Remarkably, though, there still is no awareness about the relevance of eSNI for policy co-ordination.

21.11.12 Costanza 2017 looking back to 1997

Section 21.9.10 discussed the article by Costanza et al. (1997) and the criticism by economists Pearce, El Serafy and Hueting. Costanza et al. basically did not reply to the criticism. Some of the researchers founded the journal “Ecosystems services” at Elsevier. This journal published the review Costanza et al (2017) “Twenty years of ecosystem services: How far have we come and how far do we still need to go?”. The latter article refers to the protest by Hueting et al. (1998) and states “We address some of these issues further on” but there is no further reference to Hueting’s work.

See Section 7.10 on terminology and Section 0 for a model. El Serafy (1998) criticised Costanza et al. (1997) that the “services” were Hueting’s environmental functions, and that adequate reference was in order. R.S. (Dolf) de Groot is a co-author in Costanza et al. (1997) and wrote his thesis about the valuation of environmental functions, with that name indeed, see Section 21.9.4, but he is a biologist and no economist by training, and perhaps he might think that there are differences. In a way it is a recognition of Hueting’s work that his environmental functions are continuously referred to as “ecosystem services”, with even a journal title, see Section 21.11.4, but it remains problematic that researchers do not look into Hueting’s analysis on those functions and into the subsequent development in Hueting’s work, resulting into eSNI.

Costanza et al. (2017) call their method also the “capital approach”, in which human capital and human-made capital are “embedded” (at least such is the Venn diagram) into social capital, and this again into natural capital, with subsequent “interaction” that generates “sustainable human well-being”. These authors use the term “capital” with apparently monetary values. Obviously also non-economists may use the word “capital” but it is not clear whether the analysis is sound economics. See Section 7.10 for the “capital approach” at the World Bank that has a basis in sound economics, but it would become a tedious exercise when economists are put into a position to try to guess what non-economists present as their take on an issue while using terms from economics.

21.11.13 CBS Statistics Netherlands 2014-2018

When starting as new director-general of CBS Statistics Netherlands, Tjark Tjin-A-Tsoi stated: “We must make it not so easy anymore to lie with our figures.”

¹⁷¹ <http://www.oecd.org/env/indicators-modelling-outlooks/oecdenvironmentaloutlookto2050theconsequencesofinaction-keyfactsandfigures.htm>

(NRC Handelsblad, 2014-07-19) Jan Pronk and Herman Wijffels took this as an invitation to talk with him about the problem with NI and the solution by eSNI.

In 2017 CBS Statistics Netherlands became project leader for the Monitor Broad Welfare (MBW). CBS (2018a) published the monitor and included eSNI, which is the first official recognition by CBS of this proof of concept. Yet CBS still refers to Hueting & De Boer (2018, 2019a) and does not do the calculation itself.

CBS *itself* thus presents only NI, which is a misleading figure on the environment, that no satellite account can correct, which still runs counter to Tjin-A-Tsoi's purpose quoted above.

In the letter of reply by Tjin-A-Tsoi to Pronk and Wijffels dated 2015-02-03, the DG CBS refers to the Conference of European Statisticians, and that CBS chaired its task force, see Section 21.11.4, and closes with:

“CBS Statistics Netherlands is strongly in favor of an approach in which social phenomena are described by publishing several indicators in their interconnectedness, and a way of interpreting and communicating that does justice to the complexity of reality. In our opinion, such an approach is preferable to the choice of a single indicator for sustainability, for example via an eSNI. The conceptual framework behind the Dutch Monitor on Sustainability has been endorsed by the Conference of European Statisticians and is currently being used within the United Nations Statistical Commission as input for determining and measuring the Sustainable Development Goals. With the chosen multi-indicator approach for measuring sustainability, CBS Statistics Netherlands therefore joins the (inter) national convergence that appears to be developing in the area of measuring sustainable development.”¹⁷²

Points of critique are:

- (1) The suggestion to *include* eSNI in the multi-indicator approach cannot be logically presented as a *replacement* of the multi-indicator approach.
- (2) The current multi-indicator approach is *insufficient* to attain the objective of “We must make it not so easy anymore to lie with our figures.” The inclusion of eSNI is *scientifically* required.
- (3) CBS Statistics Netherlands has misrepresented eSNI in the Dutch Monitor on Sustainability (Section 21.11.1) and to the Conference of European Statisticians (Section 21.11.4).

¹⁷² My translation of: “Het CBS is fervent voorstander van een aanpak waarin maatschappelijke fenomenen beschreven worden door meerdere indicatoren in samenhang te publiceren, en een manier van duiden en communiceren die recht doet aan de complexiteit van de werkelijkheid. Een dergelijke aanpak is ons inziens te preferen boven de keuze voor een enkele indicator voor duurzaamheid zoals bijvoorbeeld via een mDNI. Het conceptuele kader achter de monitor Duurzaamheid is door de Conference of European Statisticians bekrachtigd en wordt momenteel ook binnen de Statistische Commissie van de Verenigde Naties gebruikt als input voor het bepalen en meten van de Sustainable Development Goals. Met de gekozen multi-indicator benadering voor het meten van duurzaamheid schaaft het CBS zich dan ook achter de (inter)nationale convergentie die er op het terrein van het meten van duurzame ontwikkeling lijkt af te tekenen.”

- (4) It is awkward to say that CBS *joins* a movement that CBS actually *leads*, especially when this leadership contains misrepresentation, as if others would be responsible for this misrepresentation.
- (5) The CBS letter does not provide a statement *on content* why CBS Statistics Netherlands does not calculate eSNI. It amounts to: we simply do not do so.

The CBS letter states that the contact person is statistical researcher dr Bram Edens (1976), with head of the dept. of National Accounts G.J. Eding.

21.11.14 Thesis by Bram Edens 2013

It appears that Edens has no training as an economist. Having earned his degree in physics in Utrecht, Edens first studied in Japan on *Japanese Business and Society*, and then worked at CPB in 2002 on cost-benefit analysis. After some time in Chad he worked for the UN Statistics Division in 2006 on environmental accounting, that he calls “a topic that has fascinated and inspired him ever since”. In 2009 he joined CBS at the dept. of National Accounts on environmental accounting. Edens wrote his thesis in 2013 at VU under supervision of Cees Withagen, “*Reconciling theory and practice in environmental accounting*”.

In Edens (2013:19) we see a copy of the misrepresentation of Hueting’s work that we have identified above in various sections:

“Dutch interest in environmental accounting was pioneered by the efforts of Hueting in the late seventies to measure sustainable national income defined as the maximum level of production that is attainable while vital environmental functions remain intact (Hueting, 1980). This led to fierce discussions and was considered by some to lie outside the realm of statistics as it required modeling (Hecht, 2005). It inspired however the development of a so-called NAMEA (National Accounting Matrix including Environmental Accounts) around 1990.”

- (1) Hueting started at CBS in 1969, eSNI is not in his thesis (1974a, 1980), and eSNI was not “in the late seventies” but designed in 1986. Edens has no proper reference to eSNI and likely does not know what it is. He doesn’t have the background training as an economist to properly understand it. Apparently he has no interest to hunt for the proper reference. When Jan Tinbergen made the switch from physics to economics, he read up on economics.
- (2) CBS (1997) is the official statement at that time why it doesn’t calculate eSNI itself. It is *formal* and not on *content*, see Section 15.3. There has been discussion within CBS between Hueting and colleagues, and there is the Van Tuinen (2009) article discussed in Chapter 25. Hecht’s conjecture that the use of model played a role is only an inference, and doesn’t evaluate the capacity of CBS to use a model. It is far too simple, as Edens does, to deal with the matter in such manner.
- (3) The NAMEA only *transforms* Hueting’s work on environmental data, see the proper history in Section 21.9.8, including the onset of UN SEEA.
- (4) Remarkably Hueting does not occur in the list of references of this thesis, even while Hueting 1980 is referred to in the text and Hueting did not stop publishing after 1980.

- (5) The thesis refers to the World Bank Adjusted Net Savings, but not to the criticism provided by eSNI.

21.12 *The curious situation in 2019*

Hueting's work at CBS started in 1969 with the objective to look at the environment and economic growth, see Section 21.4. The notion of eSNI became part of the official Dutch national strategy for sustainable development for Johannesburg 2002, see Ministry of VROM (2002). Subsequently, a younger generation at CBS misunderstood the issue, removed eSNI from the Monitor on Sustainable Development (MDN) 2009 where it belongs, and later it was mentioned again in de Monitor on Broad Welfare (MBW) 2018.

Every time when CBS publishes a figure of NI the distance to environmental sustainability $e\Delta = NI - eSNI$ is unmentioned. Given the notion of "income" it is an essential part of the task of CBS to publish NI and eSNI at the same time. It is a rather freakish epiphenomenon that the analysis on eSNI got catalogued as belonging to the special category of MDN or MBW and not belonging to the very task of CBS on national income accounting, as Tinbergen had indicated in 1969.

Thus it is better to publish eSNI on a regular base alongside NI. It would be an independent discussion how to use these indicators for the MBW.

21.13 *The definition of "economic growth" 2019*

In updating this Chapter / paper, the author had cause to take a closer look at Hueting's statement on the *term* "economic growth". This caused an exposition that met with approval by Hueting, see Chapter 17. The main point is that when the term is used outside of welfare theory (which Hueting no longer considers "economics") then it is internally inconsistent, like "square circle" or defining *cow* = *horse*. My finding of this inconsistency was a surprise as I had not looked closely at the term in this detail or manner, as I had looked at the level distance $NI - eSNI$, which is the core of Hueting's contribution apart from the environmental functions. The former version of "*The Old Man and the eSNI*" properly speaks about economic growth for welfare and uses quotation marks for so-called "economic growth" when it refers to production growth. I assumed that such use of quotation marks was obvious, and that all economists would reason like this, if they considered the issue. This approach finds "economic growth" a wrong name for production growth but recognises that it is mostly used in this manner. However, it is another step to deduct that it is even internally inconsistent. The explanation for the late moment of actually deducing this internal inconsistency is that the author only now considered the position of a national statistical office that has stewardship on the use of its statistics, and that must explain to users that the same term ("economic growth") has two different meanings, while another notion (production growth) can be identified by two terms. It is remarkable for 2019 that Hueting's analysis can be supported by this additional finding, as a small brick in the edifice.

21.14 *Concluding remarks*

The figure for national income (NI) is conditional on the assumption that market prices reflect the preferences, so that "more" means "better". During the last 50

years there is a theoretical crisis in economic theory because this assumption no longer holds since we know that preferences for sustainability cannot be expressed in the market when there are no adequate regulations in place. Governments all over the world have expressed an interest in (environmental) sustainability. Mainstream economist then advise and support the growth of NI with the argument that this allows the finance of expenditures for the environment. Sometimes there is also a “trickle down” theory that aggregate growth also reaches the poor. In this way NI remains a target for economic policy. Pursuing this target however increases the destruction of the environment and the physical base for survival of large sections of mankind, and thus achieves exactly the opposite. The situation is like a patient who sickens from some medicine with the doctors upping the dose to cure this. Mainstream economists are aware that NI is no good measure for welfare but are not aware of a good solution, and by default ignore the problem. They neglect that there is a distinction between technological productivity growth using less resources and “productivity growth” that relies on continued destruction of the environment.

In these 50 years of research, Dr. Roefie Hueting has contributed not only to the development of environmental statistics and the related concepts now in use in the UN Handbook of National Accounting: Integrated Environmental and Economic Accounting 2003, referred to as SEEA 2003, but he also provided a firm base in economic theory for dealing with the environment, by relating it to the notion of scarcity and linking up to the notions of Pigou, Robbins, and a string of economists working on social welfare and national accounting. Outstanding in this contribution is that he makes economists aware of the conditionality of NI while he also provides for the concept of eSNI conditional on the assumption of preferences for environmental sustainability. Social welfare theory and national income and national accounting thus are shifted from a single tangent – see the illustration in **Figure 14** – to the realm of decision making under risk – see **Figure 5**.

It would be improper to reduce Hueting’s research only to the topic of eSNI, the issue under consideration here. Nevertheless, on this topic Hueting encountered (i) support and encouragement, (ii) criticism with reasoned argumentation, (iii) a frequent criticism that science would be mixed with ethics and politics, which criticism changes the subject from science to politics, (iv) opposition and obstruction without argumentation or with mock arguments.

(ad (i)) The first kind of response can impress us: the cum laude thesis, the support by Tinbergen, Pen and Hennipman, the support to a great extent by the directorate of CBS Statistics Netherlands, the interest and subsidies by Dutch Ministers and Parliament, and the international acclaim such as the UN Global 500 Award, the Hueting Symposium, the seminars at international institutes such as the World Bank, OECD, WSSD, and the results already included in the UN SEEA.

We must observe, however, that by time of this writing eSNI has not been adopted by the community of researchers working on economic statistics and national accounts. The cause must lie with the other three responses.

(ad (ii)) With respect to the second kind of response this paper observed a surprising number of misunderstandings. Let us hope that these can be resolved in the near future. Note that such resolution mainly requires that economists study Hueting’s existing work while it is less needed to do “new” research on points that

have already been developed. The point made here namely is that this existing work is getting neglected. New research would rather be on new topics once the concept of eSNI has been properly understood and accepted.

(ad (iii)) The third kind of response has played an important role. The argument that eSNI would be ethics or politics is unwarranted. Key researchers, both at CBS Statistics Netherlands and at institutes like EuroStat and the World Bank, apparently do not understand or accept the conditionality or “what if” approach to risk in national accounting. These scientists could have a scientific role just like Hueting has a scientific position but they hand the decision to calculate eSNI back to the political decision maker. Parliaments are advised to sooth these qualms by indeed taking the decision that eSNI is to be calculated and included in SNA alongside standard NI. Yet it must be emphasized at the same time that national statistical offices are scientifically free to decide themselves to calculate eSNI alongside NI. Even, there is the scientific obligation to explain what the current figure of NI stands for. The current reference to a “universal model” (see Bos (2007)) is quite inadequate, leaving us to wonder “a model of what?”. It is not correct to present NI without adequate instruction what it means and while knowing that the user is likely to misinterpret it.

(ad (iv)) The fourth kind of response is important too since it means that there was not a level playing field. Over the course of many years, eSNI has frequently been rejected not for content but for petty causes. Key events were: (1) the six year delay in 1974-1980 in the English publication of “New Scarcity and Economic Growth”, (2) the delay around 1996 by officials manipulating two Ministers and subsequently Parliament, that has also contributed to moving eSNI out of CBS Statistics Netherlands, (3) the disappearance of Hueting’s work within the community of “ecological economics”, where this work is not mentioned or included, (4) the confusion and misrepresentation of the definition of eSNI by the Alleingang scenario by the IVM researchers, (5) the disappearance in 2002-2018 of research funds promised by two Ministers to Parliament, (6) the non-calculation of eSNI after 2008 so that now outcomes for 2010 and 2015 are lacking, (7) CBS Statistics Netherlands having the leadership in the *Conference of European Statisticians* (CES) but misrepresenting eSNI that was created at CBS. These observations are not pleasant but have to be made. This kind of response explains the slowness and friction.

This review has identified various steps of advance and adversity, some small some large. **Table 18** gives an overview of the larger events.

It is debateable what a review like this can establish. However, it is worth a try. As said, the environmental challenge is wider than just climate change (or rather climate disaster), and both national income & production growth and their sustainable varieties provide important indicators or factors for economic welfare to guide us in the allocation of resources. **Table 18** paints the mixed picture of how the indicator for environmentally sustainable national income did not come into use yet. It is not always a matter of sound arguments. The events in the table mark the opportunities, both taken and missed, and it is important to see that key opportunities actually have been missed.

Table 18. Major steps of advance and adversity

<i>Advance</i>	<i>Adversity</i>
1974 Cum Laude thesis with Jan Pen	1974-1980 delay of English publication
1965-1994 Support by Jan Tinbergen	1996 eSNI moved out of CBS
1994 UN Global 500 Award	No participation in the London Group
1999 Hueting Symposium and book	1997 <i>Nature</i> article by Costanza et al.
Seminars at WB, OECD, WSSD	Non-reception in <i>Ecological Economics</i>
Inclusion in UN SEEA	IVM confusion and misrepresentation on the Alleingang scenario
Calculation for 1990, 1995, 2000, 2005	2002-2018 disappearance of research subsidy
2018 inclusion in CBS (2018) and ingenuity for the rough estimate 2015	2009-2018 no calculation for 2010 and 2015, potentially because some mishap
2019 book Hueting & De Boer (2019b)	CBS leading the Task Force of CES but misrepresenting eSNI

In the flux of advance and adversity the bright spots are still encouraging but the adversity is stronger than would be better for all. In December 2019, Dr. Hueting hopes to turn 90. He is undoubtedly the only person alive with a thorough knowledge of the trident of welfare theory and national accounting and the environment. While he is with us, young researchers would benefit a lot from his experience. We can only hope that the leading economists of our days find time to reflect on the economic theory that he has been crafting so diligently.

22. Different perspectives by Tinbergen and Hueting

This Chapter repeats aspects that have already been mentioned elsewhere in this book, but a revisit in different arrangement serves a new purpose.

Section 1.3 defined the Tinbergen & Hueting approach (not “theory”). Our own assessment at the meta level is that there is such an approach *on content*. It is also useful to be explicit about this approach. The approach uses the general framework of national accounting to generate information for policy advice for improving social welfare, and then extends for the environment. The approach is reflected in the structure of the Hueting & De Boer (2019b) book, as indicated in Section 7.8. For example, due to scarcity, the environment belongs to economics and thus the national accounts. Various aspects *on content* come to the fore at different points in this present book. We find e.g. other elements of the approach in Section 7.9 on the history of GDP and in particular on page 67.

Section 1.4 however indicated that Tinbergen and Hueting might have different personal views about the collaboration. They did not claim that their work constituted a particular joint approach (let alone “theory”). Tinbergen and Hueting met only 3 or 4 times in person and there is no expression of a joint endeavour for a common cause, except when writing the joint article. Here we consider what different views the authors might have had.

Different points of view are:

- Hueting & De Boer (2019b) state that they present *their* approach and mention that it got *support* by Tinbergen. They include Tinbergen & Hueting (1991) as an appendix. They do not speak about a *Tinbergen & Hueting approach*.
- Why would Tinbergen give his support ? Tinbergen has passed away in 1994 and we cannot ask. He has had remarkably few references to Hueting. This can be explained easily. While Tinbergen had Hueting appointed at CBS in 1969 to correct the national accounts for damage to the environment, Hueting (1974a, 1980) arrives at a negative conclusion that little can be said yet. This isn't useful for Tinbergen who wants to give policy advice. The useful result only arrives in 1986 with the vertical demand curve, which still needs development till 1990. By that time Tinbergen restricts himself to smaller projects. Overall, our finding will be that Hueting worked precisely within the paradigm that Tinbergen had been developing since the 1930s. Hueting got new results but Tinbergen had no problem in accepting them as sound.

One good reason to speak about the *Tinbergen & Hueting approach* is to emphasize that critics who reject the findings by Hueting also come in conflict with Tinbergen. Critics fail *standardly* to refer to the Tinbergen & Hueting (1991) paper. They might think and portray the image as if Tinbergen was off the grid when he supported Hueting. Instead, we can point to a long term commitment.

22.1 A tally over time

It may help to make a tally of the various interactions and agreements between Tinbergen and Hueting that this book has mentioned, see **Table 19**. The label “R” means a reaction to the other column.

Table 19. Tally of the interactions and agreements

	<i>Jan Tinbergen (1903-1994)</i>	<i>Hueting (born 1929)</i>
<i>Thermodynamics</i>	Physics only, no analogy for economics	R: Does not think (much) about this
<i>National accounts and income</i>	Design in 1930-1950	Trained to think in this framework
<i>Social welfare function</i>	For planning, Section 9.2	Not for statistics
<i>Environmental challenge</i>	Niko Tinbergen (1907-1988), relation to poverty	Grows alarmed in the beginning of the 1960s
<i>Population</i>	Linked to environment. World governance requires information and standards	Linked to environment
<i>Correcting national accounts for damage to the environment</i>	R: Advises CBS to appoint Hueting in 1969 to correct the n.a. for environment	Hueting (1967, 1968) criticises national accounts
<i>Other issues</i>	Less attention for the environment since Hueting looks into it	Focus only on the environment (lack of funds for more)
<i>Hueting (1974a, 1980), asymmetric bookkeeping (A = NI – NI-A)</i>	R: It is useless to refer to negative conclusion. Tinbergen (1985) speaks about “counterproduction”	Environment belongs to economics & nat. accnts. A negative conclusion. Section 21.6.3 on NI-A
<i>English translation</i>	R: Organises action with Dutch ministers to have it published “in the national interest”, Section 21.6.2	English translation of thesis is available soon but stagnates at publisher
<i>Evolution of the notion of “correction”</i>	R: Follows suit	Hueting (1974a, 1980) advises to publish NI-A alongside NI
<i>Conservation strategy and vertical demand curve</i>	R: Organises in 1990 that environmental economists support a UNEP award	Hueting (1986b) finds the vertical demand curve. This develops over time
<i>Measurement requires assumptions</i>	R: Accepted this in the joint paper 1991	Hueting (1989b)
<i>Joint article 1991</i>	20%, mainly conclusions	80%, mainly beginnings
<i>Use of a model</i>	Developed in 1936	R: after 1992 accepts the use of a model

22.2 Tinbergen's view from physics and economics

Boumans (1992) shows that young Tinbergen in his thesis Tinbergen (1929) moved from physics to economics in a “limited transfer”, namely that Tinbergen adopted the methods and not the analogies of physics. The use of those analogies is what Mirowski (1989) evaluated as “more heat than light”. Buitenhuis (2016) in a master's thesis supervised by Boumans clarifies that young Tinbergen was familiar with the methods of thermodynamics, but there are indications that he had his hesitations about their fruitfulness for economics.¹⁷³

Tinbergen in 1926 moved onwards to business cycle analysis at CBS Statistics Netherlands. Tinbergen in official position there in 1929-1945 and also at the *League of Nations* became one of the founding fathers of national accounting alongside Keynes, Hicks, Kuznets, Meade, Stone and others, as is generally recognised see Kenessey (ed) (1994), Den Bakker (1994) in the latter volume, Bos (1992)-(2013) and Vanoli (2005). The Tinbergen & Hueting approach belongs to this method of national accounting.

After his move from CBS to CPB, Tinbergen did not stop thinking about the national accounts. However, observe that Frits Bos assumes that Tinbergen stopped such thinking, and Bos neglects the innovation by the Tinbergen & Hueting approach, see Chapter 23.

On *content*, Tinbergen must have regarded Hueting as working in the same paradigm as his own, namely of welfare economics and national accounting. There is no translation of Hueting (1967, 1968)¹⁷⁴ for English readers, but the approach is no different from Hueting (1974a, 1980) that is available and online, and that Tinbergen wrote a preface for. Thus in 1968 Tinbergen saw the identical approach and saw every reason in 1969 to advise CBS (Kees Oomens (1917-2005)¹⁷⁵) to appoint Hueting, then aged 40, for the purpose of correcting the national accounts for damage to the environment. The description of these events (Tinbergen contacted Hueting and advised CBS) is based upon testimony by Hueting, and there is no reason not to trust this. (Why would Hueting contact Tinbergen when Tinbergen had long left CBS and CPB? Why would CBS appoint Hueting (a stranger) and create a new department? How to explain the later actions by Tinbergen? Hueting's testimony makes sense.) Rejection of this diagnosis – and the non-referring to Tinbergen & Hueting (1991) – amounts to a maltreatment of Tinbergen and his considerations to support Hueting.

Thus, a major foundation in the Tinbergen & Hueting approach is both the acceptance of thermodynamics as relevant for physics (and the physical boundaries for economics), and the rejection of the very analogy for economics. Instead, the framework of welfare economics and national accounting is used. This stands in contrast to “ecological economics”, discussed in Section 21.9.10. Modeling might not generate truth but econometrics allows us to deal with uncertainty, see Section 7.4.

Mainstream environmental economists like David Pearce (1941-2005) and Nordhaus (Nobel Prize in economics 2018) use the methods of the calculus of

¹⁷³ <https://tinbergenletters.eur.nl/Letters/letter-to-pikler/>

¹⁷⁴ <http://www.sni-hueting.info/NL/Publicaties/1968-03-20-Welvaartsparadoxen-ESB-2636-p263-264.pdf>

¹⁷⁵ <http://www.roiw.org/2006/2006-17.pdf>

variations, which Tinbergen used in his thesis and still in Tinbergen (1956), but the Tinbergen & Hueting approach is based upon the IUCN, UNEP and WWF (1980) “*World Conservation Strategy: living resource conservation for sustainable development*”, that uses the precautionary principle, and that allows the simpler condition that the vital environmental functions for the year of statistical observation must not be less at the end than at the beginning of the year. For statistics the use of the current state of technology and a zero rate of discount are obvious assumptions.

Tinbergen never learned matrix algebra (personal communication 1991) and at some point thus stopped reading the more mathematical developments in input-output analysis for the national accounts. Since 1969 he had made sure that Hueting at CBS worked on the environment and thus his own mind was free for other issues. Tinbergen (coord.) (1976) *Reshaping the International Order* mentions the environment as an important category but Tinbergen felt no need for himself for explicit modeling on the environment, like he did for inequality and education, except for a case like Tinbergen (1990) on the environment that was accepted by Hueting and incorporated in the Tinbergen & Hueting approach.

Tinbergen (1985:192) overviews the optimal order, and mentions employment as goals 1 and 2 (international redistribution), and the environment as 3. (This fits with my order.) This publication however indicates his growing attention for security and military spending. However, he doesn't refer to Hueting, and only refers to Tobin & Nordhaus (1972), and not to later works by Nordhaus on the environment. We can make sense of this by observing that Hueting in 1985 still only had the negative conclusion of his thesis, and that Tinbergen possibly (overly) relied upon Hueting for the environment and did not look much at other authors on the environment.¹⁷⁶ Hopefully the Tinbergen archives can at some time indicate how often Hueting informed Tinbergen about his progress and articles, and my expectation is that this will be quite limited given Hueting's modesty.

Tinbergen (1991) looks at the social welfare function, using the tools that he has available. Econometrically it makes perfect sense that Tinbergen can look at welfare for planning while Hueting looks at income for statistics, see Section 9.2. Given that Tinbergen (1991) spends an entire section to the topic of security it seems that his focus at that time was more directed at the arms race after the Fall of the Berlin Wall in 1989. However on page 12 he still mentions: “sovereignty in polluting the atmosphere or the rivers”.

Around 1990, Hueting must have informed Tinbergen about his finding since 1986 of the vertical demand curve. Tinbergen subsequently took the initiative to get Hueting nominated by environmental economists for a UNEP prize.¹⁷⁷ Hueting initially refused but Tinbergen then asked: “You want that your work is being read, don't you ?” (paraphrase) Subsequently, the economists at World Bank asked Tinbergen and Hueting to contribute a paper for the Earth Summit in Rio 1992, which became Tinbergen & Hueting (1991). This is not just a paper but a major

¹⁷⁶ This is a hypothesis. More research in the Tinbergen archive and perhaps Bayesian techniques can give more clarity about this and other hypothesis in this Chapter.

¹⁷⁷ <http://www.sni-hueting.info/EN/Others/2019-05-02-Tinbergen-1990-UNEP-Sasakawa-Hueting.pdf>

step forward for our thinking about economics and the environment, see Donkers (1992) in NRC-Handelsblad.¹⁷⁸

22.3 *Hueting's view from economics and jazz*

Around, say, 1949 at age 20, Hueting had highschool diplomas for gymnasium alpha (languages) and beta (physics and math) and might have decided to develop his skills in mathematics. If he had done so then he had become an econometrician, and then he could have singlehandedly opposed the confusion of mainstream economists like Pearce and Nordhaus as if the calculus of variations were required. Instead Hueting started his dual career in playing the piano and leading the Down Town Jazz Band. If the world of 1950-2020 can be compared to the Titanic then an unflattering picture shows Hueting playing the band while the ship is sinking. This does not apply however since Hueting did develop the economics and statistics that were required to avoid the icebergs. It were the other economists who were not paying attention.

In Holland, Hueting gained the support by Tinbergen, Hennisman and Pen, at that time the leading economists in the field of welfare theory or national accounting. Economic statisticians at CBS Statistics Netherlands however stuck to their conventional point of view, see Chapter 11. Hueting was too modest – or afflicted by the Stockholm syndrome with too much allegiance to his intellectual captors – and relied upon the inner processes at CBS, instead of explaining to these leading outside economists about the CBS mishap and the need for countervailing mass and balance.

Asked for his views, Hueting on November 5 2019 acknowledges:

- He is focused on his work and not on the work by Tinbergen.
- He regards Tinbergen's support for his work only as support for his work.
- He sees how elements of his work are in support of some of Tinbergen's work, but he has no idea how there might be an aggregate notion of how his work would support work by Tinbergen.
- He is thankful for Tinbergen's support but doesn't think that Tinbergen would require defending.
- Hueting once told Tinbergen about the adversity against his work. He sees Tinbergen's reaction as support, and he does not yet see his work as fitting in with Tinbergen's "grand scheme of things":

"Tinbergen told me: "Calmly continue with giving your arguments. You are on the right track."¹⁷⁹ This is a quote that I remember well and that has provided encouragement many times."

In sum: as outsiders we can observe that Hueting has too little distance from the situation to be able to observe the Tinbergen & Hueting approach.

Hueting is no econometrician like the present author, who has studied the work by Tinbergen. In my view Tinbergen indeed needs some defence here.

¹⁷⁸ Donkers, H. (1992), "Hueting vindt methode voor berekening duurzaam Nationaal Inkomen;"Productiegroei is de kern van het milieuprobleem", NRC Handelsblad 9 januari, <https://www.nrc.nl/nieuws/1992/01/09/hueting-vindt-methode-voor-berekening-duurzaam-nationaal-7128643-a1001615>

¹⁷⁹ Dutch: "Ga rustig door met argumenteren. Je zit op het goede spoor."

The Tinbergen & Hueting approach in fact also requires some defence against the incomprehension by Hueting for the position of Tinbergen.

On the issue of how Hueting's work supports Tinbergen's work – for which Hueting did not have an aggregate notion – the diagnosis plainly is: by providing the scientific base for sound policy advice on environmental sustainability. Tinbergen had been thinking about the environment at least as long as Hueting but was in need for a firm base within economics to be able to say more on planning. With the result by Hueting, it was an important inference for Tinbergen that the national statistical offices of the world now could become providers of the relevant information for the environment too. We have no explicit statement by Tinbergen to this effect, but his support *on content* allows us to complete the logical implications, that Tinbergen in 1991 surely must have seen.

22.4 *On the role of norms and standards*

There is an aspect of sociale welfare maximisation that might cause conceptual problems for some authors. With his background in physics, Tinbergen is used to think in terms of maximisation or minimisation, see Tinbergen (1929). For economic policy making, it is relevant to have targets. It is important to be aware that Tinbergen does not impose his own norms but only formulates advice for governments. At the same time, Hueting's development of standards for environmental sustainability perfectly falls within this way of thinking.

It is remarkable that Frank den Butter, and econometrician, for some years head of the Tinbergen Institute and for some years chairman of the KVS that organised the Tinbergen lectures, classifies the environmental sustainability standards in the Tinbergen & Hueting approach as "politics", see Chapter 39, and thereby blocks the approach, and keeps himself unavailable to discuss criticism.

22.5 *Let historians not just tally encounters and citations*

For history writing about the Tinbergen & Hueting approach, historians might be tempted to tally personal encounters and citations as criteria for the joint involvement. The number of personal encounters need not be relevant though. Einstein and Hilbert met only for a seminar of six days and still produced a breakthrough.¹⁸⁰ In our case, the Tinbergen & Hueting (1991) paper is not a breakthrough on content, but a culmination of a long commitment along the same paradigm of research. The article was no initiative by its authors but was caused by invitation by others. Economics might be different from physics again. Also the small number of references by Tinbergen to Hueting is no criterion, see the explanation given above. The judgement about the existence of a Tinbergen & Hueting approach thus must be made upon content, with in addition **Table 19** as evidence of commitment.

22.6 *The meaning of the term "contribution"*

Cornelisse and Van Dijk (2006) present "a brief survey of [Tinbergen's] many contributions to economics". They focus on Tinbergen's *original* contributions, often pioneering work. They also mention other activities like the directorship of

¹⁸⁰ <https://medium.com/cantors-paradise/einstein-and-hilberts-race-to-generalize-relativity-6885f44e3cbe>

CPB but the emphasis lies on what Tinbergen did originally himself. They refer to 18 works authored by Tinbergen himself and only 1 volume co-authored with someone else (J.J. Polak). They do not mention Tinbergen & Hueting (1991).

In the Tinbergen & Hueting approach we may indeed make a distinction as to what author contributed originally himself. Apart from Tinbergen's participation in the creation of the national accounts, modeling and the framework for statistics versus planning, the innovations for the environment were original contributions by Hueting. Thus one might say that Tinbergen had no own contribution on the environment, except for Tinbergen (1990).

However, Tinbergen (i) facilitated, (ii) understood and (iii) supported Hueting's innovations, and (iv) ranked the environment as one of the top issues that needed to be cracked. Tinbergen & Hueting (1991) can be seen as a contribution by Tinbergen too, not as an "original contribution" in above sense, but as a judgement with appreciation of a breakthrough within economics. It is like any other paper with a junior and senior author, for who one accepts such commitment.

For the Heckscher (1879-1952) – Ohlin (1899-1979) theory we find a similar age difference of 20 (rather than 26) years. Investopia: ¹⁸¹

"The primary work behind the Heckscher-Ohlin model was a 1919 Swedish paper written by Eli Heckscher at the Stockholm School of Economics. His student, Bertil Ohlin, added to it in 1933. Economist Paul Samuelson expanded the original model through articles written in 1949 and 1953. Some refer to it as the Heckscher-Ohlin-Samuelson model for this reason."

For H-O-S there is reason to speak about a *theory* since the whole setup concerned theory. In contrast we see that Hueting embeds his contributions within the empirical framework provided by Tinbergen (and also extends the framework by showing that the environment belongs to the subject matter of economics and thus also the national accounts). So we may say that Hueting presents a theory but the whole still makes for a Tinbergen & Hueting approach. It was entirely *correct* that Tinbergen was co-author.

22.7 The Tinbergen & Hueting approach requires defence

Originally, this book identified the Tinbergen & Hueting approach as a logical and straightforward observation and assessment based upon the *content* of Tinbergen & Hueting (1991). For econometricians the approach is a no-brainer. It enhances clarity when the approach is recognised as a unified whole, and not just as haphazard word-smithing by two economists (supposedly, by co-incidence, in The Hague with a common background at CBS Statistics Netherlands).

After this identification on *content*, we subsequently observed that the Tinbergen & Hueting approach was maltreated by numerous authors, see some Chapters above and the subsequent Part 4 below. Critics hardly ever refer to Tinbergen & Hueting (1991) and almost always focus upon other works by Hueting. (At VU Amsterdam there appears to be the special manner of referring as mentioned in Section 9.5.) Deconstruction of the criticism shows that it actually is maltreatment. The maltreatment apparently *includes* a removal of Tinbergen's support from the

¹⁸¹ <https://www.investopedia.com/terms/h/heckscherohlin-model.asp>

collective understanding of $eSNI$ and $e\Delta = NI - eSNI$. Section 7.9 on the history writing on GDP forced us to distinguish *conventional* and *traditional* history writing. Something appears to be seriously amiss here.

Thus, (i) there is not only a Tinbergen & Hueting approach on *content*, and (ii) there is not only good reason to defend Hueting and the support that he got from Tinbergen, but (iii) there is actually much more reason to defend Tinbergen against maltreatment afflicted upon the Tinbergen & Hueting approach. Such maltreatment directly applies to Tinbergen's own views on the importance of the environment and how to deal with this in economics, statistics and planning.

22.8 Conclusions

Key conclusions are:

- (1) There is a Tinbergen & Hueting approach, as identified here.
- (2) To identify the Tinbergen & Hueting approach it suffices to look at the content, and for econometricians it is a no-brainer. It may help however that this Chapter (i) has highlighted the long term commitment by Tinbergen since 1968, and (ii) has explained the phenomena (iia) that Tinbergen refers so seldomly to Hueting's work, and (iib) that Tinbergen by 1991 may have been too old to also write a joint book on this (like earlier with Pen on inequality).
- (3) We must distinguish Tinbergen's advices on targets for policy making like for example in Tinbergen (coord.) (1976) (with also his attention for the environment) from his *economic analysis*, that for the environment in 1991 finds expression in the Tinbergen & Hueting approach. Maltreatment of this approach not only applies to Hueting but also to Tinbergen.
- (4) We should not give researchers an excuse for not referring to Tinbergen & Hueting (1991) and for neglecting the implications from the Tinbergen & Hueting approach.

An example of the latter would be the Alleingang scenario as discussed in Section 21.9.12. We criticised this mainly as a misrepresentation of $eSNI$ but in proper perspective it is a misrepresentation of the Tinbergen & Hueting approach, and its perpetrators should also be criticised for misrepresenting Tinbergen's intellectual legacy. The definition of $eSNI$ is clear and Tinbergen would not have made the error that the IVM team made here, and what they use to suggest that the definition would not be clear. Observe that the IVM team knew about the existence of the Tinbergen & Hueting (1991) paper, because Hueting & De Boer in the same volume Verbruggen (ed) (2000) refer to it.¹⁸²

Another example is that Tinbergen & Hueting (1991) clearly point to the necessity of making the measurement of national income conditional to assumptions on preferences on environmental sustainability. This is a revolution in economic statistics. In a *Handbook on Measurement in economics* Frank den Butter however neglects this, though he knows about the article, see Section 39.13.

¹⁸² <http://www.sni-hueting.info/EN/Others/2000-Verbruggen-ed-O00-10.pdf>

23. *Frits Bos on national accounts, history and learning from the past*

Bos worked at CBS Statistics Netherlands in 1986-2000, with a spell at Eurostat in 1993-1995, and since 2001 he is at CPB. Starting at CBS, Frits Bos wrote about national accounting and its history, also at CBS. Readers might appreciate his work for its insider view. Its main value might be indeed that Bos's work highlights the conventional view at CBS, which has evicted eSNI outside of its office. Even though CBS expresses appreciation for both Tinbergen and Hueting separately, it neglects the support by Tinbergen for Hueting, and Bos follows suit.

We distinguish the (inclusive) traditional and the (exclusive) conventional views about national accounts and their history, see Section 7.9. Jan Tinbergen (1903-1994) helped create the UN system of national accounts (SNA) but the Tinbergen & Hueting (1991) paper is so devastating to the SNA w.r.t. the relation of the economy to the ecological challenge that national accountants should take notice. Frits Bos never referred to Tinbergen & Hueting (1991) and even in March 2019 he had not read it yet. This work reflects the (exclusive) conventional view and not the (inclusive) traditional view.

Section 7.9 already reviewed some key aspects about Bos's background and writing about national accounts and their history. We already looked at Bos's works of 1992, 1995, 2003, 2006, 2007, 2008, 2011ab, 2013. (i) His writings are basically about national accounting and we should not be distracted by the attention for history too, for his works are not for the purpose of history only. If historians think that history must be written in inclusive manner then Bos's work on history must be retracted anyway. (ii) His work at CPB since 2012 in Cost Benefit Analysis (CBA) would have warranted attention for the Tinbergen & Hueting approach anyway, but his predisposition apparently still blocked interest. This corroborates that he in 2019 still hasn't studied the Tinbergen & Hueting approach, see Chapter 44.

Section 21.10.5 already mentioned the theses at CBS by Bos (2003) on national accounts in general (but rather excluding the environment) and De Haan (2006) on "measuring environmental pressure in a national accounts framework". Both theses gave the Ph.D. title *sec* without stipulating an area of research, though thesis supervisor Bert Steenge was professor in economics (then Twente). Thus also Bos's Ph.D. title does not particularly prepare him for writing history, even though the thesis title suggests such. Though the thesis shows attention for history writing, the topic actually remains economics and national accounts proper, and history is somewhat on the side for which there might not have been separate training. Neither Bos (2003) nor De Haan (2006) refer to Tinbergen & Hueting (1991). We can diagnose a situation that CBS valued Tinbergen but had insulated itself against a line of thinking by Tinbergen about the national accounts, and that researchers found an external professor of economics to give his blessing. With my personal memory of Steenge from my student days (then Groningen) as a teacher involved in mathematical economics (and in particular input-output analysis) instead of practical econometrics, I can well imagine that Steenge had no particular background on the Tinbergen & Hueting approach and would not

oppose views also supported by his contact Keuning at CBS. Perhaps professors first require a thesis in the field for which they supervise Ph.D. students.

Here we will further deconstruct some works including Bos (2017) who still adopts the conventional view and wants to learn from the past to draw lessons for the future. After Bos (2003) that hardly referred to the environment, Bos met with a growing challenge by the environment. In 2006 and 2008 he referred to Hueting but incompletely. Bos (2017) apparently did not realise that once he started with mentioning the issue of “sustainable development”, he then embarked upon the research area of his (former) CBS colleagues Tinbergen and Hueting, so that he should first study their work before reporting about it. Instead he remained within a convention that ignored it. In this manner, Bos (2017) is biased and quite incomplete and misrepresentative about both past and prospects for the future. It should be retracted and not remain in the scientific record.

23.1 *Evaluation upfront of the findings below*

Below we will look at aspects in more detail but the concluding evaluation can best be mentioned upfront.

I have long doubted whether retraction of Bos’s papers would be the right measure. With doubt, he would have the benefit of the doubt. The non-mentioning of the Tinbergen & Hueting (1991) article however is so serious, with such serious consequences, that this doubt however disappears, and becomes the certainty that these papers starting from 2006 onwards should be retracted. Basically the earlier papers and the thesis of 2003 should also be retracted but there is an aspect of leniency that is clarified in that section below.

While there is an abundance of both environmental economists and national accountants who misrepresent or neglect $eSNI$ and $e\Delta = NI - eSNI$, Frits Bos provides us with a rather rare case because of his *additional* interest in the history and methodology of the national accounts, which indeed resulted in his correct but incomplete report in 2006 and 2008, see Section 7.9. His analysis suffers from his conventional view but is not inaccurate for this conventional view. While Bos was present at CBS since 1986 during the creation of the Hueting revolution in national accounting since 1969, Bos did not see it, perhaps because he was looking for the *history* of the conventional view. For Bos, the topic of the environment was apparently something like “unpaid home work” instead of an issue of ecological survival with the IUCN, UNEP and WWF (1980) “*World Conservation Strategy: living resource conservation for sustainable development*”.

Nevertheless, by not mentioning Tinbergen’s support for Hueting’s findings, Bos misinformed Boumans, Coyle, Vanoli, Den Butter, and others. If Bos had mentioned the Tinbergen & Hueting (1991) paper, and then stated that he would not further look at that line of research, then readers of his conventional analysis (including his additional history writing) would have been informed that he only reported about a partial and conventional approach, and they would have had the information to allow them to look themselves into that other line of research, favoured by Tinbergen.

Instead Bos failed as a national accountant (and additionally as a history writer though not trained as a historian) by not properly mentioning and describing the Tinbergen & Hueting approach and Hueting’s innovation. His silence on

Tinbergen's support and incomplete discussion of Hueting's finding – and curious reference to the *chapter* Verbruggen et al. (2000) but not the whole *report* Verbruggen (ed) (2000) – turns his papers into incorrect research on national accounts. (And in addition, perhaps intended to be about history, also into incorrect history writing.)

If Bos could finally see this and repair the error, then this perhaps would not require a retraction of the papers since 2006: but then those papers would still be in the scientific record, and might still misinform researchers. Thus a retraction would be necessary, while this retraction should not be made dependent upon Bos's own view about this biased research.

Perhaps Boumans and Morgan in their historic capacity might provide an avenue by writing an overview article (perhaps with Bos) to set the record straight for the wider readership, not only national accountants but also its historians.

The following discusses the evidence for above evaluation. It looks at some of the publications in more detail. Let us start with the thesis of 2003.

23.2 The thesis Bos (2003)

Bos arrived at CBS in 1986. The thesis Bos (2003) "*The national accounts as a tool for analysis and policy; past, present and future*" also accumulates various papers over the previous period. One of his questions is (p77): "Domestic Product and economic growth as yardsticks of welfare?" We are reminded immediately about the thesis by Hueting (1974a, 1980) "*New Scarcity and Economic Growth: More Welfare Through Less Production?*". Normally, with both authors Hueting and Bos having a base in CBS with an overlap in 1986-2000 (Hueting continuing as adviser till 2000), and with a younger researcher normally referring to work by the precursors, it is almost inconceivable that Bos (2003) doesn't refer to Hueting. Still, the thesis mentions neither Tinbergen & Hueting (1991) nor any work by Hueting. The issue of the environment is hardly mentioned, though there is reference to NAMEA and UN SEEA. The words "sustain" and "development" are used, but not "sustainable development". The thesis might be seen as being written in a separate line of research without much awareness of the environment, and definitely no awareness of the challenge in ecological survival. The list of "specific topics" (p ii) doesn't mention the environment indeed. For Bos (2003) the environment is an issue like "unpaid home work".

One might presume that his thesis supervisor might have agreed not to write about too many subjects at the same time. It remains remarkable that there is no reference to Verbruggen (ed) (2000) and the ESB reporting around that time, but such might be parallel events in 2000-2003 that a Ph. D. student might have no time to be aware of. However, Bos (1992) and (1995) already made the early choice to adopt the approach by Keuning. For Bos a reference to Keuning sufficed and he apparently saw no need to re-evaluate the discussion with a reference to Tinbergen & Hueting (1991) nor Hueting himself.

23.3 A consideration to accept the thesis as it is

The evaluation of the thesis Bos (2003) causes that it must be retracted as well, but there is a consideration for leniency. There is a difference between a victim and a perpetrator. When Bos arrived at CBS in 1986, it had a research community

that produced misrepresentation upon misrepresentation about the Tinbergen & Hueting approach. The period 1986-2003 may be regarded as a learning phase. Economics as a field requires some ripening of the mind. Bos had the additional ambition to look at the methodology and history of national accounting, that required additional research that would have distracted him from the issue of ecological survival and the exceptional revolution by Hueting. Bos might have selected a less ambitious subject to write a thesis, and be done with it. The retraction of Bos (2003) would punish this wider scientific interest and strip him of a Ph.D. title which comes across as too tough. If we accept 1986-2003 as a learning phase then we look at the subsequent period, when Bos had achieved a position as established researcher. We may accept that the real problem is that the progress after 2003 was insufficient.

23.4 A bit more on 2006 and 2008

Section 7.9 already criticised Bos (2008). Bos (2008) is quite similar to Bos (2006) published in *Statistica Neerlandica*, thus with the same criticism. We may elaborate the following points on 2006 and 2008 where conventional and traditional views on national accounts differ:

(i) Bos refers to the *chapter* by Verbruggen et al. (2000) in the *report* Verbruggen (ed) (2000), and not to the report as a whole. For the view of Hueting on eSNI, Bos refers to Hueting in Costanza (ed) 1991, which is important because of its early date, but this book is relatively difficult to get in 2008, and also not very recent. Why does Bos not refer to Hueting & De Boer (2000) in the report by Verbruggen (ed) (2000) too ? This chapter by Hueting & De Boer also refers to Tinbergen & Hueting (1991). Why doesn't Bos allow readers to see the link to Tinbergen & Hueting (1991) ?

(ii) Verbruggen et al. (2000) create "four variants" but Hueting & De Boer protest against the Alleingang scenario. (Apparently their chapter was written before the Verbruggen scenarios were made available, and this protest existed in 2000 but is only recorded at a later date.¹⁸³) In 2006 or 2008, a reporter should have indicated the problem with the Alleingang scenario. Bos didn't. Why not ?

(iii) Bos (2008): "The Dutch environmental account (see e.g. De Haan and Keuning, 1996 and De Haan, 2004) and time use account (see e.g. Kazemier and van Exel, 1992 and van Rooijen-Horsten et al., 2004) could be viewed as a response by CBS Statistics Netherlands to the welfare-oriented critique. Note however, that in both satellite accounts no alternative national income concepts are measured (e.g. green national income or national income including unpaid household services)." If this allusion to critique also includes Hueting, then it is problematic that it is classified as "welfare-oriented critique", since one component of Hueting's criticism concerns welfare and another component concerns the calculation of income. Hueting also presents a practical methodology for the calculation of a well-defined concept of income, namely eSNI. Thus it would have been proper for Bos to report about the internal discussion within CBS with the arguments pro and contra eSNI and NAMEA, and what caused the decision.

¹⁸³ <http://www.sni-hueting.info/NL/Documentatie/2005-05-31-Brief-JvdBergh-PrijsverhoudingBuitenland.pdf>

23.5 *Some fallout*

Section 7.9 mentioned authors who referred to Bos. In Section 11.7 we discussed Vanoli (2002, 2005) referring to e.g. Bos (2006).

Subsequently, we found Bos advising Den Butter in Section 39.13 in a chapter for a *Handbook on measurement in economics* (according to Hueting: also including the environment), and Bos (2013) partaking in this paradigm on measurement but again neglecting the Tinbergen & Hueting approach. Marcel Boumans (1992) had a special interest in Tinbergen's intellectual journey and Bos wrote a history that basically did not inform Boumans about Tinbergen's later development on this.

Since 2012 Bos has been involved in Cost Benefit Analysis (CBA) also on the environment, see Chapter 44. However, Bos's predisposition concerning Hueting affects his results significantly, for he still does not take account of the findings by traditional history writing that appreciates the Tinbergen & Hueting approach. At CPB and PBL, Bos & Ruijs (2019) on biodiversity thus is quite deficient in terms of environmental sustainability.

23.6 *An email exchange in October 2013*

In 2013, I met Bos at an economic research convention, and we exchanged some views. I followed this up with an email of October 19 2013. I expressed my appreciation for his work and my enjoyment in reading it. This appreciation remains important to emphasize in 2019, for we have at least information about conventional national accounting. I subsequently expressed my surprise, and I provided various links, like to Tinbergen & Hueting (1991). For this present book it is important that Bos thus has been informed since 2013 about the existence of Tinbergen & Hueting (1991).

In Section 7.9 it was reported that Bos still had not read Tinbergen & Hueting (1991) in March 2019.

In October 2013, apart from providing these links, my key statements were:

"I have been very surprised that you did not embrace Roefie Hueting's analysis. In my analysis, people can understand 99% of the analysis but are wrong at 1%, but each at a different percentage. My request to you is whether you want to make an effort to find the pain points with you and to communicate about them so that they can be removed in a conversation. (...) What I now read from CBS Statistics Netherlands staff Hoekstra and Smits, in particular "Measuring sustainable development and social progress: Overview and Conceptual Approach", CBS 2011, I consider straying from the path, based on disinformation about Hueting's work. (...) We both observe that there are many indicators, and that it depends what you want with policy. The current government is again focusing on sustainability. I would advise you then to evaluate the different indicators. As you know, welfare theorists and national accountants such as Hicks, Tinbergen, Meade, Stone, ... arrived at the notion of income at the time. I would be a little surprised if you, with your love for the National Accounts, came to something other than eSNI (Dutch mDNI). But I would appreciate it if you would attempt to evaluate those indicators and would like to have

an open conversation about them. (...) Incidentally, I did not claim that eSNI is perfect like the usual definition of a circle. It is work in progress just as NI is. NI is also based on assumptions, and even the meaning of NI is based upon assumptions.”

Bos replied on October 28 2013, and his key statement was (my translation and footnotes, and my italics for the core statement):

“As I have already stated, the idea of making a correction ¹⁸⁴ to national income for environmental damage is not in itself very special or interesting. ¹⁸⁵ It is important to know that national income is not a good measure of welfare and what major distortions there are, in which substantial respects and for what types of use. Such a correction falls in the large category ¹⁸⁶ of assessed figures in the national accounts; this includes various conventions, such as the assessment of home ownership and how to measure the production of the government and the banking system. This could also include a possible convention on the valuation of unpaid domestic work and voluntary work. Such conventions are useful to get a rough first impression of the economic importance (and the change over time), but actually do not have very much use seen by themselves: for analysing the housing market you can do little with the size of the assessed figure of own home ownership, to analyse the role of the government as a producer or the banking system you need very different and extra information to make even a begin of economic analysis. According to me, ¹⁸⁷ the same applies to Roefie's correction: *for economic analysis of the environment and economy and for the policy choices that play a role, it is not very relevant*. [my italics] That is the last thing I am going to comment on here. I will not delve deeper into his work. Every day many interesting papers and books are written and I am fully occupied with research that I want or have to finish. ¹⁸⁸”

Given the latter statement with rejection of the proposed conversation, I didn't send Bos a rejoinder. Now in 2019, my comments on the core statement (italics) are: (i) For someone who values national accounting so much, it is remarkable to see that national accounting is judged to be “not very relevant”. If ecological survival is “not very relevant” then what is ? (ii) Tinbergen in 1969 deemed the

¹⁸⁴ The use of the term “correction” might suffer the confusion that NI would be replaced by eSNI, while the purpose actually is to find $e\Delta = NI - eSNI$ as an environmental indicator only, namely the distance to environmental sustainability.

¹⁸⁵ Indeed, the notion of “correction” is very common to economists who use the national accounts. In my message to Bos I had explained to him that I was at CPB in 1982-1991, and thus it is somewhat surprising that he gives this long explanation with the mentioned examples. Current readers however might benefit from those examples.

¹⁸⁶ A category mistake. The economics of ecological survival is not the same as unpaid domestic work. Bos might not belong to the economists who are aware of the ecological challenge, or sees other indicators as more relevant. The Tinbergen & Huetting approach necessarily focuses on the national accounts since the issue is one of national accounting.

¹⁸⁷ This view by Bos was actually challenged by my October 19 message, and Bos now repeats his view, essentially neglecting the challenge and criticism.

¹⁸⁸ We all are.

correction relevant enough to advise CBS to appoint Hueting for the purpose of making the correction. CBS found it important enough to create a department of environmental statistics. Tinbergen & Hueting (1991) show the relevance. The environmental data were already transformed into NAMEA to link up better with the national accounts. The UN has created SEEA. We are only speaking now about the last step of turning a long list of economic and environmental variables into a coherent $e\Delta = NI - eSNI$, which can be done by five researchers, see Section 20.6 for a cost calculation. (iii) The Tinbergen & Hueting approach is that policy makers and the general public require $e\Delta$ alongside the figure for production growth (often erroneously called “economic growth”) in order to balance their priorities. Why withhold this information? It has never been suggested that other indicators (like CO₂ emissions) would no longer be needed. But $e\Delta$ better clarifies that the figure of production growth rather indicates the rising of costs. (iv) For specialists and particular choices in policy making, the modeling exercise generates much information about details.

23.7 An email exchange in March 2019

On March 19 2019, I had informed Bos about the draft of Hueting & De Boer (2018b). I also informed him about some criticism about his 2008 paper, basically the same as stated above. In his reply of March 20 2019, Bos translates his earlier “not very relevant” into *some relevance*. Apart from indicating (quoted in Section 7.9) that he now intends to read Tinbergen & Hueting (1991) when the occasion would arise in a future when he looks at national accounting again, he also states (my translation and footnotes):

“- an additional economic growth concept that corrects for depletion of raw materials (e.g. for a country like Saudi Arabia ¹⁸⁹) and possibly also damage to natural capital, such as forests, seems to me useful in practice as an extra “side light” given the many misunderstandings with GDP. See my paper “*Uses of national accounts from the 17th century till present and three suggestions for the future*”; [Bos (2017)]

- correction for environmental damage such as emissions of CO₂, particulate matter and the like does not fit in with the basic system of the National Accounts. But it is of course useful and important to monitor, monetise, analyse the scope of such environmental damage and look at different policy alternatives. This also happens in the Netherlands, see for example the work of PBL [link ¹⁹⁰]. Analyses of policy alternatives are amongst others by CE Delft, DNB, PBL and CPB.

Hueting has done useful work and that is why I refer to his work. But (... for example) look at the number of quotes about his work, the number of times his articles are read in researchgate, and his role in standard

¹⁸⁹ In 1959-2019 Holland has basically depleted its natural gas reserves in the Groningen field, and it is curious that Holland is not mentioned as an example case. Costs of the depletion are current earthquakes in the area, of course the CO₂ emissions, and perhaps all the redundant investments in gaspipes, industrial furnaces and home heaters.

¹⁹⁰ No longer operational: <https://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2018-monetaire-milieuschade-in-nederland-3206.pdf>

textbooks on environmental economics.¹⁹¹ Also for work such as the monetisation of environmental damage in the Netherlands as now by PBL, he has not played an important intellectual role: it is simply cf. Pigou's ideas and his levy on external effects, i.e. measuring emissions and multiplying them by shadow prices."

Comments: (i) If Bos accepts some estimate for $x\Delta$ then he implicitly also accepts $xNI = NI - x\Delta$. Thus the discussion has shifted to what must be included in $x\Delta$. Would Bos accept that many nations and agencies have expressed an interest in the notion of "environmental sustainability", starting with the formulation by IUCN, UNEP and WWF (1980) "*World Conservation Strategy: living resource conservation for sustainable development*" ? (ii) The PBL link is to Vollebergh & Drissen (2019) who find a monetary cost of some 5% NI. Tinbergen & Hueting find 50-30% NI, as confirmed by the IVM team, see Chapter 4. Bos knows these estimates and somehow overlooks the fundamental difference in size, unworthy of basic econometric sense. (iii) It is true that the calculation of eSNI and e Δ can be presented in the Pigovian scheme of multiplication with shadow prices, but the choice for the realm of national accounting has been deliberate, since it makes for easier comprehension of the indicators. The complexity in the actual calculation lies in the derivation of the environmental standards (executed mostly by De Boer, with advice by Dutch specialists) and actual modeling (executed by the IVM team). Apart from initiating and causing it to happen, and supervising this, Hueting's theoretical contribution for economics and economic statistics lies in more aspects, including the innovation of the conditionality in measurement, see Chapter 19 for a nutshell description of this contribution.

Again Bos propounds a view on the Tinbergen & Hueting approach while not having studied it (and declining a willingness to study it, except now for Tinbergen & Hueting (1991) at some future moment).

23.8 Bos 2017 in *Eurona*, journal of Eurostat

Bos (2017) is "*Uses of national accounts from the 17th century till present and three suggestions for the future*", published in *Eurona*, a non-partisan scholarly journal of Eurostat. Bos again performs *conventional* history writing, excluding the Tinbergen & Hueting approach, instead of *traditional* history writing that would be open to this approach, see this distinction made in Section 7.9. While Bos refers to Tinbergen's 1936 model, he does not refer to Tinbergen & Hueting (1991), and thus he buries a key contribution by Tinbergen on national accounting. Bos (2017) does not refer to Hueting at all. Bos's readership might think that Bos with his background in CBS and CPB has insider knowledge about the Tinbergen & Hueting approach, so that his silence on that approach indicates a measured judgement that it would be irrelevant. Bos seems unaware of this risk, or does not care, or it is precisely what he wants. Yet we have seen that he had been informed about the existence of Tinbergen & Hueting (1991) at least in 2013.

Proper would have been to take the wide scope. If he wanted to further neglect Tinbergen & Hueting (1991), then he could have referred and have stated

¹⁹¹ Apparently Bos doesn't consider criticising environmental economics for neglecting Hueting's work.

explicitly that he would not discuss it because it is not conventional for national accounting. Though the conventional accounting and its history can be appreciated for its information about itself, Bos (2017) does not inform his readership about this selectiveness, and thus the article fails.

In addition, the article suffers from a category mistake that such selective conventional review might really provide answers for a future. Jan Tinbergen was fond of drawing lessons from the past but his learning was future-oriented. Whatever our ancestors did with their numbers, mankind must now take stock of its current issues, and see what statistics can be used to turn data into information. History shows that ostriches put their heads in the ground but it is curious to learn from this that we can do so even better in the future.

Bos (2017) refers to the issue of “sustainable development” but without definition of what “sustainability” would entail. Bos uncritically refers to other authors who without proper definition write about “sustainable development”. This suggests that he hasn’t studied this section of the literature, which fits his lack of interest in the work by Hueting. It is actually Hueting who for the first time since the vagueness by the Brundtland Commission provided a practical definition for the notion, namely by deriving standards for environmental sustainability.

Bos (2017:57) refers to Stiglitz et al. 2009, and relays the (vague) statements “Net Domestic product adjusted to record natural resource depletion as depreciation” and “Compiling national balance sheets for financial and non-financial assets, including natural resources, is also essential for measuring current well-being and sustainability”, which statements are vague since this is precisely the discussion that started around 1965, with questions like what should count as “natural resource” (an environment without micro or nano plastics ?) and how it should be valued (at what rate of discount ?) and how a depleted resource must be depreciated (if it rises in value because of depletion ?), and such. Before Bos publishes on such issues, and before he becomes competent to criticise Stiglitz et al. 2009, he is advised to read up on this part of the literature, starting with the Tinbergen & Hueting approach, that cuts such discussions short with a practical solution approach.¹⁹²

Bos (2017:58) relays this recommendation:

“A dashboard of indicators should be used to measure sustainability. The economic component of sustainability should be captured by monetary aggregation on items for which reasonable valuation techniques exist, such as physical capital, human capital and certain natural resources. For the environmental aspects of sustainability, there is a need for a clear indicator of our proximity to dangerous levels of environmental damage, like climate change or the depletion of fishing stocks.”

This sounds reasonable but again Bos suggests a simplicity where there is none. Sometimes a historian (or a researcher with an interest in history) may fall

¹⁹² Readers might need to be informed that I am allergic to historians who haven’t first learned a proper vocation before writing the history of that vocation. I respect Bos for his writing about conventional national accounting and its history, but reject his assumed competence on issues pertaining to the environment. I myself am no environmental economist and no historian, and only deconstruct what I read about this.

into the trap of thinking that a reference to others is sufficient so that it would no longer be required to think about an issue. In this case Stiglitz et al. 2009 require serious deconstruction. The distinction between “sustainability in general” and “environmental aspects of sustainability” is dubious when the original issue concerned the environment, and other actors have polluted the issue by inserting other topics like human capital and what have you. More machines and more education cannot substitute for ecological collapse. In the calculation of eSNI not two but some ten environmental aspects were included, while the important issue of space wasn’t tackled yet, see Verbruggen (ed) (2000) and Hueting & De Boer (2019b). For comparison over time and nations (with quite variable regions), “dashboards” have bewildering complexity, while policy makers and the general public require a clear compass for gauging the course and a deconstruction of the present wrong compass that they are using. For the proper issue of environmental sustainability, which is all that matters here in the Tinbergen & Hueting approach, a compass is provided by $e\Delta = NI - eSNI$. Bos (2017) however does not inform his readers that he never deeply studied eSNI but rejects the calculation of eSNI nevertheless for whatever (potentially vague) reason that he has never explained. (There may be a consideration that he thinks that Hueting has no contribution because it would only be Pigou, as if Pigou would not be relevant here.)

Bos (2017:58) states about Stiglitz et al. (2009)

“This relatively recent report was a game-changer and has already exerted an enormous influence on public debate about measuring welfare, quality of life and sustainable development. It has also changed measurement and publication practice by international organisations, like United Nations, OECD and European Commission.”

This is historically false. (i) There was already a process in these organisations, starting in the 1970s, see also UN SEEA (2003), with Hueting as a pioneer on environmental statistics and their relevance for national accounting. (ii) UN, OECD and Eurostat already published such statistics for a long while, and those are only collected now under the new fashion of a “dashboard” (without any standard whether one is driving too fast or in the wrong direction). (iii) Stiglitz et al. (2009) only formulated the growing consensus in conventional national accounting, apparently not fully informed by their advisers from the world of official statistics.

In his conclusions, Bos (2017) gives the recommendations already discussed in Section 23.7 just above. Subsequently, Bos (2017:63) states:

“National accounts statistics were not developed for measuring welfare, quality of life, inequality or sustainable development. This reflects that for such policy issues measurement in monetary terms is less meaningful and more difficult to compile reliably and often requires also totally different data sources.”

Comments: (i) This must be an implicit reference to authors who have proposed monetisation. See also Bos’s earlier statement about a “response to a critique”. It would have been proper to give a reference so that readers can check to reasoning. Now, readers are presented with an *ex cathedra* view with implicit reliance upon authority. (ii) The statement neglects a history of both practice and

theory, see Section 1.5 and Chapter 11. (iii) The measurement of $e\Delta = NI - eSNI$ indeed is more difficult, and requires environmental statistics and standards derived from the scientific literature and economic modeling, but it is not “less meaningful”. If there are issues on data and reliability then solve those issues, instead of using those issues as an excuse to continue with the conventional approach that produces misleading statistics (that indeed can be produced cheaper and more reliably).

Bos (2017:65) states what one can only agree with, and it increases our amazement that he did not look at the Tinbergen & Hueting (1991) paper yet, though informed by it in 2013:

“How we define and measure the world is how we see the world and that can affect how citizens, business and government will react and what we think that is realistic, important or how fair. Changes in national accounting rules, corporation and income tax rules, rules by bookkeeping and supervisory bodies on banking, pension funds, they matter greatly for what we see and how we act. Explaining the value added of national accounts statistics for different types of uses and their link to administrative concepts of taxation, bookkeeping and supervision should therefore be a major part in economic curricula and in the education of national accountants.”

Bos (2017:65):

“All this information can be used to discuss the merits of changing its basic concepts, adding new perspectives or of even abolishing national accounts statistics.

This however neglects Hueting’s criticism about the abuse of the term “economic growth”, see Chapter 17. It is curious to *propose a discussion* when all the evidence points to the conclusion that economists and official statistics must adapt their terminology in order to neutralise this misleading term.

23.9 Conclusion

We already put our evaluation upfront in Section 23.1 that the 2003 thesis and earlier papers may remain intact as a learning phase and that all papers after 2003 on national accounts and their history must be retracted because of incompleteness and deficiency w.r.t. the Tinbergen & Hueting approach w.r.t. national accounting and the environment.

24. Steven Keuning (1996)

Steven Keuning did econometrics in Groningen 1973-1980, joined CBS, became head of the CBS department of national accounts till 2002, with his Ph.D. Keuning (1995, 1996) at Rotterdam, then was DG statistics at the ECB 2002-2010, then there DG Human Resources, Budget and Organisation till 2016, became adviser on pensions, and retired in 2019.

Keuning (1996) is a publication under personal responsibility in Dutch for S&D, the journal for the scientific bureau of the Dutch social democratic party PvdA. The article does not have references, presumably for "legibility". It does not mention Tinbergen's support for Hueting's analysis, even though Tinbergen had been important for the world of social democrats. Though the article gives a personal point of view, it still had repercussions within CBS and upon the perceptions by Dutch politicians about what CBS was thinking, see Section 21.9.8.

In the UK, Keynes called the Labour Party the "party of the catastrophe". The Dutch PvdA is not as catastrophic as Labour, but they manage a lot. One presumes that the editors of S&D had little knowledge of the subject as discussed by Keuning. A reader notices though that Keuning argues one side of an argument. The editors could have checked what the other side was, and what they thought about the draft article. Instead they slept and allowed Keuning to present a one-sided view.

Though the article is in Dutch, we can usefully indicate some lines of argument because they keep returning in the discussion even though refutations have been given.

24.1 *Blind to the main proposal*

In his introduction Keuning (1996:479) refers to the proposal of a "green national income", found by subtracting "unpaid environmental costs" from NI. He misses that Tinbergen & Hueting focus on $e\Delta = NI - eSNI$, so that the true proposal concerns an environmental indicator. Green national income is only an intermediate stage. Those costs are not "unpaid" but inflicted upon future generations.

Keuning describes the thinking of Tinbergen and Hueting around 1969 but Keuning then misses Hueting's advancement on the topic and Tinbergen's support for this. It is true that $eSNI = NI - e\Delta$ is called *income* indeed, and it is true that this still forms a main part of the Tinbergen & Hueting analysis in order to provide for a foundation in welfare economics and national accounting, but it remains a serious misrepresentation to reduce the true focus to only the latter part.

24.2 *Politics vs science and measurement*

The argument on p479 that eSNI would be politics does not mention the conditionality in the assumptions, with the revolution in measurement of national income. This has been discussed in Section 21.9.8.2. Perhaps Keuning does not see it himself but he could have mentioned it by properly quoting the authors.

24.3 Additional indicators for welfare

Keuning (1996:480) argues that income is only a factor in welfare, and that additional variables affect welfare, like unemployment, hours worked, home work and so on. This is fine. However, the objective of eSNI is not the measurement of welfare, and it is a misrepresentation to frame the question like that.

Keuning (1996:481) repeats that the purpose of eSNI would be to develop a “partial indicator *for* welfare” (my italics). This is inaccurate. There is a distinction between “for” and “within”. Tinbergen & Hueting (1991) criticise that NI is mistaken for welfare, and they correct $eSNI = NI - e\Delta$, but they do not suggest that eSNI could be taken *for* welfare, because that would be the same error that they warn about. It should have sufficed to quote the authors and not paraphrase misunderstandings.

24.4 Asymmetric bookkeeping

Keuning (1996:480) states that environmental effects are included in the national accounts in current prices when they are priced. This however neglects Hueting (1974a, 1980) with the issue of what Hueting now calls asymmetric bookkeeping, see Chapter 12.

24.5 Facts and no counterfactuals

Keuning (1996:480) states that CBS records economic facts and no counterfactuals. This however neglects that the distance to environmental sustainability $e\Delta = NI - eSNI$ is a fact too. It is an uncertain estimate, but still concerns the real world, see Sections 7.6 and 5.5. Keuning: “When the government books revenues from natural gas as current income, then CBS will not judge whether this is done inappropriately.” However, CBS in scientific capacity can inform its readership that the government is inconsistent when it claims to aspire at environmental sustainability while at the same time cooking the books. The proper approach is provided by Tinbergen & Hueting (1991), to show that different assumptions come along with different methods of accounting.

24.6 Behavioural effects from other prices

Keuning (1996:480) continues this line of reasoning for companies: “As well their prices as their economic decisions would have been different, if they had really booked as costs what environmental damages they inflicted. If to the contrary CBS would suddenly regard those damages as costs, then also the macro-economic effects of such accounting should be simulated. The simple deduction of fictional monetary sums for environmental damages from factual national income comes down to comparing apples and oranges.”

In economics, two monetary sums however can be compared when they have the same *price level*. Let us assume that an apple under the condition of environmental sustainability would be like an orange under the current conditions of unsustainability, or $p[\text{apple}[s]] = p[\text{orange}[u]]$. Keuning now imposes the additional condition that such goods should have the same prices but this involves techniques for index numbers on volumes and prices, and this is not necessarily the relevant technique for the current purpose. Having $e\Delta = Y - Y_s$ in volumes and market price level P then it suffices to have nominal values $P e\Delta = P Y - P Y_s$. The

distance to environmental sustainability of about 30% of GDP is so large that calculations with index numbers on volumes and prices would tend to be rather imprecise anyway, and when the gap would become small then the price differences would not matter much. Such index numbers are relevant for year-to-year changes but would be less relevant for the issue on sustainability within such a single year of observation.

The main point however is that Tinbergen & Hueting argue that NI is *invalid* for the environment, and that Keuning replies with an argument from *uncertainty*, which is changing the subject again. See Section 5.5. It is *elementary statistics* to make a distinction between accuracy and precision, or validity and uncertainty. It is remarkable that statisticians at CBS Statistics Netherlands do not apply their training here. Keuning presents a superficial argument and none of his colleagues corrects him, and over the years none takes notice of the protest against the fallacy. For example, Peter van de Ven (2019) repeats the same fallacy, see Chapter 26, even though Van de Ven by that time benefits from the calculations by Verbruggen (ed) (2000).

24.7 Value of air

Keuning (1996:480): “The value of air [i.e. air of quality] evidently is in principle immeasurable.” This confuses current use, as if the price would be zero, and what has been proposed by Tinbergen & Hueting (1991), namely to find the shadow price at the imposition of standards for environmental sustainability.

24.8 Apodicta

Keuning (1996:481) misrepresents eSNI again as supposedly a partial indicator for welfare and then lists some criteria, that fall from thin air, as if eSNI could not be fitted in with SNA. (i) Without argument: the physical effects and monetary valuation would not fit. (ii) Without argument: policy simulations would not work either. (iii) Without argument: outcomes are too rough to use for monitoring policy. (iv) Without argument: it might perhaps have value as a “mood indicator”.

24.9 Use of a model

Keuning (1996:481) argues that a model must be used in order to find the proper shadow prices. p482 presents a fine description of the imposition of standards for environmental sustainability and the use of known technology. He rightly points to the tough problem of the price elasticities (estimates on current changes of say 5% size differ from assumptions for a change towards sustainability of say 50% size). He rightly alerts to the interpretation of outcomes, when technology changes over time.

While all of this is correct, he incorrectly argues that the standards for environmental sustainability would be “politics”, and thus that there would not be one single eSNI estimate but various ones. To say so, he neglects the conditionality in the assumptions, and that such standards are derived from the scientific literature. His argument is basically one about uncertainty while the proper argument concerns validity, see Section 5.5.

It have been such arguments that caused Hueting and Reijnders (1998b) to clarify that environmental sustainability is an objective (intersubjective) concept.

24.10 Scenario's

Keuning (1996:481) suggests that modeling might be useful for scenario analyses. This line of reasoning however implies that this modeling doesn't happen at CBS but at CPB. The suggestion bypasses the very argument that there is a problem with statistics of the past.

24.11 Conclusion

The Keuning (1996) article is misrepresentative and apparently had not been submitted in draft to Hueting, then adviser at CBS, for comments. Apparently Hueting did not submit a reply to S&D but concentrated upon the fall-out at CBS and in Dutch Parliament, see Section 21.9.8.6.3. The discussions resulted into the decision and official statement CBS (1997), see Section 15.3, that eSNI would be calculated outside of CBS, which eventually led to Verbruggen (ed) (2000).

25. Henk van Tuinen 1975, 1993, 1997 and 2009

25.1 Introduction

Chapter 15 has the advice that national statistical offices calculate eSNI, conforming to Tinbergen & Hueting (1991). Section 15.3 mentioned the 1997 decision by the CBS board (with deputy DG Henk van Tuinen) to support eSNI but put it outside of CBS itself. Former Chapter 24 has indicated the internal pressure within CBS. Chapter 21 discusses the advance and adversity in the development of eSNI. Section 21.6.3 mentions that Van Tuinen (1975) rejected the Hueting (1974a, 1980) key proposal on asymmetric bookkeeping. The common denominator of these Chapters are the conditions at a national statistical office for calculation and publication of eSNI. This present chapter concerns the paper Van Tuinen (2009),¹⁹³ published in the *Journal of Official Statistics* (JOS) and originally presented at the OECD in Istanbul 2007.

Henk van Tuinen (1946) started working at CBS Statistics Netherlands in 1965, graduated in economics at VU Amsterdam in 1972, became head of the research department including deputy head of National Accounts (NA) in 1972, and later head of NA in 1977-1985, then director of Social Statistics in 1985-1994, and eventually deputy director-general of CBS Statistics Netherlands, and retired in 2003. The CBS (1997) decision to put eSNI outside of CBS, as discussed in Chapter 15, was taken with Van Tuinen as deputy DG.

This timeline is more important than might seem at first. Hueting's design of the vertical demand curve in 1986, Tinbergen & Hueting (1991), the *Methodology* of 1992, and the consequences for the foundations of economic analysis and economic statistics, *all* occurred when Van Tuinen was director of Social Statistics: during which period he tended to keep some distance to the national accounts, and had little cause for looking at eSNI. Hueting retired from CBS in 1994 though remained an adviser till 2000. Hueting has received support by Van Tuinen over the years. The Hueting Symposium in 1999 and the actual calculation in 1998-2008 that was done by external IVM, with the results presented Chapter 4 in **Table 1** and **Figure 4** above, would not have been possible without the support by Van Tuinen and CBS. While Van Tuinen supported the research on eSNI, he only came to accept its soundness because of the calculations by IVM, with Verbruggen (ed) (2000). Yet eSNI was moved out of CBS.

For Van Tuinen, *involvement* in eSNI by a national statistical office might mean a participation in a steering committee for such external calculation and publication outside of the national statistical office. When Van Tuinen retired in 2003, some work on eSNI was still included in the CBS work programme. However this present evaluation focuses on calculation and publication by a statistical office. After Van Tuinen's retirement it has not been possible to maintain eSNI within CBS Statistics Netherlands at all. The minister of Economic Affairs Laurens Jan Brinkhorst and state secretary on the Environment Pieter van Geel appointed

¹⁹³ <https://www.scb.se/contentassets/ca21efb41fee47d293bbee5bf7be7fb3/innovative-statistics-to-improve-our-notion-of-reality.pdf>

RIVM-MNP-PBL as the responsible agency.¹⁹⁴ Eventually the calculation of eSNI was silently stopped, see Section 21.11.7.2, apparently because the engineers there had little affinity with economic welfare and national accounting.¹⁹⁵

For the handling of eSNI within CBS, the period 1985-1994 is rather crucial. We would have to look at other responsibilities for decisions about it, and we should not be distracted by the phenomenon that Van Tuinen (2009) is available as a document, that in fact advises involvement in calculating eSNI. Still, errors made in 1985-1994 could have been corrected after 1994 so there remains a responsibility for CBS researchers and management in that later period too.

For Van Tuinen's position the reader is referred to Van Tuinen (2009). The following is only my interpretation and effort at trying to understand what is happening in relation to Hueting's contribution to economics and the statistical measurement of national income.

Van Tuinen may be criticised for not being perfect. Van Tuinen shows himself to be systematically blind on Hueting's contribution to *national accounting itself*, namely the *conditionality* of the notion of national income, see Section 1.5 and **Figure 2** and **Figure 5** and Section 11.3. Hueting's criticism on *national income* apparently is seen by him as being *at the level of a user*, and thus does not pertain to *CBS itself* that has SNA.

Remarkable in all of this is that Van Tuinen is aware of Tinbergen & Hueting (1991), as CBS (1997) refers to this, but that Tinbergen's support for the analysis does not seem to have any effect upon his position. Van Tuinen (2009) does not refer to the joint article while it would be important for the world of official statistics to know about Tinbergen's support. Van Tuinen (2009) contains no references to papers by Hueting et al. He refers to Verbruggen et al. (2001) in the Van Ierland et al. (ed) (2001) volume, and a reader who looks up those references and reads wider in that volume could eventually discover about Tinbergen's support, but this is rather late and tedious. Remarkably Van Tuinen (2009) refers to the IVM study without warning about the Alleingang scenario, that Van Tuinen finds nonsense, see Section 21.9.12. With this misrepresenting scenario it would be relevant to indicate that it likely runs counter to Tinbergen's support too. However, if Van Tuinen (2009) would have discussed this at more length, then it might have been more difficult for him to clarify why eSNI was removed from CBS in the first place.

A key diagnosis has been stated in Section 11.3, that identifies an underlying attitude of a national accountant who has been trained on SNA: "Presently we can observe a dubious duplicity in the presentation of the figures of SNA. On the one hand a national statistical office can present those figures "as is" and defer all responsibility to users themselves. On the other hand the bureau can go along with the use of NI as "national income" because it is being presented as such in SNA. Criticism that NI is no "national income" then comes into conflict with both the definition of SNA and the rejoinder that users are free to provide their own definition." This is a fundamental *duplicity* or *not-straight-thinking*, that allows other confusions to pop up too.

¹⁹⁴ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

¹⁹⁵ There is a pending request at RIVM and PBL about what the official reason has been.

For Van Tuinen, Hueting only designed an *indicator* at the level of *using the existing accounts* and Hueting did *not* contribute an analysis that is crucial to the *mission* of national statistical offices on the *concept of national income*.

For Van Tuinen, even in this article in 2009, eSNI can be calculated *externally* indeed, without the national bureau taking responsibility because of its mission. With this perception and presentation, Van Tuinen systematically misrepresents eSNI and Hueting's contribution, also for readers of JOS, with the only cause that Van Tuinen does not see the contribution himself and doesn't think that it is something to report about. When others misrepresented eSNI too, then Van Tuinen and CBS might have thought that there might be truth in those misrepresentations, instead of being able to properly reply to such.

The misconceptions at the Dutch National Accounts and the directorate of CBS have been quite costly w.r.t. the preparation of policy making on the environment and global warming, since key scientific criticism got misrepresented. Remarkably though, there still was an overlap of purpose so that some advance was possible. The following discussion may be useful for current CBS and other national statistical offices to help identify the pitfalls in evaluating eSNI.

25.2 Preliminary observations

Some aspects to observe are:

- The paper Van Tuinen (2009) cannot be mistaken for the official position of CBS (1997), though in all likelihood there will be no great difference in content, see Section 15.3. When writing this in 2019, there is no official statement by CBS on eSNI *after* the *proof of concept* discussed in Chapter 4.
- Van Tuinen (2009) does not refer to the government decision in 2004 to appoint RIVM as the responsible agency for calculating eSNI, with possibly less involvement by CBS also on notions of national accounting. Van Tuinen wasn't aware of this after his retirement (personal communication).
- Hueting was head of the CBS Environmental Department, and did not work at the CBS Statistics Netherlands Department of National Accounts, and thus might not have been regarded within CBS as a "national accountant". Hueting has always taken the precaution of having his writings on national accounting to be checked and double-checked there, yet this might also have confirmed an impression as if he is no "national accountant" indeed.
- Van Tuinen concurs with Hueting that users of statistics may interpret NI and "economic growth" in terms of *welfare*, and that CBS has stewardship in supporting users to make better use of the published figures. Van Tuinen's view is that statisticians would live in "reality" and understand what NI is, but that users may live in a "virtual world" with such interpretations from welfare. (There is no statement by Van Tuinen that "economic growth" has been defined wrongly, as discussed here in Chapter 17.)
- However, Van Tuinen does not see that Hueting does more, namely on the very notion of national income, see Section 1.5 and **Figure 2** and **Figure 5** and Section 11.3. In a personal communication of 2019-02-04 Van Tuinen confirms (my translation): "Hicks's notion of income certainly has had my interest, but not in the context of Hueting's *New Scarcity* and later work."

- We infer that Van Tuinen doesn't quite understand eSNI. A bit ominously, there is no joint article by Hueting and Van Tuinen on eSNI and its position in national accounting.
- A major problem in 1970-2018 is that Van Tuinen is not explicit about his position on this. It is not that Van Tuinen would hide his position but he simply does not feel a need to explain it, or perhaps he feels that he has explained it. In his view, SNA is published "as is" with a standard application for Keynesian macro-economics, and users are invited to have their own adaptations, and Hueting's indicator would be one of those, but not particularly relevant, except from a welfare theoretical point of view. It is only because of the scrutiny of Van Tuinen's papers that this *underlying neglect* of Hueting's contribution on the notion of national income comes to the surface. I also thank Van Tuinen for personal communication that was crucial for further clarification. The conclusion that Van Tuinen sees Hueting's contribution only at the level of user application was already described in "*The Old Man and the SNI*" in 2008. This is discussed here in Section 21.6.3. There is no change in Van Tuinen's point of view from 1975 to 2008 to now in 2019.
- I myself worked at CPB in 1982-1991 and helped make the Athena model, that was closely modeled upon the Dutch National Accounts, with required studying of those accounts and methods, see Eijgenraam et al. (1988) and (1990). The present evaluation thus is based upon proper understanding of national accounting and CBS practices, though obviously I do not have full operational expertise like exists within CBS itself. This evaluation is actually only possible because of this understanding of fundamentals. I find it oddly awkward that Van Tuinen as former head of the Dutch National Accounts missed Hueting's contribution. I can only conjecture that nobody is perfect.
- In 1995-1997 during the exploratory phase of the Hueting Symposium in 1999, I met Van Tuinen and he was willing to think along. In a talk I suggested that if CBS would not calculate eSNI because it contained a reference to conditions on the future, and if CPB would not calculate eSNI because it was statistics, then perhaps it might be done by a third party. Perhaps Van Tuinen was already thinking in this way, or perhaps this struck a chord. Van Tuinen supported the Hueting Symposium and agreed with Minister of Economic Affairs Hans Wijers to have the external calculation, see Section 21.9.6. All parties involved were happy that eSNI at last and at least got calculated, see Verbruggen (ed) (2000). However, at the time I thought that it was only anxiety at CBS about the use of a model, and I regret that I wasn't aware of the range of misunderstandings at CBS, or it is a pity that Van Tuinen did not explain this to me at that time, for then perhaps the suggestion and eventual decision would have been wiser, namely that CBS was actually responsible itself for calculation and publication. The decision to have an external calculation by itself was not fatal: There have been ample other opportunities for CBS in the 2000-2018 period, with the proof of concept that had been provided by IVM.

To arrive at proper representation and deconstruction of Van Tuinen (2009) it will be required to also refer to earlier papers that reflect on the continual discussion within CBS, and to include more angles.

25.3 *Review of the discussion*

Since the Tuinen (2009) paper misrepresents eSNI, it becomes less relevant. A discussion becomes an exercise in local history that most readers will not be interested in. To deal with this situation, aspects of this discussion have been put into Appendices to this chapter:

- A. Papers in 1975 and 1993, mainly on asymmetric bookkeeping
- B. Users are to blame themselves
- C. The advice for involvement in eSNI neglects the mission on income
- D. Two possible reasons *not* to calculate and publish
- E. Jargon of CBS Statistics Netherlands
- F. The main consideration: A worry about a discussion about uncertainty
- G. A single hole may sink the mighty ship
- H. Subsidiary aspects

25.4 *Review of the considered aspects*

Who has been willing to read these Appendices to this chapter may concur that Van Tuinen (2009) isn't convincing, because of:

- (i) putting the blame only on users when they interpret NI as welfare, and being blind on the own responsibility of an official bureau to be clear on its presentation of NI as *income* when it need not be income, see Section 11.3
- (ii) neglect that the conditions for in-house calculation are satisfied almost by definition
- (iii) using a basically inconsistent reasoning about those conditions (and using a selective presentation to confer the impression of being correct)
- (iv) using an ill-defined criterion of "undisputedness", and neglecting that NI is disputed w.r.t. the environment
- (v) mistaking a discussion about uncertainty as a sign or proof of inadequacy
- (vi) focusing on uncertainty while being blind on invalidity, see Section 5.5
- (vii) requiring consensus while science advances by discussion, and while there is a new specialisation and expertise of deriving environmental standards for economic modeling (*planetary boundaries* formulated for economic modeling)
- (viii) referencing in deficient manner and not mentioning criticism
- (ix) sacrificing the work done at the CBS Environmental Department for the sake of the reputation of the CBS Department of National Accounts, and falsely presenting the latter as holding for CBS in whole
- (x) using jargon of CBS, and perhaps the world of official statistics, that contributes to confusion about the argument on content
- (xi) being blind on the internal inconsistency of "economic growth" when used outside of welfare economics, and sticking to the inconsistent use of the term in the National Accounts, see Chapter 17
- (xii) presenting statements that might seem open-minded at a superficial level but that someone would not make who really understands eSNI
- (xiii) compounding eSNI with other issues like happiness. Few would say that other issues are irrelevant but it would have been more logical to present the issue of national accounting and ecological survival in a separate section in the paper, and explain eSNI properly.

25.5 An underlying view

It is remarkable that such a list of misconceptions can be generated on such a clear notion as eSNI. As Section 11.3 and the introduction to this chapter explained, national accountants who have been trained on SNA may not be aware of a fundamental duplicity in view that they have been trained on: (i) SNA defines “national income” and (ii) other notions of income are at the level of *users* and do not pertain to the official business of the national statistical office. With this duplicity as a base, all kind of confusion is possible.

In Van Tuinen’s framework, CBS would still be permitted to publish NI *even* while it is a counterproductive figure for environmental policy. If there is no other such institute, then in his view CBS would have *no responsibility* to develop the competence *itself* that now is lacking. Van Tuinen *advises* involvement but does not point to the *failure* when not getting involved. Fundamentally he does not recognise that the national statistical offices have a prime responsibility to do the job themselves.

Van Tuinen agrees that there is a multitude of notions of income, but still holds that *national income* has been defined by SNA and that there is no need for more discussion about what *national income* might mean, i.e. that such other definitions are only relevant for *user* applications *but not CBS itself*. In the email of 2007 (Appendix C) he states “eSNI shows the level of NI attainable applying current technology within the constraint of sustainability”. This would tend to allow that he regards eSNI as (a level of) income indeed, but we must allow for the possibility that Van Tuinen does not choose his wording precisely, because in his actual treatment he handles eSNI as an *indicator* and not *income*, because *income* doesn’t have those conditions. When we assess what Van Tuinen does, for him eSNI is “income” *in name only*, but it does not present the proper notion of income, because that has been given by SNA. Van Tuinen regards income in SNA as a Keynesian notion of income, targeted at expenditures in Keynesian macro-economics (that allow expenditure above one’s means), so that considerations by Hicks (keep capital intact) are irrelevant, even while Hicks would be an eminent economist. For the own responsibility by CBS w.r.t. the statistics of *income* – see Section 1.5 and Section 11.3 – he holds that this responsibility is fulfilled by the explanation that CBS presents SNA, and it is the responsibility of *users* when they ignore this explanation on the CBS website. For Van Tuinen Section 11.3 is useless since there is already SNA. Criticism w.r.t. the *notion of income in SNA* is irrelevant since he does not engage in criticism of SNA on this. He is insensitive to the possibility in Section 11.3 that there may be *more* notions of *income* alongside each other, i.e. because of *conditionality*, since for him there is only one notion of income. Van Tuinen tends to regard NI-A (i.e. NI exclusive of asyms) not as income, because NI is income and when you subtract something then it is income no longer – the quote of the 1993 paper in Appendix A shows that he is open to an alternative definition of income but it does not materialise because he finds it convincing, and but the consideration that he provides is unconvincing for us outsiders.

25.6 *Statistics may generate new insights more than once*

The situation reminds of the 1930s, when Jan Tinbergen worked at CBS and developed a model for the Dutch economy, that later resulted in the creation of CPB and was awarded with the first Nobel Prize in economics in 1969. In the viewpoint by Van Tuinen – and actually CBS in practice in this history till 2018 – this development with Tinbergen was *a singular occasion*, and does not reflect a fundamental property of statistics itself, that there can be new findings that require experimentation, new modeling, and the internal creation of competence that perhaps later can be exported to the creation of a new institute.

Obviously, CBS has more experiments, and CBS might point to those as indication of the tolerance. Now, however, we are speaking about criticism w.r.t. SNA. Van Tuinen (2009) describes how statistical offices have a natural tendency towards conservatism, and thereby suggests to create more freedom deliberately – which can only be appreciated – but he still remains conservative on SNA and eSNI itself.

While standards and model are uncertain, and while Van Tuinen's argument on this uncertainty is deficient, we may also look at it from an institutional point of view. eSNI would still belong to a national statistical office because eSNI amends or supplements SNA, but let us conjecture the need of a new institute, like was the case with Tinbergen and CPB. The point then is that there will not by itself arise a new institute by researchers on economics and environment who have no idea yet how Hueting's methodology works, who would re-invent this methodology and also have the funds to create that institution to execute it. Placing eSNI outside of CBS apparently was done prematurely, so that it did not survive. Van Tuinen has underestimated the need for better breeding grounds within CBS. Funds were provided for RIVM-MNP-PBL but apparently this institute has little affinity with national accounting. There are only some agencies in the world who are involved in national accounting and those are the national statistical offices. It was a dubious exercise to create a spin-off micro-CBS on eSNI. The motivation to do so was basically Van Tuinen's own lack of understanding of eSNI and (thus) fear of (internal) dispute, which is not the same as supporting a spin-off because you think that it is a viable enterprise.

In this institutional angle, Van Tuinen might suggest that, in the Dutch setup, PBL might establish environmental standards, CPB might provide the economic model, and then CBS would be happy to provide the economic and environmental data from the past. Van Tuinen apparently entertained this idea around 1995 and then again in this 2009 paper but it did not happen. Chapter 21 shows more how CPB thinks about modeling and how RIVM-MNP-PBL uncritically repeats confusion and misrepresentation about eSNI.

25.7 *Concluding: the challenge in a country at risk of a rising sea level*

Van Tuinen apparently does not fully understand Hueting's analysis and brings a wrong report to the world of official statistics. His paper does not refer to a paper by Hueting himself and refers only to Verbruggen et al. (2001), which report might be more difficult to locate (with its stiff paywall) and which contains a misrepresentation anyway, that is discussed in Section 21.9.12.

Perhaps Van Tuinen (2009) and his recommendations relate wisely to other researchers and decision makers in the world of official statistics, like the colleagues at CBS itself. Its author might have hoped so in 2008. In early 2019 one might have to belong to the world of official statistics to measure the impact. It seems a better diagnosis to infer that it didn't help eSNI much, and likely was counterproductive because of its misrepresentation. Indeed, this storyline continues in Chapter 21 "The Old Man and the eSNI", also with developments at CBS in 2004-2018. RIVM-MNP-PBL stopped calculating eSNI and CBS did not notice or protest.

Van Tuinen (2009:461): "But if one of its statistics runs into problems, the whole system is at risk." It is hard to believe that the mighty dike of SNA and NI and the reputation of national statistical offices would collapse because of a small hole, when the proposal by eSNI is to plug the hole rather than neglect it – though the hole is getting bigger indeed, and eventually CBS in The Hague will be flooded by the rise of the sea level too of course, though admittedly loss of reputation would be worse.

Van Tuinen's paper and quotes are so problematic that we would not want that this misrepresentation about eSNI would linger in the reader's mind, where it could block interest and might generate other confusions. Yet it is most likely that Van Tuinen worked in an environment with other national accountants who entertained many similar thoughts, while he (at least) *said* that he still supported Hueting's work.

Appendices to this Chapter

25.8 A. Papers in 1975 and 1993

Van Tuinen (1975) can be seen as a reaction to the thesis by Hueting (1974, 1990), notably on asymmetric entries, see Section 21.6.3.

Van Tuinen (1993:26-27) summarizes the same position.

This latter paper is included in W.F.M. de Vries (1942-2019) et al. (eds) (1993), which book celebrates 50 years of national accounting at CBS Statistics Netherlands. Since, bureaucratically, Hueting did not work at that department, the book doesn't contain a paper by him, even while this part of his work pertains to national accounting. There is only a distinction in "departments" within CBS Statistics Netherlands, and it would be awkward to hold that professional competence on notions of national accounting would only be limited to persons actually working at the CBS department with that name. Within a bureaucracy, it perhaps is natural to confuse departmental competence and personal competence.

As the title of Van Tuinen (1993) mentions, this latter paper concerns the period 1970-1985 when he was first deputy and then full head of the department of National Accounts, and this time-frame excludes Hueting's discovery of the vertical demand curve in 1986, the *Methodology* of 1992, and the consequences for the foundations of economic analysis and economic statistics. Though the period was chosen by the editor, Van Tuinen might still have had some possibility to comment on those developments, but he chose not to do so. Emphasis in the paper is on the '(dominant) Dutch view'. His opening statement (p13) "The original aim of national accounts (NA) is to present timely and reliable indicators on the

performance of the economy” refers to the origin in the 1930s, when a definition of “performance” was thought to be possible outside of welfare economics, and shortly later became dominated by Keynes’s analysis. At that time he recognises that Hueting writes from a welfare economics point of view but the paper doesn’t mention the implications w.r.t. the own responsibility by statistical offices with respect to the notion of income (see Section 1.5 and **Figure 2** and **Figure 5** and Section 11.3). As a national accountant, Van Tuinen obviously is aware that there is flexibility in the notion of “income”, say in his treatment of inflation and thus the loss of value of nominal assets, as has also been clarified in Section 11.3. Hueting’s analysis however amends this flexibility, namely by conditionality, and Van Tuinen does not observe or recognise this.

The issue of having a corrected NI *alongside* of NI could not be avoided for 1970-1985. Namely, there was discussion on how to account for asymmetric entries, see Chapter 12. Van Tuinen might interpret asymmetric bookkeeping as “welfare theory” too, and at least rejects a practical impact on income accounting. See Hueting on this period in Section 21.6.3. Van Tuinen states:

“At the time national accountants and Hueting unanimously concluded that it was impossible to estimate the total of all relevant environmental losses (...) National accountants concluded that it would be useful to develop systematic estimates of the expenditure on the compensation and elimination of environmental losses. But they also concluded that it was not useful to publish an alternative national income corrected for environmental losses because only part of the losses (and perhaps a minor part) could be measured. In his article in this book Keuning presents a current national accountants’ view on this topic, and one which differs from Hueting’s present opinion.”

Thus there is awareness that there might be an “alternative national income”, but it does not materialise. The argument on a “part” is unconvincing, but it is presented as if it were convincing.

There is reference to work by Keuning but no criticism of it. Keuning was the successor of Van Tuinen, and this might cause Van Tuinen not to engage into public discussion. Observe that Keuning’s view is featured as a “current national accountant’s” view, with the implied suggestion as if Hueting would not write competently about national accounting (see Section 11.3): the departmental setup of CBS invokes such terminology, that however obscures clarity on content. Hueting in 2003 protests against Keuning’s paper in 1993, yet this criticism already existed in 1992 (see page 210). It is problematic that CBS had this book of 1993 published when such criticism wasn’t included while it existed at the time.¹⁹⁶ The jubilee book is not the expression of scientific discourse as one might take it for.

25.9 B. Users are to blame themselves

Van Tuinen (2009) holds that national statistical offices are almost without blame. The bureaus present the data “as is” and it are users who interpret GDP as an indicator of (total) welfare, while they should be wiser not to do so. He

¹⁹⁶ <http://www.sni-hueting.info/NL/Ter%20overpeinzin%20op%20het%20wijde%20water.pdf>

accepts responsibility by official statistics for “*presenting GDP to an audience*”, but it is the audience that interpretes GDP as a (sole) indicator of welfare, and the official bureaus have only been *playing along*, i.e. in the past:

“The core problem (...) is that official statistics have presented GDP and related statistics to an audience, which interprets these data as dominant indicators of economic progress. Half a century ago this was justifiable, although theoretically incorrect, but nowadays it creates too virtual a reality. Of course, official statisticians cannot be held responsible for every improper interpretation of their data. But society may expect official statistics to initiate debate on so prominent a misinterpretation, and to do its utmost to provide society with more adequate measures of economic welfare.” (p450)

Van Tuinen’s position seems much influenced by discussion with Hueting on economic welfare. However, there is also the *definition of income*. Hueting’s work is not mere welfare economics as a *moral infliction* on how to *interpret* the data that CBS produces, but it also vitally concerns how CBS *constructs* and *names* those data. As shown in Section 11.3, official statistics has prime responsibility on what they present as *income* and *expenditure*. Van Tuinen apparently does not understand that CBS wrongly calls NI “income” when it is not, see **Figure 2** and **Figure 6**. He is willing to see the error in the past of *playing along* but he does not see the fundamental error also in the present, i.e. since the *Methodology* of 1992.

With reference to the tables in Section 11.3, Van Tuinen’s position might be given by a hybrid table, using the LHS column of **Table 6** with the view on SNA, and the RHS column of **Table 7** of being more forthcoming to users on welfare economics.

Thus, awkwardly:

Van Tuinen (2009)’s discussion of Hueting’s work is a misrepresentation of Hueting’s work, and he does so to the world of official statistics (with an advice on how they can best deal with eSNI).

Van Tuinen’s article (and also other work, also in Dutch) shows that he is absolutely blind for the very diagnosis that CBS gives misleading information for which it is directly responsible itself.

This is remarkable, because as former head of the dept. of National Accounts he is acutely aware that there are different notions of income. He knows by heart that when something is income under one definition then it need not be income under another definition. The only logical explanation for Van Tuinen (2009)’s paper is that he did not understand Hueting’s reasoning on this – but it is a staggeringly awkward diagnosis. We return to this below. (In Section 18.13 we have adorned it with the term “*conditional counterfactuality*”, but the term doesn’t help much since one should also be able to see it in lay man’s terms, see **Figure 2** and **Figure 6**.)

25.10 C. The advice to get involved neglects the mission on income

25.10.1 An email of October 2007

Van Tuinen writes an email to Hueting in October 2007 about the draft of Van Tuinen (2009). Observe that he agrees on having eSNI as an *indicator* alongside

of NI: but this does not imply that he regards eSNI as *income*. For Van Tuinen proper income is provided by SNA, while Hueting regards NI as likely misleading for mistaking expenditure as income. The message is accurate apart from this.

“In my paper for the OECD-conference (background paper for the session on official statistical offices) [now published as Van Tuinen (2009)] I strongly recommended official statistics to initiate and stay involved in estimating the eSNI because I am convinced that the economic concept of the eSNI is theoretically sound and policymakers and society are in urgent need of this indicator which shows how much the current economic development differs from a sustainable path. The fundamental assumption underlying the eSNI is that economic subjects have a preference for sustainability and the eSNI shows the level of NI attainable applying current technology within the constraint of sustainability. The presentation of data on eSNI alongside those of standard NI must inspire policymakers to develop strategies which effectively decrease the distance between both variables. These strategies can be targeted to the level and composition of standard NI as well as to technological innovation which increases the level of future eSNI. Therefore, the function of eSNI is limited to present information for evidence based policymaking. The eSNI itself does not set a target but it helps policymakers in developing targets for their strategies.”

25.10.2 *An advice to get involved*

Van Tuinen (2009) does not advise that national statistical offices calculate eSNI, and merely advises *involvement* in this. Involvement may also mean the participation in a steering committee for calculation outside of a bureau, as CBS did with respect to IVM.

“the involvement of official statistics in developing and estimating the SNI is a recommended element in the above mentioned strategy” (p451).

In the final recommendation: “initiate and get actively involved in the development of estimates of Sustainable National Income” (p463).

Van Tuinen *advises* involvement but doesn't state *current failure* when not getting involved.

Hueting's analysis is stronger. Section 11.3 and **Figure 2** show that eSNI belongs to the mission of national statistical offices. When a national statistical office does not calculate eSNI then it *fails currently* on its mission to provide information about national income.

Van Tuinen does not specify what is supposed to happen when a national statistical agency rejects the advised involvement, though he refers to the risk of loss of reputation, which does not apply *currently* but at some future *sooner or later*.

“After decades of presenting these statistics to an audience that interprets them as welfare and “progress,” official statistics may run the risk of being considered misleading. If official statisticians leave “striking

the balance” outside the boundary of their mission, sooner or later they may be considered inadequate.” (p439)

It is curious to state that this is a *risk*, while NI *is disputed since the 1960s* for environmental policy, and Hueting’s analysis *shows* that official statistics *is misleading* about income and expenditure. The diagnosis is right there, but Van Tuinen refuses to see it, while it has been explained at CBS Statistics Netherlands since 1991. Van Tuinen again refers to the *users* who are to blame for being confused on welfare economics and he neglects the own responsibility on *income*.

25.10.3 When there is no external responsibility or calculation

CBS wasn’t involved in the calculation in 2006-2018. The steering committee was operational till the final report Verbruggen (ed) (2000), and at that time there had been close co-operation with CBS. Two later calculations by IVM in 2004 and 2008 were commissioned by RIVM only. Though these reports do not mention a contribution by CBS, De Boer (personal communication) was involved for the environmental standards and advice. De Boer moved from CBS to CE Delft in 2005, awaiting a promised subsidy that did not materialise. After 2008 apparently RIVM-MNP-PBL lost interest. It was only a parliamentary committee that expressed an interest in a Monitor Broad Welfare (MBW) (a pleonasm). For this monitor, two long-retired CBS-employees constructed a rough estimate, see Hueting & De Boer (2018, 2019a). eSNI has been included in the CBS (2018a) Monitor Broad Welfare but as reference to an externally produced concept and figure.

The reasoning by Van Tuinen (2009) does not deal with this contingency that his advice isn’t heard, except that he refers to reputation loss. He might say that CBS might have had other reasons to stop involvement, but a more adequate diagnosis is that Van Tuinen’s argument for being involved is rather weak in the first place. Van Tuinen never specified that a national statistical office *should* be involved because of the deficiency of SNA. Van Tuinen cannot say that SNA is deficient because he does not see its deficiency and simply refuses to consider it.

In Van Tuinen’s framework, if there is no other such institute, then in his view CBS would have *no responsibility* to develop the competence *itself* that now is lacking. CBS would still be permitted to publish only NI *even* while it is a counterproductive figure for environmental policy. We return to some institutional aspects below. However, the key rejection of Van Tuinen’s reasoning is not this institutional speculation, but the argument given on content in Section 25.11.2.

25.11 D. Two possible reasons not to calculate and publish

25.11.1 Two possible reasons, expressed with some jargon

While Van Tuinen advises involvement, Van Tuinen (2009:451) suggests at least two possible reasons why a national statistical office might not do the actual calculation itself on a regular base (and instead look for an IVM):

“The reasons for not publishing SNI as a regular product of official statistics include:

- the estimation requires very strong assumptions in the application of a general equilibrium model, which are dictated by the requirement of attaining a sustainable burdening of the environment (such as by greenhouse gases)
- the sustainable burden estimates – the so-called sustainability standards – are disputable and official statistics obviously cannot take responsibility for them.”

It is a pity that Van Tuinen merely states the uncertainty itself and does not explain that those can be handled.

Thus, on one hand Van Tuinen suggests national statistical institutes to initiate *experimental* calculation and on the other hand he mentions two reasons for not publishing eSNI “as a regular product” under the *exclusive* responsibility of the statistical institute.

While standard *national income* obviously is an *annual* statistic, calculated under full responsibility of the bureau executing SNA, and while Van Tuinen advises to have eSNI alongside of NI, would he really mean that it would not fit to have eSNI alongside of NI *regularly* as well ?

We meet with issues of *jargon of CBS* and issues on *content*.

Even allowing for these distinctions, we cannot avoid the inference that Van Tuinen's position is inconsistent.

The *jargon* is explained in the **Appendix E** to this chapter.

NB. The reason that Van Tuinen gave for involvement (users interpret income as welfare) might not have been convincing. Van Tuinen's successors might have adopted these two reasons in above quote to reject involvement. I haven't checked whether CBS used the IVM outcomes to warn users on the CBS website about the misleading aspect of NI. The calculation of eSNI stopped after 2008 and CBS apparently did not feel itself involved enough to ask IVM or PBL why it did not calculate eSNI for 2010 or 2015. It took a parliamentary committee to show interest in the Monitor Broad Welfare (a pleonasm).

25.11.2 *Direct answer on content*

There are direct answers to the supposed two reasons for not calculating eSNI.

25.11.2.1. *Confusion of uncertainty and invalidity*

The first reason essentially confounds the issue of validity with the issue of the technical uncertainty of a particular model, see **Figure 6**.

It is impossible to know how a nation will behave closer to environmental sustainability, but this cannot be a reason for not making an educated estimate via the modern techniques that are available. The technical uncertainty can be managed by modelers, and will be reduced by growing experience.

This anxiety about a model within statistics is rather peculiar, see Section 5.1 and Chapter 18.

The proper response by the national statistical office is to focus on the *invalidity* of NI for environmental policy making, and not be distracted by issues of uncertainties in estimates. When NI is a multi-purpose indicator, then it does not

suffice to point only to areas where it is used without dispute, and to neglect the area where it meets with much dispute.

SNA fails on a prime purpose for which SNA is intended, namely reporting on *national income*. Van Tuinen (2009) does not report that Hueting has the analysis that SNA *fails* for environmental policy making. The main reason for this omission is that Van Tuinen does not accept this analysis himself. He simply neglects the criticism and doesn't report on it.

25.11.2.2. *Standards are derived and not set*

The second reason is one of competence, and about the professional relation between a manager and experts, or perhaps one expert with respect to other experts.

In the eSNI *methodology*, standards are not *set* but *derived* from the scientific literature. These standards for environmental sustainability are as objective as science itself, because they are established scientifically, and in practice they indeed require committees of researchers for the actual choices. If there arises dispute about those, then national statistical offices can refer to science, and the dispute can be handled in scientific manner.

Thus it is a misrepresentation by Van Tuinen to suggest that the national statistical office takes "responsibility" for the standards: one refers to the scientific literature.

The following angle should not be overlooked. Environmental scientists, like for example in WHO dose-response studies, specify effects commonly on a micro, local or regional scale. The derivation of a *standard*, as to be used for an exercise like eSNI, is quite different, and to some extent also depending about the model format. This forms a new specialisation and expertise at the overlap of economics and ecology. Van Tuinen clearly is no specialist in this, and his statement of "uncertainty" is also an expression of ignorance and lack of awareness that countries will have to allow the rise of this new area of professional international discourse. In his managing position, Van Tuinen would have been advised not to meddle with this newly arising field of expertise.

Consider a medical doctor who refuses a patient more information about his or her medical condition since "we cannot take responsibility to give more information because it is disputable by what standards we can establish when you are dead". Since *all this concerns information*, the proper approach is to provide the information, including about what that dispute would be about.

25.11.2.3. *Intermediate conclusion on content*

Van Tuinen's suggestion that a national statistical office doesn't take responsibility for calculating and publishing eSNI itself does not convince. The uncertainties about environmental sustainability standards and model are not as prohibitive as Van Tuinen suggests (and suggests only, for does not prove). Part of the very research is precisely to report about the uncertainties that have been encountered. While Van Tuinen discusses the uncertainty in the estimate of eSNI, he neglects the invalidity of NI w.r.t. environmental policy, see Section 5.5.

25.11.3 *Necessary or sufficient conditions, inconsistency*

Above quote by Van Tuinen (2009:451) uses the term “include”. He does not explicitly specify this in this paper, but it is his personal view (personal communication), that the two conditions tend to be sufficient as well, and that an national statistical office might calculate eSNI *if and only if* other bodies take responsibility for standards and model (e.g. PBL Netherlands Environmental Assessment Agency and Central Planning Bureau (CPB)).

- However, these conditions are basically satisfied, almost by definition, since standards are not *set* but referred to, so that authors in science take the responsibility, and there are more economic models available of which the best can be taken for the purpose at hand.
- Verbruggen (ed) (2000) had calculated eSNI, with environmental standards taken from the literature and IVM taking responsibility for the model, so that precisely these two conditions by Van Tuinen had been satisfied. But Van Tuinen, reading the IVM report in 2000, still rejected calculation by CBS.

If there is no hidden third condition (it cannot be money ¹⁹⁷), then the argument is basically inconsistent: If conditions are satisfied then it can be calculated by CBS. If conditions are not satisfied then it can be calculated outside of CBS. If it is calculated outside of CBS then the conditions are satisfied. CBS won't calculate it.

25.12 *E. Jargon of CBS Statistics Netherlands*

Van Tuinen (2009:461) also uses jargon that is conventional at CBS Statistics Netherlands, and perhaps wider in official statistics, with the distinction between “regular” and “experimental” statistics. This jargon is not relevant for a discussion on *content* whether or not to publish eSNI *on a regular base in time*. Nevertheless it may cause confusion. For clarity:

- The word “regular” in official statistics rather means something like “approved” and what can be calculated and published in a more routine fashion. This bureaucratic criterion creates a binary: all that is not “regular” is seen as “irregular” and potentially problematic.
- Not being classified as “regular” does not mean that it cannot be published regularly in time, with a distinction between *time* and the official word “regular”.
- In practice, statistics that are published regularly in time may also be regarded as bureaucratically “regular”, since it might be seen as curious when an experimental series is published regularly in time without achieving this bureaucratic status. However, the distinction between *time* and *label* remains.
- When eSNI has uncertainty, it need not be “experimental”. This holds a fortiori since there is a proof of concept since 2000.
- It is a bureaucratic view and tautology that bureaucratically “regular” statistics imply “undisputedness”. One can imagine that a national statistical office might not want to publish a statistic regularly in time and have to defend its quality at each moment of publication. The bureau would want to see this dispute come

¹⁹⁷ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

to an end. This bureaucratic wish need not be science, but at the bureau the bureaucratic view tends to dominate.

- The jargon facilitates a confusion, namely to reason from uncertainty to “experimental”, to “disputed”, to thus “not regular”. This is a fog of terms that is not targeted at scientific clarity.
- Since Van Tuinen uses this jargon, it might not be quite clear what he means on content, while it remains clear that he allows that eSNI is calculated and published outside of CBS Statistics Netherlands. Though Van Tuinen does not state so explicitly in this paper, according to him eSNI is not income according to SNA and thus it does not pertain to *national income accounting* done at a national statistical office: thus its calculation can be done elsewhere.

The Van Tuinen (2009) article is by a former board member in the *Journal of Official Statistics* and thus we must allow for some jargon and fog of decision making in bureaucratic conditions, but the editors of the journal are advised to apply more scrutiny on the underlying scientific argumentation, and to not let the boardroom take over scientific discussion and its terms.

25.13 F. The main consideration: A worry about a discussion about uncertainty

Van Tuinen (2009:461) actually has *another* consideration than uncertainty itself, namely a *worry about dispute* about uncertainty:

“Official statistical institutes have to provide society with undisputed information. (...) Relatively inaccurate statistical information is only published if a consensus exists that the information is by far the best available and it may be accompanied by some sensitivity analysis.”¹⁹⁸

We may concur with the care about uncertainty but not with the *worry about discussing uncertainty*.

25.13.1 An ill-defined condition

Undisputedness is not a *well-defined* and *single catch-all* condition. The suggestive statement cannot be maintained. Van Tuinen's statement is inconsistent, since he doesn't treat all statistics on an equal footing:

- If this statement were true then CBS would not publish NI. CBS itself publishes studies that warn about *widespread misuse when NI is interpreted as an indicator of welfare*. The theory and application of NI for environmental policy making is highly disputed and very controversial within environmental economics, with also serious effort at green accounting also at bodies of governance like UN, OECD and World Bank, and for CBS and Van Tuinen too. CBS itself publishes indicators like on greenhouse gases because NI is deficient on the environment. Yet CBS does not present NI as an “experimental”, and Van Tuinen still presents it as an “undisputed” statistic. Thus NI is both “disputed” and “undisputed” ? Undoubtedly NI is relevant for a

¹⁹⁸ We see again the jargon of official statistics with a distinction between “regular” and “experimental” statistics, so that “regular” statistics should be undisputed. This jargon suggests that there are only two categories, while there obviously are more. The jargon confuses *time* with the administrative *label* “regular”. Our discussion concentrates on content.

wide range of applications other than the environment, but this only shows that the true criterion is not “undisputedness”.

- If it were true that a single occurrence of dispute would break the “consensus” then certainly the criticism by environmental economics and the very eSNI would block the publication of NI. Yet CBS still publishes NI.

In truth NI, with its legal base and use of market prices, might be well accepted for purposes of taxation and budget deficits, while at the same time there is dispute in science on the use of NI for environmental policy making. The latter would require a solution, also by official statistics.

Though Van Tuinen (2009) is a personal publication, the circumstances, like the CBS “motto” at the time (“undisputed statistics”), suggest that the proposed solution approach by eSNI has been rejected by CBS indeed by the application of such an ill-defined “criterion”. The successors of Van Tuinen at CBS could argue that eSNI was calculated by IVM and not CBS. The ministers allocated the budget to RIVM-MNP-PBL,¹⁹⁹ and see Chapter 21 for a likely cause how it got stopped there, with RIVM-MNP-PBL apparently lacking understanding of welfare economics and national accounting.

PM. Below we will see the potential oxymoron but more likely inconsistency: “these disputes are needed for keeping official statistics undisputed”.

25.13.2 Sensitivity analysis on eSNI

There is no sensitivity analysis on Dutch eSNI yet indeed, mainly because of lack of funds, partly because of priority and conceptual issues. We may welcome the implied suggestion that national statistical offices become involved in eSNI and perform this sensitivity analysis. There are two important aspects:

(i) It is unknown how the economy will react when it moves closer to environmental sustainability. Ideas about this are basically a shot in the dark, or perhaps a shot into the past before the new scarcity. Thus any “judgement” about the outcome of a sensitivity analysis is a shot in the dark too. A norm could be to use the model and its elasticities in the year of observation, and not insert needless variability by trying to guess about unknowns. Alternatively, for stability in comparing NI and eSNI in the different years, those might also be calculated by the latest model. There is more knowledge for a sensitivity analysis on the sustainability standards, but those are not as uncertain as suggested.

(ii) IVM performed an Alleingang scenario but this cannot be part of a sensitivity analysis since it is a confusion and misrepresentation of the definition of eSNI, and also a misdirection of research funds, see Section 21.9.12.

25.13.3 Consensus versus scientific discussion

The true criterion for presenting statistics doesn’t lie in “undisputedness” or “consensus” but – as *sufficient* and also *necessary* reason – in science and social respect for science, with scientific discussion when it arises. National statistical offices obviously are bodies of governance and have their own considerations but

¹⁹⁹ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

the bedrock foundation remains science,²⁰⁰ and national statistical offices shouldn't mistake a discussion about uncertainty and invalidity as an indication of disputable quality, or suggest that official statistics should not be willing to clarify such misconception if it occurs amongst users.

To some extent one can understand aspects, related to the consideration on undisputedness, which is also why Van Tuinen's reasoning might seem to be persuasive even while it is internally inconsistent. A recent revision of the figure for NI caused a higher contribution of the Netherlands to the EU, and it can be beneficial for society when people are willing to pay rather than reject the revision for being disputable (given the revision in the first place). Perhaps the superficial description of such a situation indeed comes with the term "undisputed" but the real cause likely is habituation, which is quite another aspect.

25.14 G. *A single hole may sink the mighty ship*

Above quote of Van Tuinen (2009:461) can be expanded to reveal more illogic:

"Official statistical institutes have to provide society with undisputed information. That is why they avoid publishing statistics of low quality. Relatively inaccurate statistical information is only published if a consensus exists that the information is by far the best available and it may be accompanied by some sensitivity analysis. In most countries, official statistical institutes do not publish forecasts or statistical analyses based on disputable assumptions. Statistical information that "strikes the balance" between GDP growth and e.g., environmental deterioration is not produced because it requires disputable, or even controversial, assumptions. (...) It is said that "trust comes on foot and goes on horseback" and guarding the trust in official statistics is a prime task. (...) But if one of its statistics runs into problems, the whole system is at risk."

The major drawbacks have been discussed above, and the expanded quote allows some additional comments.

25.14.1 *Sensitivity analysis on NI*

The reasoning on sensitivity analysis would apply to NI too when it is used for environmental policy making. While Van Tuinen is afraid that the eSNI criticism on NI will put the whole NI and reputation of CBS Statistics Netherlands into jeopardy, the situation actually is that NI is valid for many purposes but invalid for environmental policy making, so that rejection of this critique and refusal to perform the eSNI sensitivity analysis on NI actually creates the risk on reputation that Van Tuinen wants to prevent.

25.14.2 *Deficient referencing*

Van Tuinen (2009:451)'s suggestion on a supposedly disputable quality of eSNI, explicitly on sustainability standards and model, has no other reference than Verbruggen et al. (2001) at IVM, and does not refer to Hueting for countervailing

²⁰⁰ CBS was founded in 1899 by the efforts of a scientific association, itself founded in 1849, with the objective to gather statistics for policy making. This association now calls itself KVS or Dutch association for political economy: <https://www.esb.nu/service/overkvs#over-de-vereniging>

insights – though those can be found in the same Symposium book – and he does no sensitivity analysis, while he cannot require that Hueting did so when CBS did not provide the funds. While uncertainty can be readily be agreed upon, this assertion on low quality has disputable referencing.

25.14.3 Funds

Van Tuinen (2009:463) suggests to “Earmark 2 percent of the total budget of official statistics for strategic research projects (8.2)”, which apparently would include eSNI that costs 0.25%, or, since estimates are now only once in 5 years, 0.05% per annum. This budget apparently was not available for eSNI after the retirement by Van Tuinen.

25.14.4 A moot point

A moot point remains: Hueting & De Boer and Verbruggen (ed) (2000) have used “by far the best available” information w.r.t. the sustainability standards and the model. Van Tuinen inserts the additional condition that there must be “consensus” on this, and this is unrequired and counterproductive to science and society. The selection of this best available information was done at CBS Statistics Netherlands. Instead of that Van Tuinen defends CBS and its work, his implied suggestion is that criticism by others, inside or outside of CBS, would *devalue the quality* of this work at CBS, merely because of the *existence of a discussion about uncertainties*. This is more than curious. It sacrifices the reputation of the work by these authors on a misconceived altar of the reputation of CBS that apparently is seen as linked to the reputation and legal base of NI, of which the perceived certainty and undisputedness must be guarded against the criticism about its invalidity w.r.t. the environment. This implication of Van Tuinen’s statement likely was not intended by him in this manner, but it exists. A discussion on content and uncertainty is greatly appreciated but such a general implication goes too far.

25.15 H. Subsidiary aspects

25.15.1 Topics like happiness

Van Tuinen (2009) also discusses other topics, like happiness, which has the benefit that his article might attract a wider readership, yet it would have been useful to indicate the ranking of importance. Perhaps there might be some importance of the vital living conditions for future generations, and thus more emphasis that national statistical offices are advised to start calculating and publishing their own eSNIs.

25.15.2 Self-serving statements

The following statement by Van Tuinen (2009:441) is rather self-serving (though, come to think about it, he actually describes Hueting):

“An essential competence of official statisticians is being unbiased, cultivating an undistorted view on reality and having an eye open for all developments that could be relevant. It is difficult to find occupations or institutions where open-mindedly looking at what is going on in society is so important a core competence as it is in official statistics. It enables the

statistician to be among the first to discover new developments that ask for new statistical descriptions. A rational society will expect the statistician to do so, because they look to him or her to produce unbiased descriptions of reality. This logically implies that the statistician is responsible for keeping up with reality. The statistician should be the first person to show the user of his or her statistics the relevant blind spots, why filling information gaps is important and how this can be done. The statistician has to convince the satisfied user that he or she should in fact be unsatisfied. The statistician must become a statistical entrepreneur.” (p441)

One supposes that the following can be done for a Monitor Broad Welfare:

“The virtual reality of statistics dominates our view of economic progress. It is relatively easy for official statistics to combat this misinterpretation. At least two things could be done. First, in the main National Accounts aggregates elements of GDP or consumption, which represent costs rather than direct sources of welfare should be displayed separately. Inevitable arbitrary judgements can be processed in alternative variants, provoking users to take part in the conceptual discussion. Second, elements of welfare that are not included in consumption (e.g., satisfaction in work) can be identified, measured (starting with survey measurement of elements of wellbeing) and presented in a context of economic growth and welfare. In this way, an antidote against contagious conservatism could be developed, stimulating conceptual debate on the basis of statistical data of alternative concepts.” (442)

It remains curious that the above could not be done for eSNI, so that Van Tuinen has it calculated outside of CBS.

Also, CBS might provide information about asyms A so that users can determine GDP minus asyms (NI-A), but Van Tuinen would hold that CBS itself wouldn't do the calculation $NI-A = NI - A$, nor present the concept, nor use it to compare with eSNI, because all of this would be in dispute, and *one hole might sink the mighty ship*.

The following again blames the users themselves for not understanding what NI is, and neglects the own responsibility by national statistical offices w.r.t. the notion of income, see Section 11.3:

“This leads to the conclusion that official statistics, in order to increase its ability to “keep up with reality,” must develop the scientific attitude, creativity, courage and external communication skills, needed to create a high-quality innovative organisation. This includes challenging categories of users entangled in virtual realities by showing them blind spots in their views of reality. It may include initiating controversial debates about the current interpretation of GDP growth and unrealistic elements in mainstream economics. In the long run, these disputes are needed for keeping official statistics undisputed.” (p462)

At best, the latter “*these disputes are needed for keeping official statistics undisputed*” is an oxymoron, and a figure of speech. Van Tuinen would want

official statistics to block *disputes* about the regular information about reality, and keep those disputes *outside of* the building: so *there is no real way* how disputes outside of the building can enhance the “undisputed” quality of official statistics when it “keeps up with reality”.

In the worst case it is an inconsistency. Likely it is the latter.

Would such blind spots exist within CBS Statistics Netherlands ? Hueting at CBS initiated eSNI, and Van Tuinen may claim that CBS did it. But once initiated by the *Methodology* in 1992, the work by CBS on the issue was completed, the foreign body was repelled from the system, a word of support was uttered, and the temporary dispute apparently was needed (albeit by the successors), as excuse for repelling it permanently and to keep official statistics supposedly undisputed again. It is inaccurate to call this “the scientific attitude”.

25.15.3 *A second moot point*

Van Tuinen has been head of the department of National Accounts, and thus worked at an environment with “undisputed” figures. Perhaps there was strong discussion in-house but supposedly little from the outside. When there was criticism from the angle from the environment by the Hueting (1974a, 1980) thesis, then he managed to neutralise it, either by blaming users for mistaking figures as belonging to welfare economics, or by having Hueting agree that asymmetric bookkeepings would be incomplete, so that this issue was shelved and Hueting continued looking for a complete solution.

At the board of CBS, Van Tuinen might be someone less used to dispute and be predisposed to judge in favour of the “Dutch view” on the national accounts. Van Tuinen’s view on eSNI is not about the meaning of eSNI, that he apparently doesn’t fully grasp with respect on the criticism of the notion of income. He seems primarily focused on handling internal dispute, that also breaks out into the open by Keuning (1996) and questions in Dutch Parliament, and protecting the reputation of official statistics. As a member of the board, this attention for reputation would be one of his tasks. He might have seen himself sailing between Scylla and Charybdis and then deciding not to listen anymore. A scientist would have made sure to fully understand the concepts involved, and take the road towards clarification instead of putting eSNI outside of CBS. (Perhaps Van Tuinen intended to do so, but then some younger person came along and made the fatal suggestion (see page 276) to actually calculate eSNI outside of CBS ?)

25.15.4 *Statements suggestive of an open mind*

Van Tuinen (2009) provides various considerations that would suggest that he would be open to the issue, but these considerations are misleading because he appears not to be open to the issue, and neglects the fundamental argument w.r.t. the mission of a national statistical office.

- (1) In his view, users are responsible for choosing the viewpoint from welfare economics, and not official statistics: “But if official statistics are to assist users in forming a view of welfare or progress, by striking a balance between GDP growth and environmental degradation, the answer is “no, not a complete success.” (p438) It is not clear how he measures “*not a complete success*”,

and why he does not state “*grand failure*”, with direct own responsibility for misinforming the world about “income”.

- (2) “If GDP grows and, at the same time, the environment deteriorates, nothing can be concluded about changes in true economic welfare. In order to produce an indication of growth of economic welfare, the statistician must strike a balance between GDP growth and environmental deterioration, for instance by applying a concept like a green GDP.” (p438) This would be impeccable, but from another point of view than from the viewpoint of official statistics, since later Van Tuinen in official capacity blocks it, unless the latter is only *playing along* with users who want to see “economic growth”.
- (3) “GDP growth sends misleading signals about the progress of developed economies” (p431) This is only so when you show *why*, and when you do not only blame *users* but also properly present Hueting’s analysis that official statistics have an *own responsibility* w.r.t. their job on separating income and expenditure, see Section 11.3.
- (4) “In spite of all this theory and evidence, the volume of GDP growth is the dominant indicator of economic progress worldwide, (....)” (p437) He again *blames the users* for not understanding what statistical offices do on SNA, fully neglecting the own responsibility.
- (5) “Per capita growth of GDP has remained the most important indicator of welfare in mainstream economic policies.” (p439) Idem dito.

26. Peter van den Ven 2009 and 2019

Peter van de Ven finished gymnasium in 1977 in 's Hertogenbosch (a town also famous because of the painter Hieronymus Bosch who made *The Garden of Earthly Delights* ca. 1500, and it is tempting to put away this book and start looking at that painting again), got his masters in macro-economics in 1984 in Tilburg, joined CBS at the department of National Accounts (NA), worked amongst others on NAMEA under supervision of Steven Keuning, was head of NA 2003-2011 and moved to OECD head of NA since.

eSNI belonged to the official Dutch government's strategy for sustainability, in the wake of Johannesburg, see Ministry of VROM (2002). The advisory bodies were instructed by their political masters to continue to develop the indicators. The Ministries also provided funds for calculating eSNI in five-year intervals.²⁰¹ CBS et al. (2009a) *Monitor Duurzaam Nederland 2009* (MDN 2009) is the result of this continued improvement. eSNI however got removed from the MDN 2009, with misrepresentation. The project leaders at CBS were Rutger Hoekstra (Chapter 27) and Jan-Pieter Smits (Chapter 28) but we may surmise that they needed approval by the key responsible CBS head of the department of National Accounts, Van de Ven. On October 15 2009 the Ministries that commissioned the MDN organised a symposium to review the monitor. The report of the symposium is CBS et al. (2009b).²⁰² Section 21.11.1 and Chapter 40 discuss aspects of this. This present Chapter looks at more information about the views by Peter van de Ven.

At the symposium Van de Ven did not specifically refer to eSNI but gave similar arguments that already have been debunked in Section 21.11.1. We now basically look at the progress since then.

Van de Ven (2019) "*Measuring economic well-being and sustainability: a practical agenda for the present and the future*", was published in July in EURONA, the *Eurostat Review on National Accounts and Macroeconomic Indicators*.

It is important to observe the context. The *Editorial* of the issue states the relevance of the present discussion.

"the 50th session of the United Nations Statistical Commission, held in March 2019, welcomed the establishment of three dedicated work streams to review the relevance of the 2008 System of National Accounts (SNA) for measuring new economic and social developments. The three work streams concern digitalisation, globalisation, and well-being and sustainability. Work on these topics will determine the directions to be taken in the next iteration of the SNA."

Van de Ven (2019:27) has good news:

"The uptake of implementing SEEA-consistent accounts has been relatively good, with currently 69 countries having programmes on

²⁰¹ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

²⁰² <https://www.pbl.nl/publicaties/verslag-symposium-en-review-van-de-monitor-duurzaam-nederland-2009>

environmental-economic accounting. The goal for 2020 is to have at least 100 countries with ongoing, well-resourced programmes in line with SEEA 2012 – Central Framework. Within the European Union (EU), the compilation of a number of SEEA-based accounts is even mandatory through a set of regulations. Furthermore, global databases are being developed, with priority given to accounts for air emissions, energy, material flows, land, and possibly water. At the OECD, a programme has started to build up databases for emissions to air, mineral and energy reserves, and, in the near future, environmental taxes. These accounts will gradually be extended, by collecting national data and by including own estimates for missing countries.”

Van de Ven (2019:28) seems to be aware of the challenge of ecological survival:

“Paragraph 2.31 of SEEA 2012 — Experimental Ecosystem Accounting (SEEA-EEA; United Nations et al. (2014b)) defines ecosystems as ... *spatial areas comprising a combination of biotic and abiotic components and other characteristics that function together*. These assets provide ecosystem services and benefits used in economic and other human activity, a rather euphemistic formulation for services on which human and other life depends. (...) *In SEEA Experimental Ecosystem Accounting, it is recognized that spatial areas must form the basic focus for measurement.*”

Van de Ven (2019:26) states: “It is clear that the 2008 SNA deals poorly with issues relating to environmental sustainability.” What does he propose to do about this ? Observe that the SNA-amendment of eSNI is not so large: only 5 personyears per national statistical office for the modeling using data that are collected anyway. It is a minor expenditure that corrects a major error of misinformation by NI with respect to the crucial issue of environmental sustainability. However, Van de Ven does not give reasons why he rejects eSNI, he simply does not mention it at all.

Major criticism w.r.t. Van de Ven (2019) is:

- (1) He does not refer to Tinbergen & Hueting (1991) or any work by Hueting. Note that Hueting & De Boer (2019b) were published around the same time in 2019 and could not yet be referred to, but the earlier works were available.
- (2) He refers to Stiglitz et al. (2009) as a major criticism to the current NA but this hides 30 years of earlier criticism, while their report is deficient w.r.t. the Tinbergen & Hueting approach.
- (3) Page 29 (top) has this statement:

“The allocation of the benefits derived from ecosystem assets and the use of these benefits either for the production of goods and services or for direct final consumption can be quite problematic.”

He does not distinguish between: (i) Tinbergen & Hueting (1991) who only measure shadow prices found at standards for environmental sustainability, (ii) ecologists who want to value such “services” also at current unsustainable use. Curiously, at OECD in 2019, Van de Ven now has to deal with ecologists, like

Hueting already at CBS in 1969 onwards had to deal with them, in which the economist gets the role to have to explain to the ecologists that economic valuation requires knowledge about economics. Van de Ven apparently has to deal with the same ecologist R.S. (Dolf) de Groot as Hueting had, see Section 21.9.4. Van de Ven apparently is not aware that De Groot cs. apparently deliberately deviated from Hueting's terminology, which made Hueting's work less accessible to ecologists trained by De Groot cs. and now apparently also less accessible to economists like Van de Ven, see Section 7.10 on terminology.

(4) Page 29 (top) has this statement:

"It is therefore not possible to simply deduct the loss of ecosystem services from value added and GDP in order to arrive at macroeconomic indicators of economic activity that are adjusted for depreciation, depletion as well as degradation of ecosystems. If economic agents actually had to bear these costs, a completely different combination of economic activities would have been observed, and thus a completely different level of GDP."

The word "simply" is abused here. The simplicity of arithmetic should not be confused with the underlying complexity of Tinbergen & Hueting (1991). While the Tinbergen & Hueting approach clarifies that NI is *invalid* for the economic analysis on the environment, Van de Ven replies with a statement on *uncertainty*, which is changing the subject, see Sections 7.4 and 5.5. He shows that he is entirely unaware of the revolution in the *measurement in economics*, even though he worked at CBS in 1984-2011 where it happened. His statement implies that Tinbergen & Hueting would be dimwitted on the meaning of such price changes, while such different prices and their effects were the precise target of Tinbergen & Hueting (1991).

PM 1. Hueting accepted part of the criticism by agreeing with a model to include such behavioural effects, but this should not distract from the main point of (in)validity.

PM 2. Keuning (1996) gave the same argument (though not specifically referring to ecosystem services), see Section 24.6, and Van de Ven should have referred to the refutation, also taking into account the Verbruggen (ed) (2000) calculation.

PM 3. If I understand Vanoli (2014:9 & 33-34) correctly then he has the same argument, but he might also confuse the within-period decomposition in price and volume reactions and the across-period deflation to a common price-level see Section 11.7.

There is also the minor point of Van de Ven (2019:9)'s vague statement:

"Thirdly, it may not be possible to find what is considered by some as the holy grail, one catch-all indicator that provides a perfect monitoring instrument for welfare or wellbeing, which also takes into account the present-day losses (or gains) in the possibilities to generate future well-being."

It would have been helpful if Van de Ven had specified who those "some" are. There are some like Tinbergen who for the purpose of forecasting think that the welfare optimisation technique could be useful, see Section 9.2. Instead, if the

statement is a somewhat furtive put-down of eSNI as a supposed effort to find a social welfare function also for statistics, then it amounts to a misrepresentation. We may assume that Van de Ven has no intention to put down either Tinbergen or Huetting but the use of language may contain a legacy of a dismal situation at CBS Statistics Netherlands.

The advantage of the discussion by Van de Ven (2019) is that it shows progress on the UN SEEA and a clear focus that something needs to be said about environmental sustainability. The world of statistics has been kicking the can down the street since 1990 and the changes in the environment are such that even statisticians may start wondering that something ought to change for themselves too.

27. Rutger Hoekstra 2009, 2013 and 2019

27.1 Introduction

Hoekstra (2019b:xvii) states that he has a MSc in environmental economics (Wageningen) and a PhD in ecological economics (VU). He wrote his thesis in 2003 with supervisor Jeroen van den Bergh at VU Amsterdam with the title “*Structural change of the physical economy: Decomposition analysis of physical and hybrid-unit input-output tables*”. The latter subject is closely linked to *techniques* of national accounting but quite different from the current topic on *welfare theory and national accounting*. Thesis supervisor Van den Bergh claims expertise on the latter two fields too, but apparently is deficient on this, see Chapter 35. Van den Bergh wants to get rid of (attention for) GDP and Hoekstra refers uncritically to his work. Hoekstra had better listened to Hueting’s protest to Van den Bergh as a warning to study Hueting’s work and protect it (and himself) against the misrepresentation by Van den Bergh. Hoekstra (2019:xxvi) expresses “special thanks” to Van den Bergh instead of deconstructing the misrepresentation. Apparently Hoekstra is similarly incompetent as Van den Bergh, which is awkward since he worked since 2003 at CBS Statistics Netherlands on national accounts and in 2007 became project leader on indicators, with some advice for the EU and on the UN Sustainable Development Goals (SDGs). Though Hoekstra called himself an environmental economist he now calls himself an *expert* on *GDP and Beyond*,²⁰³ while this chapter shows that he lacks the basics.

Hoekstra (2019b) “*Replacing GDP by 2030*” aims to replace *the role of* GDP, which objective is different from the title *Replacing GDP*. The aim in the title is a sufficient but not necessary condition for replacing its *role in policy discussion*.

Thus, Hoekstra follows Van den Bergh in confused statements about abolishing GDP. Hoekstra has a motivation like Van den Bergh to minimise attention for the Tinbergen & Hueting approach which maintains GDP.

This chapter will show that Hoekstra’s book fails in analytical clarity. His book is best neglected, and regarded as the phantasy by an incompetent researcher who ventures into another subject without proper study. I would rather not spend attention to it. However, it is hard pounding again. We better deconstruct it, in order to gauge the situation w.r.t. the Tinbergen & Hueting approach at CBS Statistics Netherlands and at international fora that have received advice by CBS.

27.2 2009 and 2013 at CBS

Rutger Hoekstra and Jan-Pieter Smits (see Chapter 28) (also from VU) were project leaders at CBS Statistics Netherlands for the *Monitor Sustainable Netherlands* 2009 (Dutch MDN 2009) (see Section 21.11.1), and formed the *Task Force on Sustainable Development* (TFSD) of the *Conference of European Statisticians* (see Section 21.11.4). Both studies eliminated eSNI from the list of relevant indicators for sustainable development, with a misrepresentation of the Tinbergen & Hueting approach, see the discussion there. See Section 9.2 for a

²⁰³ <http://metricsforthefuture.com/>

major misconception by researchers at CBS. See Section 9.5 of the apparently existing *citation malpractice* at VU. This current Chapter has an appendix on 2013.

Hoekstra (2019b) dedicates his book not only to his wife and kids but also to J.-P. Smits, whom he also mentions in his preface and on his page xxiv. One wonders whether Hoekstra ever checked J.-P. Smits's expertise on the subject.

27.3 *The other aim by Hoekstra (2019b)*

We must distinguish Hoekstra at CBS in 2003-2018 from Hoekstra (2019b). The latter book has the stated aim of looking somewhat beyond economic statistics and the UN sustainability development goals (SDGs). A problem is that Hoekstra p112 presents a confused terminology. See for reference our clarity in Sections 7.10 and 7.11. With his confused terminology, Hoekstra:

“Economic methods are not applicable to all situations. What is needed is a science which is truly multidisciplinary in nature. Economics, both mainstream and heterodox, should be included in the [new] science but economists should not be in the lead. Terminology aligned in welfare theory and the capital approach should be replaced by more neutral terms. The aim is to create a community for well-being and sustainability *science* [WSS] rather than well-being and sustainability *economics*.” p113

“The overall effect (...) will be to broaden the range of quality assessment methods. This will also help to wean society away from the dominant economic methods such as welfare economics and the capital approach. This does not mean that these approaches should be rejected. These economic perspectives definitely have value, but they are currently too dominant in society's perception of when things are getting better or worse. A second advantage is that the quality accounts might lead to a multidisciplinary cooperation with provides even more perspectives beyond what a single scientific discipline can provide.” p121

“The Stiglitz report was written ten years ago. There have been successes in terms of institutionalisation but, given the long time span, progress is somewhat disappointing. (...) This book argues against a process based upon economic theory.” p241

“The most important aim of this book is that a sense of urgency emerges: something needs to change. This book is meant to provoke other researchers to think about their own strategy.” p243

One is reminded of the ideals of *unified science*²⁰⁴ and consilience,²⁰⁵ but now duly recorded by accountants. My problem with Hoekstra's aim is that he does not define what he regards as “well-being” and “sustainability”, so that it is not clear what this science would be about, even if it is “urgent”. Perhaps it is the purpose of this WSS to discover what it is about ? On p250 he refers to the wealth of data at Google, expresses fear of abuse, and resolves this by stating: “A healthy balance will have to be found.” This is as specific as a sermon to be good for one's

²⁰⁴ https://en.wikipedia.org/wiki/Unified_Science

²⁰⁵ <https://en.wikipedia.org/wiki/Consilience>

neighbour. In itself, his page 242 provides for a nice summary of his aim, but as a catalogue of hazy images. In contrast, economic theory has a definition of its subject matter, and within economics we define notions of well-being and environmental sustainability. Well-being is basically an empty box, consider for example that Socrates accepted his death sentence (honour, immortal impact) rather than fleeing from Athens (dishonour, forgotten). Tinbergen & Hueting criticise fellow economists for being confused on the term “sustainability”. Tinbergen & Hueting looked at the urgent problem of ecological survival, while Hoekstra, as a claimed environmental economist, is remarkably attracted to the quite elusive notion of happiness. (Socrates was (un)happy to commit suicide because ?) I can only infer that Hoekstra is another confused incompetent, and that his vision *beyond economics* is only part of his confusion. Hoekstra correctly refers to “economic imperialism” (economists venturing into other fields of science and learning) but there is also the imperialism by confusion.

Hueting (1990c) already criticised the Brundtland report for having conflicting goals and hiding the conflict. At that time, scientists for the conservation of nature and the environment at IUCN had made a forceful argument, and the Brundtland commission had been created to answer this. Instead, Brundtland sabotaged the discussion by expressing a dream, a *fata morgana*, and did not present an analysis on how to come to terms with the conflict. Stiglitz-Sen-Fitoussi in 2009 repeated the criticism that the term “sustainable development” refers to both development now and sustainability later, which tends to hide the conflict between the generations. Hoekstra p115 does not defend CBS-colleague Hueting against being buried. He joins Stiglitz-Sen-Fitoussi and others in burying him. He also replaces “development” by “well-being” and “happiness”. In criticising the Brundtland report, it is not sufficient to criticise their word-smithing by starting a new round of word-smithing yourself, and getting lost with lack of definitions.

Hoekstra's other point is the open door that there is not only economics but there are also other sciences. See the calculation of eSNI for the reliance on other fields of science for the derivation of the standards for conservation of nature and environment.²⁰⁶ It is curious that Hoekstra writes his lines as if he himself invents the need for multidisciplinary. It is laudable though that he also wants to induce biologists to become accountants too. Biologist Dolf de Groot abuses terms from economics without proper background in economics, see Section 21.9.4. Hoekstra is welcome to try to teach De Groot the principles of economics and accounting, but will meet with the problem that the pupil doesn't want to learn but to teach himself, as likely has been the case with Hoekstra himself too.

Hoekstra (2019b:257) rightly points out that the UN has a clear mandate since the Earth Summit in Rio 1992. He also criticises the failure in providing a “comprehensive and compulsory scientific process” for the mandate. If only he had repented that he has been sabotaging the Tinbergen & Hueting approach himself.

27.4 *There is no distinction actually*

Overall, we find that Hoekstra (2019b) restates mostly the same misconceptions as in his period at CBS 2003-2018. His book is no break with his past but its expression. With the aim of his book found void, let us consider some aspects.

²⁰⁶ <http://www.sni-hueting.info/#Norms>

27.5 GDP does not account for the environment

Hoekstra (2019b:70-73) discusses that GDP does not account for the environment. He gives the example that the clean-up of an oil spill by a tanker adds to GDP while the earlier environmental loss is not subtracted. Hueting calls the latter “asymmetric bookkeeping”, but this term is not mentioned by Hoekstra. Hoekstra refers to some authors, like his thesis supervisor Van den Bergh who misrepresents the Tinbergen & Hueting approach, see Chapter 35, but Hoekstra also manages *not* to mention the Tinbergen & Hueting approach here. Hoekstra p73 then takes issue with nameless people (Tinbergen, Hueting and others) who criticise the SNA on asymmetric bookkeeping (my emphasis):

“Finally, there is a rhetorical trick that is often used in the Beyond-GDP literature. The trick is to **malign** the accounting rules of the SNA by pointing to some counterintuitive development. (...) What is perhaps not realised is that all these [malining] statements have a particular pattern.”

The latter pattern consists of hiding (p74):

“(...) that GDP is meant to measure the size of the economic activities and not the well-being effects (...)”.

The claimed malignancy is that authors like Tinbergen and Hueting would misrepresent the latter true purpose of SNA. One wonders how Hoekstra PhD manages to forget the scientific discipline of following an argument step by step. Hoekstra suggests that the original oil spill by a tanker was no part of “economic activity” (but perhaps “an act of God”, a common term in insurance) and thus can be neglected. While he knows that many choices in accounting can be arbitrary, he fails to accept a discussion about this particular choice. Hueting wants to correct for the impact on the environment. If the clean-up is recorded then also the spill should be subtracted, and the end result would be the same as the original situation, and all production has resulted in nought for the environment, except that we now can identify the costs for environmental restoration. That is all. Tinbergen and Hueting leave GDP as it is, but indicate the error w.r.t. the asymmetric bookkeeping. Surely an environmental economist ought to understand this, but Hoekstra miraculously doesn't. In formula, NI corrected for asymmetric bookkeeping: $NI-A = NI - A$.

Thus, in Hoekstra's discussion of GDP and the environment, he misrepresents the relation of GDP to the environment, burkes Hueting's analysis, slanders Tinbergen & Hueting as malign who present a scientifically valid reasoning, and actually is the one who is doing the malining – if this is the proper term, because one rather thinks about incompetence.

The problem actually goes deeper. Hoekstra's suggestion that GDP would measure the size of “economic activity” is erroneous since GDP measures *production* and not economic activity, see Section 1.3. While Hoekstra (2019b) refers to Hueting's thesis (1974a in Dutch) we must infer that he hasn't studied it. We encountered this already in the discussion about terminology in Section 7.11.

27.6 Hoekstra (2019b) on Tinbergen (1903-1994)

Hoekstra (2019b:34) emphasizes that Tinbergen took part in the development of the notion of GDP, with his model of 1936 and Nobel Prize in 1969.

Hoekstra does not emphasize that Tinbergen also partook in the *GDP and Beyond* development, the very subject of his book. Tinbergen namely indicated also other goals for government policy – e.g. employment, external balance, equality, international solidarity – and also advised CBS to appoint Hueting in 1969, and he co-authored Tinbergen & Hueting (1991). Hoekstra does not explain the importance and relevance of the latter article. He mentions it only with some hiding: we find reference to it only in footnote 31 on page 91, with the “footnote” text as an *endnote* (always more difficult to find) on page 284.

I find it remarkable that Hoekstra *knows* that Tinbergen worked on national accounting at CBS and received the Nobel Prize (very much for his work there), but that Hoekstra *shows no interest* in (i) Tinbergen’s ideas on welfare theory, (ii) Tinbergen & Hueting (1991), and (iii) Tinbergen’s support for Hueting’s work, including the diagnosis that *measurement of national income requires conditional assumptions on preferences*.

Observe also that Hoekstra on p91 also puts the 1991 article in the context of his own discussion on “subjective well-being” (SWB) while Tinbergen & Hueting (1991) explicitly present an *environmental* indicator and used a measurable factor namely income. Subsequently, Hoekstra on p91 and p108 suggests a contrast with the capital approach, but then allows authors outside of SNA to confuse terms, see Section 7.10, instead of requiring those authors to respect the terminology of SNA (his area).

27.7 Hoekstra (2019b) on Hueting (directly)

Hoekstra (2019b)’s discussion of Hueting’s work is mainly indirectly (by covering same topics without reference). We find only a single direct discussion on p91:

“The MEW / ISEW / GPI approach is from the same family of green accounting aggregates. A different, rather unique, approach was proposed in 1974 by Roefie Hueting: [missing: environmentally] Sustainable National income. [ftnt 30] **[to Hueting (1974) in Dutch and not including the English translation Hueting (1974, 1980)]**. Instead of adding benefits and subtracting damages from existing macro-economic indicators, the SNI approach took environmental limits as the foundation of the methodology. The indicator quantifies the question “*how high would national income be, if the current technology were used to stay within sustainability limits?*” [ftnt 31].”

Errors are:

- (i) Hoekstra overlooks that the focus is on $e\Delta = NI - eSNI$ and the environment.
- (ii) Hueting (1967, 1968) in Dutch already proposed to use the national accounts. This concerned adding benefits and subtracting damages.
- (iii) $eSNI$ adds benefits and subtracts damages too. It is strange of Hoekstra to suggest “instead of adding benefits and subtracting damages”. $eSNI$ calculates those by using the standards for environmental sustainability.

- (iv) Hueting 1974 did not propose eSNI. This was developed only in 1986b.
- (v) Since 2007 the term is eSNI and not SNI.
- (vi) The question and the technical description with the conditional “*how high ... if ...?*” are correct but incomplete. Hoekstra’s current discussion concerns SWB (“Subjective Well-Being”) and then he should mention, which he doesn’t, Hueting’s *conditional assumptions on preferences on environmental sustainability*. Preferences directly relate to well-being and not to income.
- (vii) Hoekstra, who wants to “create” a WSS, should mention that other indicators may speak about “sustainability”, but tend not to provide a *definition* for the practical calculation of this. They actually confound the issue of environmental sustainability with other issues like happiness. (It is not so that eSNI and happiness would always be in conflict, but having more time for leisure might no longer appeal to you if you aren’t surviving.)
- (viii) It is nice of Hoekstra to refer to the early date of 1974, but he should be aware that readers of English might have problems with Dutch, and it is unclear why Hoekstra would not refer to the English translation. Most likely he hasn’t studied either the Dutch or the English edition, see Section 21.11.4.

Footnote 31 generates this text on page 284:

“The method requires estimating technology cost curves, sustainability limits and also requires assumptions about how an economy might react to imposing the technology. In its most recent application this was done using a general equilibrium model (Gerlagh et al., 2002). The method received support from Nobel laureate Jan Tinbergen (Tinbergen and Hueting, 1991).”

Errors are:

- (ix) In 2019, the most recent calculation was by Dellink and Hofkes (2008). This is not irrelevant, since the indicator $e\Delta = NI - eSNI$ works best when one can see the development over more years.
- (x) It is true that Hueting’s work received support by Tinbergen, but we should not forget that Tinbergen helped create the current system of national accounts, so that he was in the driver seat too. Tinbergen aspired at a quantitative approach w.r.t. the challenge of the environment, and he found Hueting to do it for him. From a choir of voices, Tinbergen *selected* Hueting. Tinbergen explicitly advised CBS to appoint Hueting because Tinbergen thought that Hueting was on the right track. See Chapter 22 for the different perspectives of these authors. It is not just that Tinbergen supported Hueting, which he did indeed, but Tinbergen was convinced that the national accounts should be adapted along the lines as explained in the Tinbergen & Hueting (1991) article: keep GDP – and do not replace it as Hoekstra’s title suggests – and also calculate $e\Delta = GDP - eGDP$. Hoekstra doesn’t tell it accurately, and it is remarkable that CBS Statistics Netherlands keeps neglecting *the message by Tinbergen* that such change is required.
- (xi) It is a serious error that this crucial information about the position of Tinbergen is put into a footnote. At least it should be on the same page (no endnote, in terms of books; not in terms of html).

Again rather hidden in the book we find footnote 79 on page 232, with this text in the endnote on page 303. Hoekstra recognises that the method is a *no-brainer* for econometricians, but with his focus on well-being and happiness he does not appreciate the precautionary principle:

“The Sustainable National Income is also based on the idea of the precautionary principle. This method has the advantage that it uses only information from the present (Tinbergen and Hueting, 1991). It uses the environmental sustainability limits as a basis for the calculation and then calculates how much it would cost to remain within those limits (using current technologies). Gerlagh et al. (2002) calculated SNI within the setting of a General Equilibrium Model.”

Hoekstra (2019b:91) continues with this statement:

“A third variety of green accounts emerged in the 1990s and is based on a different economic method, the capital approach. This method starts from the premise that society has certain assets (produced, financial, human, natural and social capital). John Hicks, back in 1939, defined real income as the maximum amount that could be spent on consumption without reducing the capacity to maintain the same consumption stream over time. [ftnt 32] For non-declining “Hicksian income” it is necessary to maintain a non-declining stock of capital. This is sometimes seen by economists as the conceptual equivalent of the term “sustainable development”. Based upon this capital theory, the genuine savings indicator was suggested in 1993. [ftnt 33] ”

Errors are:

- (xii) Hoekstra apparently isn't aware that the Tinbergen & Hueting approach, with the explicit name “environmentally sustainable national *income*” also uses this Hicksian notion of *income*. When he separates Tinbergen and Hueting from Hicks in such manner, he might presume that they have their own concept of income. However, the truth of the matter is that Hoekstra must be confused since he did not properly study the Tinbergen & Hueting approach, see the discussion about terminology in Sections 7.10 and 11.2.
- (xiii) For the inadequacy of “genuine savings”, see Chapters 30 and 43. It is nice of Hoekstra to list all these indicators and then preach “there are too many”, but a good method is to eliminate the counterproductive ones (using proper scientific criticism instead of Hoekstra's unscientific method w.r.t. eSNI).

On all these aspects, Hoekstra (2019b) is wholly inadequate on the Tinbergen & Hueting approach, *while he had this very job* at CBS Statistics Netherlands since 2007 to look at indicators for economic welfare and sustainability. See Chapter 26 for Peter van de Ven, apparently his supervisor at the time.

27.8 The fox preaches

Hoekstra (2019b) “*Replacing GDP by 2030*” is the preaching fox, who in 2009 burked main ideas from the Tinbergen & Hueting approach as we saw in Sections 21.11.1 and 21.11.4, and who in 2019 presents some same ideas as his own.

Hueting in 1996 presented his “*Parable of the carpenter*”, see Section 21.9.10:

“But I am worried about the existence of more than ten different methods in the literature of ecological economics for the valuation of environmental losses, with outcomes that differ by a factor of ten or a hundred or more. As far as I know, there is nothing similar in the beta sciences. I predict that, as long as this situation continues to exist, politicians and the public will react by saying: “What are we supposed to do with these outcomes, for heaven's sake?””

Hoekstra blocked Hueting's work but now preaches the same message:

“Yet as time went on, I felt a growing frustration about the Beyond-GDP scene. Around 2012, I had come across an (incomplete) database on the internet which showed that there were over 900 systems to measure sustainable development.” (2019b:xx)

Hoekstra (2019:xxi) however curiously admits that the chaos is not as large as he has presented it himself – and the situation may be quite alike Hueting 1996:

“We started focusing on the commonalities of the various measurement initiatives rather than their differences. It turned out that if you look at the systems closely, there is a surprising degree of overlap. For the European Commission we wrote *The Convergence Report* in which we argued for more harmonisation (...).”

To handle unruly numbers of indicators, one would employ and improve scientific methods, but Hoekstra (2019b:xxi) hides that he himself has used *unscientific methods* to eliminate eSNI from the Dutch MDN 2009 and the CES recommendations:

“My favourite draconic rule was: “If you want to propose the 1001st indicator system you first have to explain what is wrong with the 1,000 others.”” (In practice Hoekstra also allows unscientific methods.)

Hoekstra (2019b:241) exploits his own malpractice also in another way:

“However, these approaches have existed for a long time. Green accounting has been around since the early 1970s. Welfare-based ISEW/GPI and capital-based wealth accounting have now existed for about thirty years. The Stiglitz Report was written ten years ago. There have been successes in terms of institutionalisation but, given this long time span, progress is somewhat disappointing.”

Thus, Hoekstra *within an institution and European network* helped block eSNI, and now uses this “lack of success” (actually: his own malpractice) of eSNI to argue that progress is disappointing – even while there was the support by Tinbergen which he rather hides – and then launches “his own solution”.

Hoekstra (2019b) doesn't *analyse* why there is no “institutionalisation” (e.g. why the SNA wasn't amended with eSNI) and he doesn't deconstruct the fallacies in official statistics (like at CBS) or in academia (like Van den Bergh), and thus he cannot provide an analysis *on content*.

For the environment he doesn't resolve the choice between conservation of the environment ("strong sustainability") and (unwarranted) optimism for future technological solutions ("weak sustainability"). He only wields the argument "there are too many indicators". He only proposes a process towards harmonisation, while such process already exists, namely in the institutional processes around SNA. Somehow Hoekstra doesn't see that universities have quite different purposes than the official statistical or planning institutes built for support of policy making. Hoekstra is quite confused on the welfare theory about the use of indicators anyhow, see Section 9.2.

27.9 Summary of the malpractice

Hoekstra has the same modus operandi as Opschoor (Chapter 38) and Van den Bergh (Chapter 35) both at VU: take something fashionable that already exists, including work by others, rephrase it in new terminology so that it *seems* as if *you* have something new to tell, and insert your own misconceptions along the way so that experts may be somewhat perplexed, and would be forced to deconstruct your new terminology before they can discover that you are not saying anything new but only have misconceptions: but by that time you may already have moved to newer horizons (and in the mean time you burke others and avoid responding to criticism by others who understand your malpractice).

27.10 2019ab: Replacing GDP by 2030

Hoekstra (2019b:91) "*Replacing GDP by 2030*" mentions Hueting on p91 but not in the index. Hoekstra (2019a) in ESB is presented as a Dutch pre-publication and summary of (2019b). Hoekstra (2019a:75) mentions the name of eSNI but does not include Hueting in the list of references.²⁰⁷ The abstract of Hoekstra (2019b) doesn't mention that *Hoekstra's own* (unscientific) blocking of eSNI was instrumental in the "failure of beyond-GDP":

"How did Gross Domestic Product (GDP) become the world's most influential indicator? Why does it still remain the primary measure of societal progress despite being widely criticised for not considering well-being or sustainability? Why have the many beyond-GDP alternatives not managed to effectively challenge GDP's dominance? The success of GDP and the failure of beyond-GDP lies in their underlying communities. The macro-economic community emerged in the aftermath of the Great Depression and WWII. This community formalised their 'language' in the System of National Accounts (SNA) which provided the global terminology with which to communicate. On the other hand, beyond-GDP is a heterogeneous community which speaks in many dialects, accents and languages. Unless this changes, the 'beyond-GDP cottage industry' will never beat the 'GDP-multinational'. This book proposes a new roadmap to 2030, detailing **how to create** a multidisciplinary Wellbeing

²⁰⁷ Hoekstra (2019a) is a paper in the ESB-dossier "Meten van welvaart". Page 26-27 in that dossier has a diagram created by the editors of ESB who refer to Hoekstra (2019b) as the source. The diagram wrongly assigns eSNI to Hueting (1974a, 1980).

and Sustainability **Science** (WSS) with a common language, the System of Global and National Accounts (SGNA).” (my emphasis)

It is necessary to distinguish reality and **framing**:

- In reality there is (i) the world of SNA with standard NI and with the challenge by eSNI, see **Figure 2** on page 29, (ii) alongside there are the academia who have their own objectives, (iii) and there are the policy makers (state ministries) who may use all this information and who might selectively shop to find a scientist who supports the policy maker’s view.
- Hoekstra does not describe reality but creates an artificial **framing**, see **Table 20**. The framing perhaps captures his perceptions well, but doesn’t fit reality and the history of the theory and practice of economic statistics (with its interdisciplinary influxes). Hoekstra’s book’s abstract uses quotation marks but the book itself loses all caution about such framing.

PM. Hoekstra (2019b:117) indicates that Raworth 2012 “makes a similar point when she argues that economists have been so successful because they have managed to create iconic pictures” but that in his own book “the importance of language is stressed”. One uses an idea of someone else and gives it a new name, and there is no longer need to refer.

Table 20. Reality versus Hoekstra’s framing

	<i>Reality</i>	<i>Hoekstra’s framing</i>
GDP and SNA	Developed by theory and practice of economic statistics in interaction with the world of policy making: <i>made official</i>	‘Multinational’
SDGs	17 goals and 169 targets for sustainable development set by many governments for the period to 2030	“indicator sets that do not have a conceptual basis” (Hoekstra (2019b:94))
Wellbeing and Sustainability (W&S)	There are <i>academics</i> and their PhD students who study aspects of wellbeing and sustainability, some who participate in “GDP and Beyond” conferences	There is a “cottage industry”, and one must <i>create</i> a “W&S Science” (WSS), and it is better to have a SGNA (without considering alternatives)
eSNI, environmental sustainability	$e\Delta = NI - eSNI$ is relevant for environmental policy making	Not relevant for WSS, and a cottage industry that may disappear
Resolving differences	The scientific method, with the role of the academia to invent news at the frontier of knowledge ²⁰⁸	“towards a common language”

²⁰⁸ For methodology and philosophy of science, see e.g. De Groot & Visser (2003), <https://www.knaw.nl/nl/actueel/publicaties/het-forumwaarmed-merk-van-wetenschap>, and my own <https://boycottholland.wordpress.com/2015/11/24/a-general-theory-of-knowledge>. Not easy to find: Groot, A.D. de (1984), “The theory of the science forum: subject and purport”, *Methodology & Science*, 17(4), 230-259.

It is curious that national accounting is presented as a *multinational* against *cottage industries*, and that a new language must be invented. SNA and eSNI have been developed within the world of science in the *language of science*, in interaction with the world of policy making, and the obvious road ahead is in that same venue. This is *what Tinbergen and Hueting have been doing* and what Van den Bergh, Hoekstra and Smits have been sabotaging. It is true that the academia are an unruly bunch, which deserves criticism indeed (peer review doesn't work so well) (especially when we can observe unscientific behaviour, like at VU), but this unruliness seems less important than the scandal within official statistics in which Hoekstra partook as willing perpetrator.

Hoekstra (2019b:260) has a table "A1. Influential conferences / initiatives" which doesn't mention the development of eSNI in 1986b and presentation of the methodology in 1992d. Clearly eSNI is not "influential" but then such a table is useless and only an exercise in Hoekstra's **framing** and effort to lure the reader along in his perceptions, as if "not-influential" means "scientifically inadequate". A proper and relevant table would list *relevant initiatives and scientific results*, alongside efforts to sabotage science, e.g. at CBS.

It is curious to say that one wants to "**create a science**". It takes only one scientist to write about a new topic *A* and then we have the creation of a science of *A*. It would be science *if the methodology and integrity are sound*, and it remains to be seen how other scientists react and how this newly created science evolves. Perhaps Hoekstra means implicitly that he himself already "started WSS" and that he wants followers (or a cult – compare the researchers who adopted the paradigm of thermodynamics but who coined themselves "ecological economics" even though they reject economics, see Section 21.9.10, and while it really is unclear what they have achieved over all these years, other than producing papers and Ph.D. students).

27.11 Details in Hoekstra (2019b)

27.11.1 Contributing to the chaos

Hueting's 1996 *parable of the carpenter* indicated the chaos w.r.t. development indicators. Section 9.2 explains the view from welfare theory at national accounting and other indicators. Unfortunately at CBS in 2007 Hoekstra was assigned to the topic without a good background check on his competence, and he himself took this assignment as evidence that he would be competent. Subsequently he increased the chaos by not properly studying welfare theory including the works by Tinbergen and Hueting on the topic. While he agreed with Hueting that the field of development indicators grew in chaos, he and Smits increased the chaos by presenting yet another selection of indicators. What seems like a selection and reduction of indicators actually is *yet another set*:

"In the end, the TFSD reached agreement and proposed a "suggested list of sustainable development indicators". In 2014, Jan Pieter [Smits] and I had a proud moment when the report was endorsed by the Conference of European Statisticians (CES) (...)" (Hoekstra (2019b:xix)

27.11.2 Comparison to a multinational

Notwithstanding the quotation marks, Hoekstra (2019b:6) aspires at a real comparison to a multinational instead of using it merely as a (wrong) analogy:

“It is easy to argue that GDP has a lot in common with a multinational company. It has a worldwide presence and vast logistical infrastructure. There is a structure in which international organisations such as the UN, IMF, World Bank and OECD cooperate with the statistical bodies of all countries in the world. The “product” is created using globally harmonised SNA methodology. Quality control procedures are in place, to ensure consistent delivery.”

The analogy fits in well with Hoekstra’s phantasy of the world but not with its reality. You may argue that men and women are much alike in many respects, but while this may be granted, you cannot argue that this similarity is sufficient basis to argue that men would be able to bear children as well. While SNA comes about in international collaboration between scientists and policy makers, it differs in key aspects from a multinational, notably on conditions of scientific integrity. The *analogy* is not convincing and then the *comparison* is not convincing *a fortiori*.

27.11.3 Analogy of GDP and sneakers

Hoekstra (2019b:7) has this simplistic analogy of GDP and sneakers:

“GDP measures the size of the economy yet the perception is that it measures whether a society is doing well or not. These positive associations are common for other global brands as well. Global sneaker companies want their shoes to be associated with qualities such as freedom or an independent way of life. These emotions are important for product sales, which is why advertising rarely stresses the objective characteristics of a product but rather tries to appeal to these deeper emotions.”

We may assume that Hoekstra will already be aware that this analogy is rather simplistic. Using an analogy is not problematic in itself, but errors are:

- (i) GDP does not measure “the size of the economy”. GDP measures production. “The economy” is undefined when you do not provide a proper definition. Hueting (1974, 1980), which Hoekstra refers to and should have read, explained that the new scarcity on the environment meant that it was included in the subject matter of economics, and thus would be part of “the economy” and thus also fall under national accounting. Hoekstra at CBS Statistics Netherlands sabotages this scientific finding. See Chapter 17 on the confusion about the term “economic growth”.
- (ii) If GDP would measure the size of the economy, and if the economy concerns welfare (as welfare theory explains), then Hoekstra cannot argue that there is anything *beyond GDP*. Hoekstra thus has contradictory terms, and he confuses his readership. Very likely he is confused himself.
- (iii) Using an analogy isn’t wrong, but the chosen analogy is wrong. In welfare theory, GDP is closely linked to welfare, see Figure 5 on page 42. Thus GDP

has an intricate relation to welfare. The definition of sneakers does not relate to the definition of national welfare in the same way. The analogy is wrong.

Hoekstra's framing of SNA as a "multinational" induces him to create an analogy with multinationals, but his "analogy" fails on proper definitions and on being a proper analogy.

27.11.4 *Schumpeterian dream*

Joseph Schumpeter identified stages in an industry: early adoption, take-off, saturation and decline. Hoekstra (2019b:10&28) employs this for his **framing** of a multinational and suggests such stages for GDP and Beyond-GDP. He expresses his hope that GDP would begin a decline and that Beyond-GDP might be at the top (saturation) in 2030. He doesn't specify what the vertical axis in his diagram represents. Would it be "proper use" or "improper use" or "any use" ? This question clarifies that the SNA cannot be compared to an industry or multinational, and that the use of indicators is determined by their relevance for science and policy making. Counting the number of countries is also somewhat curious.

27.11.5 *Popular quote by Simon Kuznets*

Hoekstra (2019b:8) repeats the *Beyond GDP* mantra, already indicated by Hueting (1967, 1968) and Nordhaus & Tobin (1972) in their reference to Kuznets:

"GDP is a measure of economic activity but not, as is the general perception, a measure of societal success. This has been known for a long time. Simon Kuznets, one of the pioneers of national accounting famously wrote in 1934 that "the welfare of a nation ... can scarcely be inferred from a measurement of national income". [ftnt] Even the SNA, the worldwide handbook, explicitly warns: "GDP is often taken as a measure of welfare, but the SNA makes no claim that this is so and indeed there are several conventions in the SNA that argue against the welfare interpretation of the accounts." [ftnt] Issues such as well-being, sustainability and inequality are not measured by GDP. As a result of these shortcomings many alternatives to GDP have been proposed. These are known under the collective term "Beyond-GDP" but defining the boundaries of this field [is] difficult."

Hoekstra suggests that the world of official statistics (including himself) can hide behind Kuznets, but errors are:

- (i) Hoekstra doesn't criticise the world of official statistics, that it provides misleading information via the term "economic growth", see Chapter 17.
- (ii) Hoekstra doesn't criticise the world of official statistics, that it provides misleading information on "income" when this actually would not be really income but be stealing from the children's future (see the definition of eSNI).
- (iii) The term "Beyond-GDP" is a later invention after about 2000. Hoekstra skips over the scandal that earlier (and early) protests by Hueting (1967, 1968) and Nordhaus & Tobin (1972) and Hueting et al. (1992d) were maltreated within the world of official statistics, including by Hoekstra himself.

27.11.6 Taking a start at Nordhaus & Tobin 1972

Hoekstra (2019b:90):

“Although SWB [“Subjective Well-Being”] surveys started earlier, many economists take the year 1972 as the starting point for Beyond-GDP. That was the year the Measure of Economic Welfare [MEW] was created by Yale economists Nordhaus and Tobin. [ftnt] This was the first prominent example of a “green accounting” aggregate.”

Nordhaus & Tobin (1972) might indeed be the “first prominent example” in terms of SWB for practical statistics of the past, alongside Meadows et al. (1972) “*The limits to growth*” on environmental sustainability for planning for the future. MEW clearly appealed to econometricians to improve upon the metrics in national accounting, but we may also acknowledge that its categorisation and quantitative results have quite some arbitrariness, so that in many respects it is not too far from others who merely made the point in a qualitative manner, and who were more cautious with quantification. Nordhaus & Tobin must actually have started some years earlier, and in that period Hueting (1967, 1968) also proposed the correction of the national accounts for environmental damages,²⁰⁹ which proposal landed him at the end of 1969 with the job at CBS Statistics Netherlands to start doing so.

Hoekstra’s **framing** of taking 1972 as a “starting point” allows him to put the Tinbergen & Hueting approach at a later date, with the thesis Hueting (1974, 1980), which suits Hoekstra’s purposes, while an objective description of the history would record the dates, without any need for a value judgement “when it started”. Hoekstra suggests that he only records what “many economists” say, shifting responsibility of this judgement on history onto them, but if he disagreed he should have said so – and he could also have skipped this issue “when it started”. Given that Hoekstra doesn’t indicate that there was a (parallel) development in this period in Holland and at CBS Statistics Netherlands, with Tinbergen and Hueting, one cannot avoid the impression that Hoekstra wants to present his book in a good light to Nordhaus, the Nobel Prize laureate of 2018.

Hoekstra (2019b:97) claims that “The idea of environmental accounts had already started in the 1970s in Norway and France and in the 1990s in the Netherlands” (referring to Edens 2013 in ftnt 41 page 285). This presumes flexible words so that one can distinguish the environmental statistics set up by Hueting starting at CBS in 1969 from the later rewriting into the input-output format of the NAMEA by Keuning et al. and as adopted by SEEA. Obviously Leontief made a large step in creating the input-output model but once it was there, the application to production and the environment is not special. See Section 21.11.14 on the 2013 thesis by Bram Edens and the diagnosis that he apparently did not study the Tinbergen & Hueting approach. We can diagnose that Hoekstra fails to criticise Edens. Subsequently, Hoekstra weakly states that “it was decided” to created the SEEA as satellite accounts, without deconstructing the intellectual deficiency in that decision and its supposed arguments. See **Appendix 53** for El Serafy

²⁰⁹ <http://www.sni-hueting.info/NL/Publicaties/1968-03-20-Welvaartsparadoxen-ESB-2636-p263-264.pdf>

(2014)'s continued protest. Hoekstra (2019b:98) states that the SEEA has dropped the term "satellite account" and is "seen as on an equal footing as the SNA". This is like saying that horses and donkeys are on equal footing because they they are not kept in zoos, and further forget about differences. Hoekstra produces statements that might seem informative but they distort. Hoekstra's table 4.3 on page 99 gives the first edition of SNA in 1953 and lets it be completed in 1993, while the history of national accounting is far longer and hasn't ended yet. He lets SEEA start in 1993 but then Norway and France of the 1970s disappear. He claims that SEEA was completed in 2012 while we are still waiting for the integration of SNA and environmental accounting. All this is only creative imagery.

27.11.7 Taking target year 2030

Hoekstra (2019b:xx-xxi) mentions his goal of replacing **the role** of GDP (which differs from his title). He also provides the **frame** that there is a (relevant) community that shares his goal, but perhaps there is no such community:

"The Beyond-GDP community seems to be suggesting new indexes in the hope that one day one will hit the jackpot. But even after hundreds of attempts this strategy has not yet yielded the "golden index" – none has ever come close to **replacing the role of GDP** in society. Certainly there are success stories, such as the Human Development Index, (...) and Ecological Footprint, but these pale in comparison to GDP. Apparently there is hope in the community that one of these indexes will achieve a breakthrough or that someone, somewhere, is currently working on an amazing project which is so clever that someday soon the GDP hegemony will be broken. Over the years I have become increasingly convinced that this is wishful thinking. Something else is needed." (my emphasis)

However, as explained in Section 9.2, welfare theory clarifies that it is nonsense to think that there might be a single SWF index that could be established statistically. There are different fields of policy making, like employment, education, health, or road construction, etcetera, that each require their own sets of indicators to evaluate policy making with respect to such fields.

If GDP has some dominance in policy discussion then this dominance must be analysed, instead of bunching all discontent together into one single complaint. GDP often is correlated with often-used indicators in fields like again employment, education, health, or road construction – and indeed with a role in election campaigns – but such correlation is not sufficient for conclusive policy discussion. It would generate better quality in policy making to develop indicators per field of interest. Like $e\Delta = \text{GDP} - e\text{GDP}$ for the environment.

Namely, the Tinbergen & Hueting approach focuses on environmental sustainability, see Hueting & De Boer (2019). This is a well-reasoned exposition within the confines of economic theory and official statistics, and which explains where the SNA (Chapter 15) and the term "economic growth" (Chapter 17) are problematic.

Hoekstra (2019b:23) chooses the year 2030 because it are the end dates of the current SDGs and a possible revision of SNA. It is quite unclear why

“environmental economist” Hoekstra sabotages the Tinbergen & Hueting approach and wants to wait till 2030 before there is clarity about what psychologists think about happiness. One consideration by Hoekstra (2019b:275), note 17, is that 2030 marks the 100th anniversary of Keynes speech “*Economic possibilities for our grandchildren*” (1930), but this is no argument on content of course.

I can only surmise that Hans Opschoor (Chapters 38 and 40) at VU, possibly with some rancour from 1974, has created a culture at VU that indoctrinates his staff members and (PhD) students to be antagonistic to Hueting *whatever it takes*: for such behaviour by VU researchers on this issue is devoid of rationality and scientific integrity. Alternatively VU awards MSc and PhD degrees to persons who are still deficient in scientific understanding and competence. Indeed the multitude of researchers are outside of VU, and show similar deficiency on welfare theory and national accounting, but the point for VU is that the contact existed since 1974 and shows this peculiar property. It is all so irrational and unscientific.

27.11.8 Late awareness of the history of GDP (but still not T&H)

Hoekstra (2019b:xx) reports that by 2012 he got wary of the ever increasing number of indicators. He reports on the next page xxi that he started reading about the history of GDP, apparently after 2012:

“Ironically, the disarray of the Beyond-GDP scene made my respect for GDP grow enormously. Not for GDP as an indicator but rather GDP as a process. I started reading about the history of national accounting and GDP. [ftnt] I remember reading a PhD thesis by Frits Bos (...)”

The Bos (2003) thesis was earlier but apparently read by Hoekstra much later. The point to observe here is that Hoekstra worked at CBS since 2003 and eliminated eSNI from the Dutch MDN 2009 monitor on sustainable development while apparently mostly ignorant of the history of SNA and likely of the meaning of the Tinbergen & Hueting (1991) article (also Bos doesn’t report about the latter). In other words: he wasn’t the expert on national accounting that he thought he was.

Another point is that Hoekstra now abuses the history of GDP to suit his purposes, to claim that it is like a “multinational”, and that Beyond-GDP must somewhat copy that history. In truth, actually, with SNA and GDP already in place, the conditions for other indicators are quite different.

PM. Ward (2004), of the UN intellectual history project, and in Hoekstra’s bibliography, indicated that the UN allowed priority to statistics, since the UN had little else to do with its lock-down in the Cold War.

27.11.9 Hoekstra (2019b)’s index and bibliography

Making a person and subject index is no sinecure for a book. Nowadays book producers become rather sloppy at it, because readers can also buy the digital version and directly search in the book. The indexing and referring to the Tinbergen & Hueting approach in Hoekstra’s book is more than sloppy and rather suggests at least lack of interest or selection of what Hoekstra wants readers to focus on.

- The index of Hoekstra (2019b) states that Tinbergen is only mentioned on page 34. Hoekstra's index thus does not refer to Tinbergen & Hueting (1991), which article is mentioned on p284 and included in the bibliography p332.
- Hueting is not mentioned in the index, but he is mentioned on page 91. The thesis Hueting (1974, 1980) is in the bibliography p320, though only the Dutch text and not the English translation, making it more difficult for readers of Hoekstra (2019b) to find Hueting's work in English.
- The index mentions various indicators but doesn't list environmentally sustainable national income, though it is mentioned on pages 8, 16, 91 & 303.

Hoekstra (2019b) refers uncritically to two works by Frits Bos, who discusses eSNI in deficient manner, see Chapter 23. Remember that Bos acknowledged in 2019 that he still hadn't read Tinbergen & Hueting (1991). Hoekstra refers uncritically to Vanoli (2005) (Section 11.7) and Coyle (2014) (Section 7.9). Environmental economist Hoekstra has six references to Costanza et al. but apparently doesn't achieve the criticism provided e.g. in Section 21.9.10 above. If Hoekstra had studied the Tinbergen & Hueting approach then at some point he should have noticed that these other authors misrepresent this approach, while El Serafy alerts readers that these authors employ the term "services" without reference to Hueting's "environmental functions" (Section 7.10). Hoekstra refers to UN SEEA (2003) but when discussing Hueting's work then he doesn't refer to UN SEEA (2003) that mentions contributions by Hueting. Hoekstra (2019b:335) has references to three papers by Van den Bergh that I have not looked at. Hoekstra has many other references that I have not looked at, and he might seem to be an expert, but when the problem concerns welfare theory and national accounting (even as a base for "global accounting") then it would be wise to first develop good foundations before looking at other shelves in the library.

Hoekstra's boek is recommended (in the book and its cover itself, and on the publisher's website) by Peter van de Ven (Chapter 26), Diane Coyle (Section 7.9) and Frits Bos (Chapter 23) again.

Curiously, while Coyle had her "*GDP: A brief but affectionate history*" (that according to Marcel Boumans (2014) much relies upon Bos) she now declares: "There is no question that the conventional economic statistics have outlived their use; they obscure rather than enlighten." Apparently she is *affectionate* about things that she perceives as outlived and obscure ? Or does she play both sides ?

27.11.10 All men are women

Hoekstra (2019b:14) has this twisted reasoning, alike the argument that all men are women, since their bodies can be surgically changed from males into (infertile but still "true") females:

"Despite these disagreements [*in macroeconomics*] all these perspectives can still be seen as part of a broad macroeconomic community. All participants in the debate agree that the goal is to enhance economic growth and there is no disagreement about the language to use. [ftnt 14] They might disagree how to achieve economic growth, and which policies to implement, but there is an underlying language which gives the community a coherent and solid foundation."

This footnote 14 (p275) reads:

“There are macroeconomists [who] are critical of the common language laid down in the national accounts (see also Chapter 4). Nevertheless, the criticisms are usually formulated in terms of changes that should be made to the accounts. The SNA therefore still remains the foundation of this line of reasoning.”

Thus e.g. Hueting and I agree that the goal would be economic welfare and economic-growth-in-the-sense-of-growth-of-economic-welfare, and that the meaning of “economic growth” as “production growth” in common economic vocabulary is wrong (Chapter 17), but according to Hoekstra we would still agree with the vocabulary including this wrong item, simply because we participate in this macroeconomic discussion ?

It is remarkable how twisted Hoekstra’s reasoning can be. On my part, I would say that economists share a common body of economic theory, as presented in the textbooks and the literature, and that the SNA derives from that common body, and contributes to it, but that there is no fixed and ordained “rule in stone tablets” about *which* is *what*. Our fellow economists clearly entertain a wrong term “economic growth”, just check Chapter 17.

27.11.11 No Beyond-GDP community

Hoekstra (2019b:16-17) now reports to our surprise that there is no Beyond-GDP community, even though elsewhere his book suggested that there was one.

“However, these definitions are not clearly defined in a “dictionary”. Meanings will vary from research to researcher. What is quality of life, well-being, welfare, sustainability, progress, development, happiness, etc.? (...) This is why there is no community. There is no means of communication. How can the general public be expected to understand if the people involved don’t even understand each other?”

Errors are:

- (i) eSNI focuses on environmental sustainability, and provides clear definitions, e.g. via the standards for environmental sustainability that are well-specified. Thus there is a means of communication.
- (ii) These definitions for eSNI have been included in UN SEEA (2003) (i.e. their references to the underlying papers). Thus *there is* a means of communication. Now Hoekstra simply denies this ?

It is not clear why researchers on well-being or happiness etcetera do not support eSNI since 1992, and why they don’t let eSNI be accepted first and then proceed with their work on well-being or happiness etcetera, and why they instead give priority to their research on happiness above ecological survival. Hoekstra fails in analytical clarity by not exposing and analysing this phenomenon. Hoekstra claims that he is an environmental economist but when he sees mankind driving towards the ravine then he focuses on finding a language so that the researchers on happiness can better speak with one-another. He hides the problem by stating that there would be “no means of communication” but *there clearly is* a means of

communication on eSNI, and it would be quite enlightening to understand why this communication isn't used. For example, there might be incompetence by Hoekstra and malpractice at CBS Statistics Netherlands and some academia. A key step for example might be that Hoekstra responds to my email of 2013, see the appendix to this Chapter, Section 27.14.

27.11.12 Macro-economics and the Greek Ferries Timetable

Someone once identified the *Greek Ferries Timetable* as mankind's greatest achievement in literary art and fiction. Hoekstra (2019b:18) table 1.1 ranks high in that list, see **Figure 16**.

Figure 16. Hoekstra (2019b:18) table 1.1

Table 1.1 *Community features underlying macroeconomics and well-being and sustainability science*

Community features		Macroeconomics (GDP multinational)	Well-being and sustainability science
Goal		Economic Growth	Well-being and Sustainability
Community structure	Policy science	Macroeconomics	Well-being and Sustainability Science
	Accounting framework	System of National Accounts	System of Global and National Accounts
	Key indicator	Gross Domestic Product	System and Quality Indicators
Common language		System of National Accounts	System of Global and National Accounts
Institutionalisation		√	By 2030

A problem seems to be that Hoekstra's involvement in national accounting did not provide for a background in macro-economics. The "goal" of macro-economics is not only "economic growth", but also at least (full) employment, low inflation, balance on the external account except for international solidarity, etcetera, see Section 7.14. In many countries "economic growth" has already been replaced by "sustainable growth" (though with distortion w.r.t. environmental sustainability).

Secondly, the common language in macro-economics is not provided by the SNA but by macro-economic theory, for which the SNA provides an empirical anchor, though not the only one. Information about rates of interest and exchange rates for example are provided by Central Banks.

Thirdly, column 3 falsely suggests that “well-being” and “sustainability” would be completely overlooked by modern macro-economics. Indeed, the SNA looks at nations but environmental sustainability is by definition a global issue, also for macro-economics and its attention for (sustainable) “economic growth”. (Some readers might enjoy watching this video by Peter van Bergeijk (ISS) on his textbook “Earth Economics”.²¹⁰)

Fourthly, it is **framing** by Hoekstra to focus on macro-economics now. The true perspective is from welfare theory and national accounting. The calculation of eSNI generates information about sectors, that may be relevant for well-being.

27.11.13 *Implementing the phantasy*

Hoekstra (2019b) on pages 18-23 instructs his minions how to implement his phantasy. Their goal will be:

“The WSS community’s goal is to understand well-being and sustainability and to create policies to enhance them.”

Hopefully other researchers may also aspire to understand well-being and *environmental* sustainability, even those who do not belong to this WSS church and who do not sing hosanna and hallelujah to Hoekstra’s bible.

Like Jesus had his John (Johannes), Hoekstra refers to the Brundtland report. While many may have thought that the report was about the tension between “economic growth” (production growth) and ecological survival rephrased as (environmental) sustainability, Hoekstra now recasts the Brundtland report into the distinction between Well-Being in the “here and now” and the “sustainability” (continuation) of Well-Being for future generations (“later”).

Environmental economist Hoekstra thus manages a disappearing act for the issue of ecological survival. If the current 7.5 billion people on the planet wouldn’t survive and be reduced to Adam and Eve again, this would still be sustainable, in Hoekstra’s view apparently, provided that Adam and Eve promise to be happy (even if they do not belong to the WSS church in trying to understand their Well-Being).

One of the weirdest sections in Hoekstra’s book is:

“The WSS community’s goal is to understand well-being and sustainability and to create policies to enhance them. This is the underlying philosophy of the Brundtland Report which was the seminal publication that led to the institutionalisation of the term sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. This Brundtland definition stresses two dimensions: the well-being of the current generation and the well-being of the future generations (sustainability). In essence, it is to understand the current state of humanity (“Here and now”) and its future on a finite planet (“Later”). The vast majority of Beyond-GDP initiatives strive to measure current well-being or sustainability, or both.

²¹⁰ https://www.youtube.com/watch?v=NUsiUhlhl_0

The advantage of this research goal is that sustainable development is the most institutionalised concept in Beyond-GDP. However, the term sustainable development does not have an unambiguous definition. Its meaning has been debated since the Brundtland Report was published. This book chooses to use the more neutral terms “well-being” and “sustainability”, which focuses attention on the temporal dimensions of sustainable development.”

Hoekstra (2019b:232) confirms the reduction of “sustainability” to well-being:

“It seems unlikely that one could arrive at a single index of sustainability. The current methodologies underlying the capital approach might be indicative of long-term income, but not of well-being.”

Perhaps Hoekstra’s study of those 900 experimental indicators on well-being and sustainability turned his facilities into mush. Alternatively, Hoekstra aspires to remain popular in policy circles who do not want to consider the environment. Comments are:

- (i) The Brundtland report was indeed analytically deficient, see Hueting (1990c), *“The Brundtland Report: A Matter of Conflicting Goals”*. The report provides a *reference in time for a policy process but no analytical foundation*.
- (ii) With the new scarcity, ecological survival is an economic problem too. Given the importance of ecological survival, it would require priority. Hoekstra’s infatuation with the fashion on happiness and well-being forms part of that fashion, which fashion however is distractive for the real economic problem facing the planet, and which fashion makes a mockery of welfare theory.
- (iii) In economic theory and practice, only the current population (overlapping generations) exists, and future populations have no say in current affairs. It are we ourselves who decide what we will do, based upon our own preferences for future populations.
- (iv) The Tinbergen & Hueting approach restricts itself to the conservation of the environment, and leaves it up to future generations what they do. Conservation is based upon the precautionary principle. For econometricians, the approach is a no-brainer. There is some arbitrariness in what one regards as the nature that one wishes to conserve, but the pre-industrial 1850 appears to be much-mentioned. Standards can be derived from the literature, etcetera.

Hoekstra (114-115) extends on the vagueness of Brundtland, and:

“The conceptual approach which comes closest is the capital approach because it stresses the importance of intertemporal trade-offs. It allows one to distinguish current and future well-being.”

However, this only shows again that Hoekstra is not aware of the issue of terminology, see Section 7.10. Economist Hueting reserved “capital” for human-made products in SNA and identified environmental functions for the new area, while ecologists refused to adopt economist Hueting’s terms and preferred to speak about capital anyway (as if they also had economic knowledge). But there appears to be no law against toddlers using words from the theory on financial derivatives (which is not quite the same as physicists using words from literature).

Hoekstra (2019b:115) quotes the Stiglitz report on the dashboard:

“To take an analogy, when driving a car, a meter that added up in one single number the current speed of the vehicle and the remaining level of gasoline would not be of any help to the driver. Both pieces of information are critical and need to be displayed in distinct, clearly visible areas of the dashboard.”

Hoekstra (2018b:116) uses this quote to infer that the key distinction would be between well-being now and well-being in the future. This environmental economist then overlooks that the key discussion since 1969 has been about *production* versus the *environment and ecological survival*, and was not about feelings of happiness and well-being. Hoekstra publishes his book in 2019 while the world was awakening to the risks of climate change, as oblivious to this as to the Tinbergen & Hueting approach.

27.11.14 *Accounting in the Second Ring and indicators in the Third Ring*

Hoekstra (2019b:19) distinguishes:

“The scientific community requires three elements: a science (Well-Being and Sustainability Science) [WSS], accounting framework (System of Global and National Accounts) and indicators (Quality and System Indicators).”

In some respects, Hoekstra's book is an invitation to other fields like biology or psychology to make some study of accountancy, and to appreciate the distinctions between stocks and flows (capital and income). Hoekstra (2019b:21):

“The system accounts are based on neutral concepts which exist in many scientific disciplines: stock-flow accounting, networks and limits.”

Still missing here are *targets*, because your body thermometer may show 47°C but if you do not know the target of 37°C then you might not be aware that you just died of overheating. Hoekstra (2019b:236) mentions targets indeed, but curiously in a less systematic manner. It may be that politicians change targets so often and then still do not adhere to them anyway, so that statisticians are wary to keep track of them. Political scientists may record target promises and actual outcomes, but their practice hasn't yet affected the conventions of official statistics.

It seems that Hoekstra hopes that when all disciplines learn to speak the language of accountancy, then communication will flourish, because then we are all a happy community of happy accountants. Also, it is very likely that all information already exists, but the effort to put everything in a neat accountancy framework will generate a sense of joint accomplishment (which itself might enhance Well-Being) (even if the accountant would only record ecological collapse and non-survival of many species).

While “*Limits to Growth*” 1972, Hueting (1974, 1980), and eSNI 1986b emphasized the importance of limits, it is nice that national accountant Hoekstra finally in 2019 acknowledges their importance for national accounting. However, Hoekstra (2019b:146) doesn't really seem to do so:

“It is a matter of discussion whether the planetary boundaries are really “limits”, in the sense that is being proposed in this book. The concepts of natural limits in the SGNA should show the limits of complex systems. These may be biological, thermodynamic, practical or otherwise. For example, the gestation period of the Javan rhino is a limit. The availability of fossil fuels and minerals is limited. The amount of sunlight reaching the earth’s surface is a limit. The extinction of a species is an example where a lower limit has been reached. In that sense, the 2-degree target for climate change is not a limit. It is not the case that at 1.9 degrees society is fine while at 2.1 the global natural system transitions into another state. The impacts of climate change are gradual, and even if there is [a] tipping point it is hard to pinpoint. This does not mean that the 2-degree target is not an important policy target, but it is not a limit in the strict sense proposed in this book.”

Current calculations for eSNI use a target of 1.5°C, derived from the scientific literature on irreversible processes. Even though Hoekstra stated earlier that eSNI uses limits, according to this new twist in his reasoning, eSNI would not belong to his SGNA, but to the *Third Ring in Hell*, the “Indicators (Quality and System Indicators)”.

Hoekstra (2019b:233-234) still keeps (a) GDP as a “*system indicator*” while (b) eGDP = eSNI would be a “*quality indicator*”:

Comments:

- (i) Hoekstra doesn’t distinguish uncertainty and invalidity, see Section 5.5. While the 1.5°C or 2°C boundaries would be uncertain, it would be invalid to do national accounting as if there would be no boundary. Researchers at CBS Statistics Netherlands claim that they are statisticians but apparently they do not understand basics in statistical theory.
- (ii) It is curious to have “accounts” in the *Second Ring in Hell* and “*account system indicator*” GDP in the *Third Ring in Hell*, as if accountants in the *Second Ring* are forbidden to perform addition and subtraction. Hoekstra’s scheme has the only purpose to make it *seem* as if the other indicators are on equal footing with GDP, while in reality GDP would remain the direct summative result of the accounts in the *Second Ring* and thus still carry more weight than the other indicators that employ more complicated methods. Hoekstra assumes that the creators of ISEW / GPI, Frootprint, and the other 900 indicators would be delighted to arrive in his *Third Ring in Hell* on equal footing with GDP, and perhaps they indeed are so blind and self-centered as they have been towards the Tinbergen & Hueting approach.
- (iii) Hoekstra’s scheme of Science / Accounts / Indicators only reorders a world that already exists. At best he kicks in open doors, but in fact, at worse, he does not reply to the criticism by the Tinbergen & Hueting approach that the current SNA is misleading, since the SNA presents a figure of national income which is only true under some conditional assumptions on preferences and which is definitely no income under other conditional assumptions on preferences. Hueting’s finding is that measurement is only possible by making conditional assumptions on preferences.

Thus Hoekstra claims to present a new approach within welfare theory and national accounting but in fact evades criticism. In a proper scientific book, Hoekstra would present the criticism by the Tinbergen & Huetting (1991) article (that he has referred to), and show how his approach answers the criticism w.r.t. SNA: but none of this happens. Basically his approach neglects and buries the criticism. (His reference to Tinbergen & Huetting (1991) suggests to other readers that he has studied their approach, but apparently he hasn't, see Sections 27.6 and 27.7 above.) eSNI might linger on in Hoekstra's *Third Ring of Hell*, as one of the 900 other Indicators, but without answer to its scientific criticism on national accounting per se.

27.11.15 *Incomplete, biased and singing the praise of GDP*

Hoekstra (2019b) chapter 3 claims to discuss "What does GDP measure (and what not)?". He basically repeats the common textbook introduction about what GDP does and doesn't do. However, with the Tinbergen & Huetting (1991) in his list of references, he would have the opportunity to also explain their position, but he doesn't. Thus, Hoekstra's chapter is incomplete. Hoekstra doesn't inform his readers about the *conditionality* in the measurement of national income.

Hoekstra (2019:55) neatly recalls Ingvar Ohlsson who suggested three options to handle alternative calculations for economic developments. Hoekstra p56 comments: "(...) his idea never really caught on, probably because it was costly." This however is lame remark. It is evasive to hide behind a vague term "costly" while this concerns the very topic of the book. All this criticism running over the 50 years since 1970 might have been avoided when the national statistical offices of the world had specified that they would have needed a little bit more money (perhaps even twice their budget) to make their accounts fit the problems (instead of forcing society to tackle problems by using only one set of accounts) ? How much would it cost for society to get the information that society requires ? (For eSNI, such costs have been specified: 5 person-years per nation per year.)

Hoekstra (2019b:74-75) lists criticism about GDP and argues that such criticism only shows that GDP is no SWF, while he repeats the mantra that GDP remains an indicator of "economic activity". He asks:

"So given these criticisms of GDP, why is it still in use?"

This is a curious question. GDP is a measure of production, and the measure of production would remain in use since we would want to know about production. Likely Hoekstra means to ask: "Why is GDP still in use as a welfare indicator ?" Here he provides the answer that GDP seems to be a good proxy for welfare, given the history since 1750. Hoekstra obviously cannot change anything about the empirical correlations between GDP and other indicators like health and education. Eventually he conjectures that this correlation seems to stop after a certain level of production (as currently measured). Then on p78 he claims:

"One of the primary reasons why GDP has remained so dominant, despite all the criticism raised in this chapter, is that there is no clear alternative."

This is absolutely false, since there are eSNI and $e\Delta = NI - eSNI$ as alternatives for environmental policy making. The reason why it is not in common use for environmental policy making is the *abuse within the world of official statistics*, including the abuse by Hoekstra, all documented by this present book.

Hoekstra (2019b:237) and his minions would still sing the praise of GDP:

“What will happen to GDP? In the SGNA philosophy, GDP is a system indicator rather than a quality indicator. GDP is a summary measure of the size of the economy.”

Errors:

- (i) This omits saying that this is also the situation and philosophy in SNA.
- (ii) Hoekstra enhances the position of GDP by identifying it with “the size of the economy”. Hoekstra burks the criticism by the Tinbergen & Hueting approach that GDP is *not* quite a summary measure of the size of “the economy”. Given the new scarcity, the environment becomes part of the subject matter of economics, and thus must be included in the measurement. Current SNA is misleading and must be adapted. Given the difficulties in measurement, it is only possible to make *conditional assumptions on preferences on environmental sustainability*. Thus alongside GDP there is also $eGDP = eSNI$, and the relevant indicator for the environment is the distance $e\Delta = GDP - eGDP$.

How can Hoekstra *refer* to Tinbergen & Hueting (1991) and not *understand* their criticism, while their approach, once explained, is a no-brainer for any econometrician ? He can do so by the wonderful procedure of malpractice.

27.11.16 Kicking in more open doors

By now it would be clear that Hoekstra will not replace GDP at all, but Hoekstra still keeps using the term of *replacing*. Hoekstra (2019b:235-236) maintains the confusion between “replace GDP” and “replace the role of GDP”. He finds more open doors to kick in:

“The quality indicators are the alternatives whcih should replace GDP by 2030. However, none of these indicators is perfect. The discussion has shown that each approach is based on specific assumptions and has limitations in terms of interpretation. Well-being and sustainability are complex phenomena which can only be measured by a couple of imperfect approaches. Choosing one indicator will automatically lead to an imperfect view of society and the environment. Adopting a wide range of imperfect quality indicators is the closest we can get to a complete view of developments. Science therefor cannot provide a definitive answer about whether the systems are going in the right or wrong direction. The political process has to weigh the information provided and the various policy options. (...) Together, the set of quality indicators and the system targets should comprise the “SDG2.0” approach (...).”

This comes close to Section 9.2, that clarifies that it is rather illusionary to try to find a SWF for the statistics of the past, and that the use of a SWF is mainly

relevant for planning for the future. Hoekstra's quote kicks in this open door, in this respect. He still enhances confusion in suggesting that there might still be a role for composite indicators, like ISEW / GPI of Genuine Savings / Adjusted Net Savings, as if policy makers would not be confused if the one goes up and the other goes down. It enhances more clarity to advise policy makers and the statistical offices to use indicators and targets at the lower level of areas of policy making, where specified objectives and outcomes can be compared. In this philosophy, $e\Delta = NI - eSNI$ is targeted at environmental sustainability.

Thus, Hoekstra should rather have stuck to his comment on page 21, and not have tried to entice the "community of 900 indicators" to join in his phantasy:

"Individually, each quality indicator provides only a partial and insufficient depiction of the state of affairs, but taken together the full range of quality indicators provide the best information basis possible."

27.11.17 *The wrong example of IPCC*

Hoekstra (2019b:22) suggests:

"Creating a scientific community might seem difficult but has been done before, and not just by the macroeconomic community. The Intergovernmental Panel on Climate Change (IPCC), which started in the early 1990s, has resulted in a coherent climate science community."

The example of IPCC is wrong since there is a clear and imminent danger of climate change, while for Hoekstra's topic of Well-Being there is no similar threat. Apparently there still is much uncertainty about well-being, and there are no warnings about a dangerous collapse of well-being by say 2031. Environmental sustainability is closely linked to climate change. If mankind succeeds in keeping global warming to below 1.5°C by 2030 and 2100 then other issues of environmental sustainability come to the fore, like extinction of species because of other pressures upon the environment. This is a reason to welcome a community on eSNI rather than a community on well-being.

One way to create a community is to set up a journal, like Daly and Costanza did with "Ecological Economics" and De Groot and Braat did with "Ecosystem Services". Academics always look for outlets and ways to harvest citation scores.

27.11.18 *Modesty about his experience*

Hoekstra (2019b:24) (my comment):

"This book is about my training as an environmental economist [though PhD at VU] and my nearly twenty years of experience in national accounts [though at CBS Statistics Netherlands] and the measurement of sustainable development [not specified how this is defined, and sabotaging eSNI]. This has given me some expertise [illusions] to tackle this topic [phantasy], but at the same time I am acutely aware of the many areas in which my knowledge is lacking [but I am not aware that it lacks where I need it]. The strategy I have set out is a way of approaching the issue [phantasy], but I make no claim that it is *the* way to do it [since one may also go jump in a lake to achieve the same effect]. It is a

reasoned [twisted] and logical [haha] proposal [in my delusionary view] based upon my imperfect experience, knowledge and creativity [and malpractice and burking of the Tinbergen & Hueting approach and neglect of criticism]. (...) When embarking on such a mission [to delude the world] you need to agree on a rough sketch first [while I gladly accept the revenues from who buys my book, and enjoy my increased academic status of having published at Cambridge University Press by having them deluded too].”

While Hoekstra expresses a statement of modesty, the reader might be annoyed that such statement requires clarification about its true meaning, and perhaps the best antidote to this annoyance is to look at my email to Hoekstra in 2013, translated and included in the appendix to this Chapter. If Hoekstra had responded in scientific manner to my criticism of 2013 then he might have seen that there is no need for his book, and then I would have been saved the time to deconstruct it. My clarification to Hoekstra’s statement of modesty is modest in itself too.

PM. In January 2019 I noticed that Hoekstra’s email address at CBS.nl did no longer function, and I asked J.-P. Smits to give me his new address. Smits didn’t respond. An opportunity was lost to inform Hoekstra, a half year before the publication of his book, about the draft text and publication of Hueting & De Boer (2019).²¹¹

27.11.19 *The use of the word “compass”*

It was Hueting who used the word “compass” to indicate how GDP is used as a wrong compass for economic policy and the environment, see also Tinbergen & Hueting (1991), here Appendix 50.1. Hoekstra likes the word “compass” too (p15, 79), and it will be somewhat bitter for Hueting to see that his apt analogy for the abuse of GDP is abused itself for burying eSNI. At the same time, Hoekstra acknowledges that there cannot be a single indicator within the statistics of the past that would be a proper “compass” (one direction only) for his own purpose other than the environment. Hoekstra also acknowledges that for him the best outcome in statistics of the past would be a “dashboard”. Thus Hoekstra’s use of the term “compass” isn’t apt and he should rather use “dashboard” where this applies.

27.11.20 *You are with me or against me*

Hoekstra (2019b:25) instructs his minions:

“The inclusive philosophy of this book is that each of these approaches is part in a large jigsaw puzzle. The value lies in creating the entire puzzle, not in choosing one piece and rejecting the others”

²¹¹ 2019-01-14 message to jpsmits at CBS.nl and some others, in Dutch: “(2) Het adres r.hoekstra@cbs.nl werkt niet meer. Mijn verzoek aan Jan Pieter Smits is diens adres bij KPMG te geven. Rutger kondigt een boek aan "Replacing GDP by 2030" te verschijnen bij Cambridge, en toont weer dat hij is gepromoveerd bij Jeroen van den Bergh die GDP ook al wilde afschaffen. Het zou fijn zijn wanneer al die inzet werd gebruikt om te snappen wat Roefie voorstelt, en dat de werkelijke discussie echt over iets anders gaat.”

Errors:

- (i) Hoekstra suggests that the view that “*GDP is sufficient*” can be combined with the view “*GDP is insufficient*” as pieces of a larger puzzle. This is not analytical science but “feel good” rhetorics, trying to lure all sheep into the shed where some will be slaughtered anyway.
- (ii) Hoekstra doesn’t *state*, but his way of phrasing *suggests*, that other approaches cannot be open-minded and inclusively minded too. He should have been aware of this suggestion, and thus have employed a different phrasing. This current phrasing creates a “with me or against me” situation, since it suggests that all researchers who think inclusively would naturally join up in the Hoekstra WSS community, and that abstainers think exclusively and are deficient and spoil-sports.
- (iii) It would be wrong to suggest that who rejects his book as inadequate wouldn’t have an open mind and an inclusive philosophy. If really inclusive, Hoekstra had written “this book tries to be inclusive but perhaps fails in this” instead of claiming *ex cathedra* that it is inclusive, and implying that all criticism is exclusive.
- (iv) The Tinbergen & Hueting approach causes us to reject Hoekstra’s book as inadequate. This doesn’t imply that the Tinbergen & Hueting approach would be closed-minded and exclusive itself. It would be wrong to suggest (and Hoekstra does not preclude this suggestion) that a protest against Hoekstra’s maltreatment of eSNI would indicate a lack of open mindedness and inclusive thinking.

The Tinbergen & Hueting approach focuses on the environment and the use of the indicator $e\Delta = NI - eSNI$ only. It is agnostic about other indicators. There is no need to confuse such agnosticism with inclusive thinking. If eSNI is maltreated by Hoekstra (see Sections 21.11.1 and 21.11.4) then it is reasonable to request for a correction. Asking for such explanation does not imply a rejection of other approaches.

Apart from the merits of the Tinbergen & Hueting approach, this Chapter employs logic to deconstruct the Hoekstra (2019b) book itself.

27.11.21 *An open mind on a dire situation*

Hoekstra (2019:25-26):

“This book argues for a rather ambitious community building process. That might be viewed as an overly elaborate and time consuming way of going Beyond GDP. A narrower focus would also take far less time and lead more quickly to results for this urgent issue. (...) I would ask for an open mind. This book argues that the situation is indeed dire and that it requires a new, inclusive strategy which will take some time to implement.”

The World Bank has its mission carved in stone: ²¹²

“Our Dream is a World Free of Poverty.”

²¹² <https://www.worldbank.org/en/topic/poverty/overview>

For decades now, the World Bank misrepresents the Tinbergen & Hueting approach, see Chapters 30 and 43. See Colignatus (2000a, 2011) (DRGTPE) on unemployment and poverty. In 2015, 736 million people lived on less than \$1.90 a day. World poverty reduction is very much an achievement by China, though at the cost of the environment. UNEP indicates, see Figure 3 on above p30, that CO₂ reductions are pledged to some 35 GtCO₂ by 2030 and should be some 17 GtCO₂ by 2030 (reading the charts) if the world wants to attain the 1.5°C maximum.²¹³

Thus we can agree with Hoekstra indeed that the situation is *urgent* and *dire*. We are all the more mystified that Hoekstra does not specify an impending *crisis on well-being and happiness*, that would require the sabotage of the Tinbergen & Hueting approach, and the creation of his elaborate Christmas tree, to distract all attention from the Tinbergen & Hueting approach, and to get researchers to haggle about well-being and happiness say in the year 2100.

Apparently we differ with Hoekstra about *what* is urgent and dire. Most likely Hoekstra is speaking about something else. With some 195 countries in the world and 195 GDP's and 900 indicators supposedly about "welfare", and thus roughly 200,000 data points, he might actually refer to his own state of mind, that he turns this into a puzzle that he wants to solve. This, however, as said, is a phantasy, and the reader should not be lured by his admonishing that it would be not be "open minded" not to follow Hoekstra in his delusion.

27.11.22 History of national accounting, revisited

Hoekstra (2019b:27) summarises some writings by historians about national accounting and GDP, though not as critical as required, see our own Section 7.9 above. Recently, it crossed my mind that Johan and Pieter de la Court had also published a volume on political economy in 1662, though apparently without figures.²¹⁴

Hoekstra's chapter 2 on the history of GDP makes mostly good reading, but at times is unbalanced in the timeline, as he first discusses 2008 on page 42 and only then on page 43 refers to Robert Kennedy's criticism of GDP in 1968. The readership misses the onslaught and unscientific behaviour within official statistics like CBS Statistics Netherlands on the Hueting (1974, 1980) thesis and the Tinbergen & Hueting (1991) approach, see Chapter 21. Another drawback is that Hoekstra tries to force the history writing within the Schumpeterian scheme, with a hoped-for demise of GDP and rise of Beyond-GDP after the publication of Hoekstra's book. Sometimes the reader starts to suspect that Hoekstra would not mind ecological collapse since this would make it certain that GDP disappears, while attention for the Tinbergen & Hueting approach must be avoided since this might save GDP (alongside saving environment and society as collateral effect but less important).

Hoekstra creates a "Studentski paradox" which is no paradox (seeming contradiction), and then employs this artificial "paradox" to cement his diagnoses

²¹³ <http://productiongap.org/wp-content/uploads/2019/11/Production-Gap-Report-2019-Executive-Summary.pdf>

²¹⁴ <https://oll.libertyfund.org/titles/court-the-true-interest-and-political-maxims-of-the-republic-of-holland> and Dutch https://www.dbnl.org/tekst/cour001inte01_01/

that “the GDP multinational was created”. This invents evidence like claiming that New York is the place to be *because* it is the Big Apple.

Hoekstra (2019b:47) recovers an interesting quote by Nicolas Sarkozy in the *Financial Times* 2009-09-15:

“The world over, citizens think we are lying to them, that the figures are wrong, that they are manipulated. And they have reasons to think like that. Behind the cult of figures, behind all these statistical and accounting structures, there is also the cult of the markets that is always right.”

The world of official statistics claims that they present objective and scientifically warranted information. Tinbergen and Huetting (1991) show in scientific manner that this is not the case, in the sense that it is misleading to present only one side of the coin. The public likely understands indeed that GDP is misleading when presented as “economic growth”. The national statistical offices thus fuel the anxiety in the population. This however makes it even more curious that Hoekstra at CBS did not protest against the publication of “economic growth” based upon only GDP, and that he eliminated eSNI from the MDN 2009, see Section 21.11.1, and does not report about this in this book of 2013 and make amends. We already pointed to the rather unavoidable conclusion of malpractice.

Hoekstra (2019b:52) repeats his phantasy that SNA would be the language of macro-economics, while actually macro-economists use macro-economic theory to create and maintain their language, of which SNA is an element but an imperfect element only. To maintain his phantasy, Hoekstra is advised to first find employment as a macro-economist, though he lacks such training, and the employer and the world should be warned about the havoc that he might achieve there on an even grander scale than what he here claims about macro-economics.

27.11.23 Reference to Van den Bergh 2009

Hoekstra (2019b:54) refers to Jeroen van den Bergh 2009 that GDP is “the greatest information failure in the world”. This is basically wrong, as the error concerns the identification of the term “economic growth” with production growth, see Chapter 17. See Chapter 35 for the incompetence and malpractice of Van den Bergh. Clearly, Hoekstra is a victim of Van den Bergh’s illusions, and willing disciple, but one would suppose that Hoekstra since his thesis in 2003 has had ample opportunity (like my email in 2013, see the appendix to this Chapter), to come to his senses. In each cult, a cult member might start a new cult, seeing how great it is to gain the leadership of your own cult. With “inclusive thinking”, each cult can be a piece of the puzzle, and they will meet at the glorious mountain in 2030 when world population will be 1 billion larger and global warming is set to move past 1.5°C to 2°C. All in all, such malpractitioners like Van den Bergh and Hoekstra would likely not matter, as world leaders and responsible scientists may be expected to steer mankind from disaster, but it likely remains relevant to expose the malpractice.

A problem in cases like this is that Hoekstra is not totally incompetent. Hoekstra (2019b) Chapter 3 repeats a discussion about how to measure “the economy”. If you haven’t thought about such things (for a while) then this seems like a useful refresher. Such evidence of some competence might induce the idea that he

would be competent in other areas too. A discoverer who travels to a primitive tribe and who forecasts a sun eclipse might seem mighty too, even though he or she has only invested some time in the library, but few readers of Hoekstra's book would tend to compare themselves with such primitive tribe, and even fewer would start studying the Hueting & De Boer (2019) book to discover what Hoekstra has been sabotaging.

27.11.24 Anthropocentrism

Hoekstra (2019b:130-131) compares assets in SNA to those in SEEA and develops a proposal for a (global) GENA. We discussed this in Section 7.11 and look at it from another perspective. SNA defines: "An asset is a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time. It is a means of carrying forward value from one accounting period to another." SEEA drops ownership because some environmental functions are not owned. There are environmentalists who still think this anthropocentric, see Section 28.7.5. Hoekstra, thinking inclusively and widening the scope for finding support for his ideas, suggests to drop "that may provide benefits to humanity" in the SEEA definition, and in changing "assets" into "stocks", which would give: "Natural stocks are the total of all naturally occurring living and non-living components of the Earth, together comprising the bio-physical environment." This however might imply that the national statistical offices would also accept the obligation to set up accounts from the viewpoints of the ants, and another for the bats, and so on. One can imagine how Hueting, setting up the CBS department of environmental statistics in 1969, distinguished the environment as useful for humanity and nature as the remainder on Earth (and now including parts of Space), causing the question whether a car wreck has become "natural". Accountancy comes with conventions and tax evasion. One can only agree with Hoekstra: "This implies that two of the most important environmental problems of this era, climate change and biodiversity loss, do not get a full global accounting treatment in SEEA." though his footnote 9 (p289) modifies: "Earlier versions of the SEEA (1993 and 2003) were far more forceful in arguing that all natural capital should be should be included." These important environmental problems however are tackled in eSNI. Thus basically Hoekstra is kicking in open doors again, and the tardiness of SEEA only is a result of the decades long sabotage of eSNI, and Hoekstra should have explained this message instead of presenting himself as the inventor of some GENA.

27.11.25 Andreas Georgiou 2010-2018

Hoekstra (2019b:63):

"Famous is the trial of the head of the Greek Statistical Office, Andreas Georgiou. He was recruited in 2010 in the aftermath of the financial crisis in Greece. The manipulation of the statistics in the previous years had hidden the true nature of Greece's economic problems. Yet when new figures were published Georgiou was accused of manipulating them and siding with foreign creditors. In 2017 he was convicted and in 2018 this was upheld under appeal, despite significant criticism from abroad."

To return to our point of departure: Hoekstra just followed the herd and did not first check the key elements in the story, and thus sold his readers the same false story by the herd, see Colignatus (2020).²¹⁵

27.11.26 *New uncertainties, ict and trade, well-being, inequality*

Hoekstra (2019b:64-67) discusses new uncertainties by ict and trade, e.g. international usage of “free” software. Some readers might benefit from the awareness that some things are not clearcut indeed. Personally I would think that scientists should call attention to the overall riskiness of the situation, with too many eggs in one basket of software that is at risk overall.

Hoekstra (2019b:68) discusses that GDP no longer associates with well-being, and refers to his chapters 4 and 10. Hoekstra (2019b:69) discusses that GDP does not express inequality. It is not clear why someone might think that GDP would express inequality. When it has been stated that GDP differs from well-being, one wonders why two more chapters are needed.

27.11.27 *GDP as a proxy for welfare*

Hoekstra (2019b:75-78) considers whether GDP might be an acceptable proxy for welfare, even though it was established in the earlier pages that it doesn't cover well-being. Before 1750 AD population and GDP were rather flat, and thereafter exploded with the industrial revolution(s). If people also grew healthier and happier in that period then there is rough correlation. Hoekstra refers to papers that this correlation is breaking down. The world is meeting with limitations. Thus, Hoekstra arrives at the theme of his book: GDP requires a competitor index that can at least take over the role of the proxy. As such, Hoekstra's reasoning has the structure of a fish hook or quicksand: the more you try to resist the nonsense, the more you get stuck. The lure is that Hoekstra has sold the link to GDP and welfare in the first place. When you do not buy this, then there is no need for a proxy and then there is no need for “beyond GDP”. The better argument has been given by the Tinbergen & Hueting approach: GDP gives only production, and there is need for $e\Delta = \text{GDP} - e\text{GDP}$ to find the distance to environmental sustainability.

27.11.28 *Welfare economics*

Hoekstra (2019b:210-214) discusses welfare economics: “Every student of Econ 101 will be taught the basics of this theory.” The current flavour in Hoekstra's presentation is: “I discussed welfare economics and thus I do no longer need to explain the Tinbergen & Hueting approach.” (no quote) A problem might be that Hoekstra does not explain what might be wrong in elementary teaching, and what would be required beyond Econ 101 to understand the relevant analysis. It would have been better to indicate a particular textbook so that we can verify that the foundations are correct. Subsequently, though, it is important to continue with the Tinbergen & Hueting extension, which is relevant also for his book, and which cannot be found in Econ 101 but perhaps should be there. Hoekstra p212 refers to Adam Smith's “invisible hand” and does not explicitly state that the hand is invisible because it does not exist.

²¹⁵ <http://thomascool.eu/Papers/FT&NASL/Index.html>

On p211 fnt 5 on page 298, there is reference to Arrow's impossibility theorem. Hoekstra correctly states that under some assumptions there is an impossibility, like with assumptions of roundness and squareness you get square circles. A relevant deconstruction is in Colignatus (2001, 2014), not referred to by Hoekstra.

27.11.29 Contingent valuation and stated preferences

Hoekstra (2019b:212) fnt 9 page 298 uncritically refers to Freeman et al. (2014) *"The Measurement of Environmental and Resource Values"*, while a critical comment would have been that they do not refer to the Tinbergen & Huetting method, and Huetting's critique of contingent valuation methods.

27.11.30 Costs

Hoekstra (2019b:252) states that he cannot say how much the implementation of his vision would cost. One would think that it might be more advisable to first determine how "well-being" would be defined and measured for a single small country or perhaps even a village, before one would consider to scale this up to (inter-) national accounting.

At the same time, it is a lost opportunity, no doubt deliberate, that Hoekstra does not mention that calculating eSNI costs about EUR 0.5 million, or ¼% of the budget of CBS Statistics Netherlands. The relevant environmental indicators already have to be collected for policy making anyhow. The costs are in modeling and reporting, see Section 20.6. If the argument had been that eSNI would be misleading, so that it would be a waste of time and money, then this burking might have a semblance of rationality. Yet eSNI and eΔ are a cost-effective indicator for environmental sustainability, and Hoekstra apparently only burkes it because it isn't an indicator for happiness. (We hypothesise a somewhat different consideration than the false argument used at CBS when eliminating it from the monitor MDN 2009, see Section 21.11.1.)

27.12 Burking criticism again, now at Leiden University

On December 12 2019, Hoekstra was a visiting scholar at the Institute of Environmental Sciences (CML) at Leiden University. This CML organised a conference: *"GDP. Get rid of it!"* It is curious to argue to get rid of GDP when you need it for the calculation of $e\Delta = GDP - eGDP$. Such a conference title is only sensationalism to impress outsiders who have no idea what you are speaking about, and to solicit their support and book-buys as if you would be the new guru.

"There are hundreds of welfare and sustainability measurement systems proposed by scientists, non-profits, international institutes, companies and individuals. This heterogeneous 'Beyond-GDP cottage industry' sends a very confusing message to society, (...)." ²¹⁶

In your book you then present known information from standard economic textbooks, so that outsiders might get the impression as if you are knowledgeable and reasonable, and you mix this with confusions so that also experts are mystified and might regard you as a super-expert. It might take a few years before

²¹⁶ <https://web.archive.org/web/20191214151630/https://www.universiteitleiden.nl/en/news/2019/12/gdp-get-rid-of-it>

criticism percolates within the academic journals but by then you might already have your academic position and research group to start your own cottage industry of creating ever more confusion.

The conference website has the same message as Hoekstra's commercial (paywall) book. The other speakers invited for this conference are not known for their criticism of Hoekstra's approach. Though CML scientific director Arnold Tukker²¹⁷ and Rutger Hoekstra himself must know about my criticism, CML did not invite me to come and present my criticism at this conference.

²¹⁷ My email to professor Tukker in June 2019, long before this December 2019 conference (no urgent need for an English translation too):

Date: Thu, 06 Jun 2019

To: tukker at cml.leidenuniv.nl

From: Thomas Cool / Thomas Colignatus

Subject: Onderwijscommissie en nieuw boek van Hueting

Geachte professor Tukker,

Ik heb Roefie Hueting (89 jaar) en ir Bart de Boer geholpen een nieuw boek af te maken:

"National Accounts and environmentally Sustainable National Income"

<http://www.sni-hueting.info/> (PDF online)

<https://eburon.nl/product/national-accounts-and-environmentally-sustainable-national-income/>

Hier is mijn concept-artikel over 50 jaar Tinbergen en Hueting:

<http://thomascool.eu/Thomas/Nederlands/Wetenschap/Artikelen/2019-05-02-Aanpak-Tinbergen-Hueting.pdf>

Er is het wonderlijke verschijnsel dat economen vroeger weinig van milieu moesten hebben, dat milieu-mensen geen belangstelling voor economie of statistiek hadden, en dat statistici vastzaten aan de methoden voor het traditionele groeicijfer. Deze oude discussies hebben in Nederland ook oude wonden geslagen, waardoor er veel onbegrip voor het werk van Hueting is. Ik heb echter kunnen vaststellen dat Hueting zelf nog een zeer open geest heeft. Hier is mijn bespreking op meta-niveau welke misverstanden er bijvoorbeeld kunnen zijn:

<http://thomascool.eu/Papers/Environment/2019-04-17-THAENAES.pdf>

Ik zie dat Rutger Hoekstra een postdoc-adres heeft aan CML. Wellicht is dit dezelfde persoon die op het CBS het werk van Hueting heeft geblokkeerd? Zoek dan in THAENAES op diens naam. Ik wacht nog op ontvangst van Hoekstra's nieuwe boek om dit te bespreken, maar het is reeds duidelijk dat hij Hueting daarin niet noemt. [Corr.: Hueting is only not mentioned in the index.]

U bent directeur CML. Leiden heeft geen faculteit economie, en mogelijk ben ik bij u aan het juiste adres. Mag ik u uitnodigen om deze informatie binnen faculteit en wellicht ook de Univ. Leiden te bespreken (economen, milieukundigen, statistici), en te kijken of ook studenten op dit werk van Tinbergen & Hueting attent kunnen worden gemaakt? Het boek is open access. Mijn advies zou zijn dat een tiental docenten in de faculteit vanaf papier gaan lezen, en dan de analyse samen bespreken. Mijn eigen diagnose is dat Hueting een waardig kandidaat is voor de Nobelprijs economie, en ik heb nog geen deugdelijk tegenargument tegen zijn werk gehoord, alleen misverstanden.

Met vriendelijke groet,

Thomas Cool / Thomas Colignatus

Econometrician (Groningen 1982) and teacher of mathematics (Leiden 2008)

Scheveningen, Holland

<http://thomascool.eu/>

<http://econpapers.repec.org/RAS/pco170.htm>

27.13 Conclusion

CBS had traditionally a strong international position in the discussion about national accounting, also linked to the involvement by Tinbergen. Hueting was the main proponent at CBS Statistics Netherlands since 1969 for a discussion about welfare theory and national accounting. The strong or even leading CBS participation in the international discussion on *Beyond GDP* or *GDP and Beyond* can only be understood with Hueting's early involvement. It is sad, at a dramatic level, that Hoekstra and Smits were handed this leadership role but were deficient in the required background, and did not see this deficiency themselves even when it was pointed out to them (see the appendix to this chapter). Hoekstra (2019b) refers to Tinbergen & Hueting (1991) only in a footnote (page 91 footnote 31) instead of putting it center-place. Attention for his predecessors at CBS apparently must be minimised instead of treating them fairly. Overall, he misrepresents this approach. Hoekstra restates many other ideas without reference to the precursors, with the false suggestion that he invented this as news, and with the loss of the ability to gauge the slowness in progress, and also sabotage. Hoekstra has a confused terminology, false hidden assumptions (like that contingent valuation would be adequate), and an essential lack of understanding of welfare theory and national accounting. He states a vision and mission that cannot convince scientifically. Its vagueness might allow him perhaps later to claim that the world responded to his vision though.

27.14 Chapter appendix on 2013

Hoekstra had been informed in 2013 about a serious oversight for UNECE and the Conference of European Statisticians. The occasion was a colloquium on June 3. The following has been translated from Dutch.

Date: Wed, 5 Jun 2013

To: r.hoekstra at cbs.nl [email address still applied in this year]

From: Thomas Cool / Thomas Colignatus

Subject: W.r.t. the colloquium at the Ministry of Economic Affairs (EZ) about environmental sustainability and eSNI

Cc: jp.smits at cbs.nl and some others

To Rutger Hoekstra (and J.P. Smits)^{218 219}

Dear dr. Hoekstra,

Thank you for your presentation at the Ministry of Economic Affairs (EZ) last Monday. I have found and largely read the paper "Measuring sustainable

<https://zenodo.org/communities/re-engineering-math-ed>

²¹⁸ <http://www.unece.org/index.php?id=32136>

²¹⁹ <http://www.rutgerhoekstra.com/>

development and social progress: Overview and Conceptual Approach", CBS 2011.²²⁰

I copy to the (former) CBS staff present. Dr Smits was not present but this email can also be considered addressed to him in his capacity of the TFSD.

I have written about Hueting's work:

In ESB (the magazine for Dutch economists) in a series about "legators":²²¹

A historical and conceptual overview based on a few long interviews, which is available for a journal: "The Old Man and the SNI" (OMS)²²² (with PDF)

P.M. See also the passage in which Hueting's old acquaintance Walter Radermacher [in 2013 director of Eurostat] calls eSNI "political", while this is obviously not the case.

A book for which I am still looking for a publisher: "The Tinbergen & Hueting Approach in the Economics of Ecological Survival" (THAEES)²²³ (with PDF)

And recently a piece in *Ökologisches Wirtschaften* about eSNI as "work in progress" – which is not relevant now.

In THAEES p57-64 you will find why, in my opinion, Hueting deserves the Nobel Prize in economics. He could at least be nominated for this.

So it surprises me a great deal how CBS dealt with its work in the past, which apparently still continues into the present. In OMS you will find descriptions of "advance and adversity".

Let me indicate a few misunderstandings that emerge from your EZ presentation and your 2011 paper.

(1) You do not seem to regard eSNI as a statistical figure. But it is a statistical figure. It is conditional on preferences by the existing population in the year of estimation with regard to their descendants. For various reasons, the preferences for sustainability cannot be expressed through processes of the market and, in part, the government. Therefore, it is the task of the statistician as information provider to estimate that figure on the basis of the assumption of environmental sustainability. That the statistician makes that assumption stems from professional ethics not wanting to give incorrect information, as well as the fact that governments have formulated such a sustainability objective internationally, even if they do not adhere to it.

(2) As economists, we all find that NI does not represent welfare. You rightly say that this is also mentioned in the publication of NI. For you this suffices. For Tinbergen and Hueting (and me) this is insufficient.

(2a) Namely, NI was originally set up to measure welfare indeed. William Petty started to collect observations and add up numbers. For us it is somewhat vague

²²⁰ <https://www.cbs.nl/-/media/imported/onze%20diensten/methoden/dataverzameling/korte%20onderzoeksbeschrijvingen/documents/2011/36/measuring%20sustainable%20development.ashx>

²²¹ <http://www.sni-hueting.info/NL/Anderen/2001-08-24-ESB-Cool-over-Hueting.pdf>

²²² <http://mpira.ub.uni-muenchen.de/12690>

²²³ <http://mpira.ub.uni-muenchen.de/13899>

what he wanted with it [apart from determining capacity for taxation]. But economic theory has developed, with a welfare theory in which NI got meaning as a plane tangent to the Social Welfare Function (SWF). Without this theory, NI is meaningless, a dumb number that would be of no use to anyone and for which it makes no sense to have all the effort to calculate it. It has since become clear that there is a lot wrong with NI that makes it an inadequate measure of welfare. So also NI only has conditional meaning based on certain assumptions, but such conditional meaning remains in terms of welfare.

(2b) Therefore, CBS Statistics Netherlands gives misleading information to its customers when it only publishes NI and, given the issue of environmental sustainability, no eSNI. CBS Statistics Netherlands here fails with regard to scientific ethics. CBS Statistics Netherlands is proud of publishing statistical information but publishes disinformation.

(2c) It is very nice that all sorts of other aspects of welfare are considered too, like happiness and so on, but these aspects should not distract from the fact that the discussion about sustainability originally related to environmental sustainability. Others have become involved in this discussion and have polluted the concept of sustainability with all sorts of other things. Given the scientific ethics, proper information about environmental sustainability is needed and that is possible via the figure of eSNI.

(2d) It is nice that there are environmental indicators like in NAMEA. For, one wants to know everything, also at the detailed level. And one can also expand with all kinds of environmental aspects. But for environmental policy making one has to focus on the measures and effects that are the most relevant in terms of policy, and to that end one also wants to compare with NI at an aggregate level. E.g. CO₂-tax or emission rights. For that, eSNI lies on the shelf and one must have a good reason not to use it and to develop it further. Who considers the arguments that were used also at CBS Statistics Netherlands in the past not to use it, will only find fallacies based on misunderstandings such as above.

(3) Your CBS paper of 2011 only refers to Hueting's dissertation [of 1974, with English translation 1980]. In it he reaches the negative conclusion that environmental correction [of NI] is not possible because the preferences cannot be expressed. Only his later work provides the positive eureka of the assumption of [preferences for] environmental sustainability. It is conceivable that you have missed a lot of this. Your paper and lecture exude the atmosphere that all kinds of choices regarding the development of indicators have been made in scientifically rational consultation. You are then not aware of the obstruction towards Hueting's analysis both at CBS and at VU Amsterdam where you obtained your PhD and internationally where people have their own hobby horses. Reading the Rejoinder by Hueting concerning the contributions to the book for the Hueting Symposium could be an eye-opener for you:

<http://www.sni-hueting.info/EN/Publications/2001-Rejoinders-In-Vanlerland-EtAl.pdf>

Also the researchers at IVM / VU recently present fallacies with regard to the eSNI, see possibly here, also available on the internet: Hofkes, M.W. and H. Verbruggen, 2012, "Van groene welvaartsmaten tot een nationale

maatschappelijke kosten-batenanalyse", TvOF, jaargang 44, 2012, nummer 4, p247-253, Wim Drees Stichting voor Openbare Financiën.²²⁴ [²²⁵]

The unkindness of the latter article is that the authors did not send it to Hueting in advance for comments. They write about eSNI but actually don't understand it, and do not have the courtesy towards the designer of the analysis. It is self-evident that people should present their own insights, but they must inform readers adequately and not increase confusion.

It could be a good exercise for you to try to punctuate the fallacies regarding eSNI in this article by Hofkes and Verbruggen, and then check with Hueting whether you have succeeded.

There is also a correspondence with the directorate of CPB, in which the CPB's position is full of fallacies and misrepresentations, see²²⁶

Here too you could see if you can deconstruct it, after which you can compare your finding with the reaction by Hueting and De Boer.

(4) In your lecture you stated that the use of an indicator such as eSNI requires the consistent support by a powerful institute, such as Genuine Savings at the World Bank. You presented this kind-of as your most important message of the colloquium, and you repeated that in our short after-talk. I myself take this for granted and I do not fully understand why you think that Tinbergen and Hueting (and I) do not know this. In Tinbergen's work you can already read about asymmetric bookkeeping, and he calls it "counterproduction". Hueting has done an enormous amount of work to remove misunderstandings amongst researchers in such a way that there is scope for CBS Statistics Netherlands or institutes internationally to adopt eSNI.

Policy makers are liable to refer to disagreements among researchers and then say that there are no funds for the information they would rather not hear. A researcher like Hans Opschoor is inclined to tell politicians that eSNI is subject to uncertainties, and in such manner deter them from giving a subsidy. It would be more correct if he told politicians that there should be a grant so that the researchers can do what they would very much like to do: to map the uncertainties.

(5) You referred to the UNECE plenary meeting in Geneva on 10-12 June where the Dutch contribution to SEEA is discussed in session 25, and I have read the conclusions that seem reasonable except that eSNI is missing:^{227 228}

Ah, and there in the formal business of the high-level group, also a recent version of the previously cited article from 2011:²²⁹

²²⁴ http://tvof.nl/page/downloads/TvOF_2012_-_n4_-_art-7.pdf

²²⁵ Dutch readers may benefit from (1) <http://www.sni-hueting.info/NL/Anderen/2012-TvOF-Hofkes-Verbruggen-2014-Hueting-DeBoer-plus-briefwisseling.pdf> and (2) <http://www.sni-hueting.info/NL/Publicaties/2014-07-TvOF-Kosten-en-baten-van-groene-welvaart.pdf>

²²⁶ <http://www.sni-hueting.info/NL/index.html#monitor>

²²⁷ <http://www.unece.org/stats/documents/2013.06.ces.html>

²²⁸ <http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/2013/25.pdf>

²²⁹ http://www.unece.org/fileadmin/DAM/stats/documents/ece/ces/2013/SD_framework_and_indicators_final.pdf

In that reference list Hueting is completely missing.

A remark could be that you grew up intellectually and was trained in an environment in which the work by Hueting did not receive the attention it deserves. It is to be feared that this applies to all young "environmental economists" (who apparently do not receive good basic education in welfare theory).

You therefore face the challenge of finding out why the information about eSNI does not lead to an interest and motivation to thoroughly investigate what Hueting has written about the eSNI. In the paper OMS I explain that people can understand 99 out of 100 points, but that everyone has 1 different point so he or she drops out, so that discussions can be a cacophony. It is then your task [Taskforce] to find your one point of resistance, and then to look in the texts by Hueting why your point is a misunderstanding. But above you already had more points of misunderstanding. Subsequently, it is also wise to be very cautious with statements about eSNI, because people easily misrepresent it. It is wise to first submit statements to Hueting and De Boer. I now take a certain risk not to do that, but I rely upon the above texts.

If you would like to speak with me before the UNECE meeting, we can do so on Thursday morning June 6 or else Thursday evening June 6. In essence, CBS Statistics Netherlands owes apologies to UNECE for systematically misrepresenting eSNI, but people at the OECD and World Bank have misrepresentation too, so I tend to call on the younger generation of researchers to take a fresh look at the analysis.

Kind regards,

Thomas Cool / Thomas Colignatus
Econometrician (Groningen 1982) and teacher of mathematics (Leiden 2008)
(CPB 1982-1991)
<http://thomascool.eu/>

28. Lintsen, Veraart, Smits, Grin (2018)

28.1 Introduction

Section 7.10 discusses how Hueting (1967, 1969a, 1974a, 1980) introduced terminology in such manner so that notions of capital and services in the System of National Accounts (SNA) could be supplemented, without risk of confusion, with notions of natural resources and environmental functions. This section also discussed how other authors later preferred to extend capital with “natural capital” and services with “ecosystem services”. The two approaches have the same analytical structure but apparently the terminology may cause researchers to think that there is a difference. What is different is what has been identified as Hueting’s contribution to economics, see Section 19, with the practical development of eSNI.

The World Bank adopted the “capital approach”, see Chapter 30. Hueting retired from CBS Statistics Netherlands in 1994 and eSNI was still mentioned in the Dutch national strategy on sustainable development for Johannesburg 2002, see Ministry of VROM (2002) as discussed in Section 21.10.3. At CBS Statistics Netherlands new researchers environmental economist Rutger Hoekstra²³⁰ and economic historian Jan-Pieter Smits²³¹ became the project leaders for the CBS et al. (2009a) monitor on sustainability in the Netherlands. This monitor discussed eSNI and referred to Hueting (1974a, 1980) where eSNI *cannot* be found, as it was introduced in 1986, see Section 21.11.1. It is remarkable that they express an interest in sustainable development but do not properly study Hueting’s work where they could have found the proper reference (and also its discussion on content). They adopted the World Bank “capital approach”, potentially unaware of the issue of terminology, and perhaps thinking that Hueting’s method was too much different from that “capital approach” while there is the same analytical structure. Hueting’s protest to CBS received a reply by CBS that does not meet standards of science.²³²

Hueting had given CBS Statistics Netherlands a leading role on the statistics of the environment and the interaction with the economy. Keuning inherited this and pushed for the NAMEA, i.e. a transformation of Hueting’s work but with indicators only and without a link to national income. Hoekstra and Smits inherited that leading position again, and upon their advice the Conference of European Statisticians (CES) adopted the “capital approach” too, see Section 21.11.4. Hueting’s successors thus buried his analysis and work.

CBS Statistics Netherlands finances the “Quantification of Sustainability” chair at Eindhoven University of Technology (TUE), with the appointment of Smits (Section 21.11.10). Smits (2016) is his oration of acceptance.²³³ A result is already the book by Lintsen, Veraart, Smits and Grin (2018), henceforth LVSG.²³⁴

²³⁰ <http://www.rutgerhoekstra.com/cv/>

²³¹ <https://www.tue.nl/en/university/departments/industrial-engineering-innovation-sciences/the-department/staff/detail/ep/e/d/ep-uid/20167725/>

²³² <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CBS.pdf>

²³³ https://pure.tue.nl/ws/files/91607849/Rede_Jan_Pieter_Smits_LR_26_01_2018.pdf

²³⁴ <https://link.springer.com/book/10.1007%2F978-3-319-76696-6>

Hueting and his work are mentioned neither in the oration nor in the book, while Smits in the first chapter of the book nevertheless discusses sustainability and the environment. Smits refers to CES and apparently thinks that this is sufficient. However, the situation is that he should have referred to Hueting's work.

This chapter will discuss some aspects of Smits (2016) and LVSG (2018). While this present book emphasises the Tinbergen perspective on planning for the future it is remarkable that we now see us compelled to look into the history of 1850-1950 as well. In Holland there is a sustained interest in national history, and also of its economy, now also extending to the relation to the environment. It would be a pity when eSNI would be lost to this community of history researchers merely because economic historian Smits as the connecting point at CBS lacks proper understanding of economics and national income accounting. Since the scarcity of environmental functions became dominant for economic analysis only after 1950, it may be doubted whether eSNI is relevant for Dutch national history before 1950, but at least one would wish that eSNI is properly presented in this historical literature too, which now is not the case.

28.2 Conclusion up-front

In a customary exposition the reader would consider the evidence without yet knowing the conclusion. Nowadays it is not unusual to present the conclusion up-front. I will do the latter. While I present my conclusion, the reader may regard it as a conjecture. The evidence has been collected in the Appendix to this Chapter, and I now conclude this Chapter with its conclusion.

Originally Smits is no economist but a historian with a specialization in socio-economic development (not MSc but MA 1989, dissertation 1995 VU). My proposal is that students first learn a field of science and develop respect for science before they start doing history.²³⁵ There is a structural phenomenon that historians propound on issues with curious arrogance and without proper knowledge and even respect for science. Smits' work is another such case. It shows that he is not sufficiently at home in welfare theory and environmental economics, and, moreover, that he has little interest in it, because we can observe that he does not bother to look up the relevant articles by Hueting. Smits has worked with Maddison in Groningen on the long run time-series on national income, but the evidence is that he does not understand the theory of eSNI and its statistical measurement.

Smits may be particularly interested in technological growth, indeed relevant for the centuries before 1950, which also explains the collaboration with Harry Lintsen (emeritus physicist, history of technology) and Frank Veraart (PhD in history of technology 2008) at the TUE and John Grin (physicist 1986, dissertation technology assessment VU 1990) at the UvA. The latter three scientists are making the transition to the "softer" field of research on well-being, with a scope for 2050, and they may then seek support from economic historian Smits. Unfortunately, he then puts them on the wrong foot with regard to welfare economics and environmental sustainability, reducing the quality of their joint book. Next, it should not be forgotten that Hueting has also written about

²³⁵ <https://vragen.wetenschapsagenda.nl/vraag/kan-en-moet-de-studie-geschiedenis-niet-strenger-gaan-opleiden-tot-wetenschap-en-respect>

productivity and technological growth. It is for good reason that Hueting had appointed researchers to the CBS environmental statistics department with backgrounds in physics, chemistry and biology.

This impact at CBS, the monitor, CES, misplaced professorship and corruption of the LVSG-book are a pity, may create another obstacle against eSNI and the economics of ecological survival, and there is no reason for it, and only the cause of a tradition amongst historians to train for arrogance rather than respect for science.

The following sections are the Appendix to this Chapter.

28.3 *Appendix to this Chapter*

28.4 *No science but magic*

Smits (2016:8) has the same Graph 2.2 of LVSG (2018:40), with the following explanation there on page 487:

“Graph 1 is taken from the study by Harry Lintsen, Frank Veraart, John Grin and myself. It compares trends in GDP per capita with an aggregate measure of human well-being. Of course, this graph gives only a rough approximation of the improvement in well-being, as the different aspects of quality of life such as education, health, air quality, material consumption etcetera, are all lumped together (with equal weights) in one composite indicator. The only reason to present this figure is to give a broad outline as to how, in the long run, GDP growth has, or has not, resulted in comparable improvements in human well-being.”

This is not science, and thus must be some form of magic. Putting different indicators together and then adding them with equal weights as if the basket represents something is irresponsible. NB. In the explanation on page 487 different weights are mentioned, before and after 1960.

Smits allows this kind of magic and also allows that the outstanding work by Hueting is rejected, with himself in CBS et al. (2009a) referring to disputability, though without explaining what exactly, and now resorting to magic himself.

One might say that the presentation of an “indicator” that is alternative to GDP at least shows a growing awareness that there is some value in comparing GDP to some alternative. It is awkward that this growing awareness results in the invoking of magic, and not in admitting that Hueting had a point in developing eSNI and comparing NI and eSNI in $e\Delta = NI - eSNI$.

Since Adam Smith in 1776, economic science has developed the concepts of income and utility functions and the (Bergson) Social Welfare Function to reflect on this subject in a scientifically responsible manner. LVSG ignore this, but the other authors may think that they have a capable economist with Smits.

Observe: (i) A key result of Hueting (1974a,1980) is that preferences on the environment cannot be derived empirically. This caused Hueting to develop the method of conditionality. See also below on methods to elicit value. (ii) Smits and his monitor on “broad welfare” (pleonasm) has various indicators and he may call this “monitoring” or “tracking” but then he still has not solved how these indicators relate to well-being and (environmental) sustainability, so that he leaves it unclear

what exactly he is monitoring or tracking. He only *claims* that there is some connection, and he resorts to magic in an effort to substantiate that claim, but it remains *claiming* only and resorting to *magic*. With this monitor, Smits is at risk running after a *fata morgana*, and throwing out the baby with the bathwater. (iii) eSNI however has been developed as a practical approach to an unsolvable problem. (iv) See Section 28.8.2 on the “per capita” denomination.

28.5 The CBS-history nexus

LVSG:vii explain that their book has been in a stage of development already over some years, originally with a focus on technology, before Smits joined up and contributed to an additional focus on “broad welfare” (a pleonasm) for the period 1850-2050. Smits provided this new sexy umbrella and his chapter opens the 2018 LVSG book. There is much overlap between Smits’s oration of 2016 and this chapter.

Lintsen, Veraart and Grin have a background in physics and engineering, while Lintsen and Veraart switched to the history of technology and Grin to technology assessment and its political science dimensions. They might have thought that Smits had a background in economics but Smits background is in history with an application to social economic history. Though Smits has been involved in the project by Angus Maddison (1926-2010) at Groningen University to establish long run data series on economic growth, and though Smits may know about national accounting in conventional fashion, this need not imply that he has command of the economic theory that is required for understanding national accounting in the way as this is also used for eSNI (Section 11.2).

28.6 Referring to work done at CBS

LVSG is not just a book by some private persons but the link to CBS is there. LVSG:v states: “Research was conducted at Eindhoven University of Technology, University of Groningen, University of Amsterdam and Statistics Netherlands (CBS)”. Also on this account, LVSG should have referred to the work by Hueting done at CBS and pertaining to the same topic, namely the relation of economy and environment, also in the period 1850-2015, e.g. with the information available in Figure 4 (perhaps excluding the rough estimate for 2015). It is improper, and unkind to CBS, that Smits gives a selective presentation, by not alerting its readership to Hueting’s work on the same topic.

For Hueting it must be strange to see that the environmental statistics that he helped develop at CBS and elements of his analysis on economic growth are presented here, in a roundabout via UN SEEA and World Bank, without proper citation and without mention of the development of eSNI.

28.7 Terminology and analytical structure

Since Smits refers to the “capital approach” – perhaps as if it would be something (fundamentally) different than Hueting’s approach, so that it would not need referring – it will be useful to indicate how both approaches overlap. If we hadn’t already established the structural identity in Section 7.10 then the overlap would be spooky and suggestive of plagiarism by LVSG. As said, potentially the

situation would have been much clearer when Pearce et al. (1989) had referred to Hueting, and in particular to his analysis on eSNI.

28.7.1 *Environmental functions vs ecosystem services*

LVSG:19 use “ecosystem services” while Hueting has “environmental functions”:

“This is why we define natural capital as the ability of colonised ecosystems to provide so-called ecosystem services, in other words the ability to generate yields of food, energy, potable water etc. [ftnt 31]”

The word “capital” may also be used by non-economists. Smits refers to CES and also to TEEB and Dirkx and De Knecht (2014) at PBL, who also adopt the “capital approach” and who also do not refer to Hueting’s work. Bart de Knecht is an ecologist and Joep Dirkx is a rural land planner at Wageningen University and was at PBL for one year to write this document, see Section 21.11.6.

28.7.2 *Vital environmental functions vs critical capital*

LVSG:18 use “critical capital” where Hueting has “vital environmental functions”:

“In the second place we can view a portion of available natural capital as critical capital. Were economic, human or social capital to be seriously threatened, well-being would doubtless be severely compromised. But if nature and the environment are damaged beyond repair, ecosystems can collapse and with them the very foundations of economy and society.”

PM. See references by Hueting (1974, 1980) to ecologists, so that the use of the notion is warranted. At issue here is the link of ecology and economics.

Hueting is alarmed by the threat to the vital environmental functions and therefore designed the eSNI measure to support information to the general public and decision making on environmental policy. LVSG however are lacklustre on the threat to the “critical natural capital”, and they resort to the magic mentioned in Section 28.3, while also allowing in that magical indicator that more education can substitute for ecological survival.

28.7.3 *The importance of the environment for the LVSG book*

One might conjecture that LVSG wrote about history and well-being while Hueting writes about economics and the environment, so that LVSG need not refer. However LVSG:18:

“The Monitor of Well-Being utilises a broad concept of well-being. Concerning the question of the depletion of vital resources, the Monitor distinguishes four capitals: natural, economic, human and social capital. This book, however, devotes particular attention to natural capital, and that for two reasons. First, natural capital can be seen as the foundation on which the entire economic and social system is built. Humans are able to construct (material) well-being by utilising natural resources.”

PM. An economist would like to see a better distinction between (i) the production function and the factors of production, (ii) the preferences and the Social Welfare Function (SWF) (well-being), and (iii) income, as the tangent. GDP

can be output in the simple production functions $y = f[\text{labour}, \text{capital}]$, but it is more logical to see GDP as the income tangent in a more complex model. Linking well-being (SWF) directly to a factor of production (natural capital) doesn't quite fit.

28.7.4 Future generations

LVSG:486 like Hueting adopt the precautionary principle for future generations. In itself this seems rather logical given the topic of discussion, but even after the Brundtland report of 1987 most economists have been lacklustre about ecological survival, while Hueting has been emphasising it. Smits's adoption of the principle cannot be seen as fully independent from Hueting's contribution to the Dutch national discussion on this. At least it is a parallel in the analysis.

"In the third place, this study has granted pride of place to natural capital. It sees natural capital as the foundation of a given quality of life. The way a society deals with natural capital (soil, air, water, subsoil resources) in large part shapes social structure in the 'here and now' and 'elsewhere.' It also has a great impact on the quality of life 'later.'"

This pride of place however still appears to allow that education can substitute for the flooding of Holland.

28.7.5 Reference to "intrinsic value" vs condition on preferences

LVSG:14 hypothesise an intrinsic value while Hueting has a conditional assumption on preferences for environmental sustainability:

"Natural capital occupies a special position, because it can be seen as the foundation of well-being. The usual economic view of natural capital is anthropocentric, seeing nature only as 'useful and productive' and as a purveyor of 'ecological services' to humans. This ignores the fact [that] certain forms of natural capital, like biodiversity, have an intrinsic value quite apart from the specific 'utility' it might have for humans."

The latter is a misconception. Authors who refer to such intrinsic value are actually humans who express such value themselves. As humans we cannot avoid anthropocentrism, simply because we are humans. Thus: (i) This rebuttal should at least have been mentioned. (ii) This argument on anthropocentrism cannot be used to reject the development of eSNI.

PM. The oration page 18 has the statement: "unexploited nature – which renders no services to humanity - has no value". And on page 19: "Does nature not have an intrinsic value?" It is strange to pose such questions when Hueting (1974a, 1980) has extensively discussed this and when Hueting later introduced the conditional assumptions on preferences.

Smits (2016:22) has:

"The long-term agenda on tracking human preferences will not only improve the statistical monitoring of well-being and sustainability, it may also help to engineer a world with a better and more sustainable quality of life; a world where not only human life but all life forms matter."

This statement combines some of the misconceptions mentioned above, like that such preferences can be tracked while only indicators are tracked. The misrepresentation of the anthropocentrism of neoclassical economics now is transformed as if only human life would matter.

28.8 Confusions

Smits follows the approach by authors like Hueting to look at these issues from the angle of welfare theory. Remarkably this is presented as both new and old, and the reader wishes that Smits had stated clearly that this isn't new, unless he had referred to Hueting who presents something new. Smits apparently has little background in welfare theory, and doesn't take advantage of Hueting's work, though in CBS et al. (2009a) and CES (2013) he actually referred to Hueting (1974a, 1980). If Smits had properly studied the work by Hueting then he could have avoided the following confusions.

28.8.1 Reference to the Brundtland report vs criticism on it

For this topic it is rather impossible not to refer to the Brundtland report, and thus we see this also in the oration Smits (2016:5) and the book LVSG (2018:13). However, had Smits properly studied Hueting's work then he would have noticed Hueting (1990c), who criticises the Brundtland report for relying upon "economic growth" that actually tends to be destructive to the environment.

Who would understand how big this misconception by the Brundtland commission is, would not refer to it as an authoritative source, as Smits does, but would refer to it as a source of confusion.

PM. Brundtland gave an oft-quoted statement on sustainability. Curiously, Smits *adapts this by including a phrase in brackets*. This adaptation is clearly identified in the oration but it is less clearly identified in the book. The adaptation is superfluous and confusing anyhow. The adaptation causes the impression as if the original statement by Brundtland would not be clear enough, while it suffices to clearly explain the original statement.

28.8.2 What variable is supposed to be sustainable ?

The oration Smits (2016:5):

"The inter-generational conditions of sustainability are met if future generations can at least enjoy levels of well-being comparable with those of the present generation. However, we have no crystal ball to look into the future, so it is impossible to know the preferences of future generations. One way to say something about future well-being is by focusing on the resources that are needed to generate well-being. The preconditions of inter-generational sustainability are met if the amount of resources per capita remains at least constant over time. Capital theory identifies the key resources that society has at its disposal. Apart from economic capital (machinery, equipment, infrastructure and knowledge), it considers human capital (the educational attainment and health of people) and social capital (the quality of inter-personal networks and institutions). Natural capital deserves special attention, as it is a form of critical capital. If natural resources fall below certain critical levels, the

effects on the future of different life forms on this planet may be far-reaching.”

This contains some misconceptions that could have been avoided by properly studying eSNI:

- (1) It is too simple to transform the Brundtland “sustainable development” into one’s own concoction of “sustainable well-being” without proper clarification of the steps between these.
- (2) The issue is not what future generations want to do. This is up to them. The issue concerns the preferences of the generation living here and now, namely what we think about bequeathing to future generations.
- (3) The issue is not “constant resources per capita”. (i) This might involve some forecast about population growth. It is up to future generations what they do with their resources. Perhaps as professor at TUE Smits might look ahead to 2050 but at CBS Statistics Netherlands he would provide statistics about today and the past. (ii) When you look at the distance $e\Delta = NI - eSNI$ then the per capita figure $e\Delta / POP$ may go down while the total burden on the environment $e\Delta$ increases. Thus the per capita figure is a wrong indicator for the burden on the environment. Smits apparently has not the competence of a statistician to select the right indicator.
- (4) The issue of sustainable development actually has been much contaminated by other notions than the environment. Given the challenges of ecological survival, it is advisable to give it priority in attention. Smits mentions “critical capital” but still allows that “other forms of capital” like education can compensate for ecological collapse, so that his term “critical capital” is an empty shell. Environmental economists have discussed notions of weak and strong sustainability, but Smits is no environmental economist, only a historian who thinks that he could have a leading role in this area, and he apparently is not aware of an article like e.g. Hueting & Reijnders (1998b) that would illuminate the issue. Instead for eSNI, environmental standards have been derived from the scientific literature, so that it is clear what the vital functions are. It is less relevant to describe what the effects of ecological collapse are, it is more important to give information how it might be prevented.

28.8.3 *Drawbacks of the notion of natural capital*

Smits (2016:21):

“Of course, there are serious limitations to treating nature as a form of capital, but at least by using the concept of natural capital, nature can become part of the social cost-and-benefit analyses on which policy makers base their decisions. It is important to speak the language of policy makers.”

(i) This flies in the face of his rejection of eSNI. eSNI speaks the language or policy makers by looking at $e\Delta = NI - eSNI$. (ii) It is pertinently false that the term “capital” in SNA must be extended with the term “natural capital” *before* the environment can be looked at in CBA or be discussed in the language of policy makers, see eSNI. (iii) It would be useful when Smits specifies what those limitations are. Conversely, eSNI, with the notion of environmental functions and

sustainability standards and use of a model, has no blocking limitations, apart from the common uncertainties in science.

28.8.4 *Difference between economist and economic historian*

The following error in the oration p17 would likely not be made by an economist who has an interest in understanding economics, but the error might be made by an economic historian who has another focus:

“One of the shortcomings of conventional economic analysis is that it treats people’s preferences as exogenous. Neoclassical economics, the dominant stream of economic thought in the twentieth century and an exponent of the modernist paradigm, argues that the preferences of citizens can be tracked down by looking at their consumer behavior. According to this approach, well-being equals the utility derived from consumption. In other words, our well-being only depends on what we consume. The question must be raised whether this approach tells us anything meaningful about human preferences. Do we really know and measure what is important to people?”

Points of criticism are:

- Neoclassical economics regards preferences as “given” to economics, which need not be the same as “exogenous”. Hueting e.g. has conditionality.
- It is incorrect that neoclassical economics would hold that “the preferences of citizens can be tracked down by looking at their consumer behavior”. It was only a *proposal* by Paul Samuelson to speak about “revealed preference”. This itself shows that economists generally allowed for more (other) options. Hueting as a neoclassical economist emphasised the conditionality of assumptions on preferences when evaluating the data.
- It is incorrect that “According to this approach, well-being equals the utility derived from consumption. In other words, our well-being only depends on what we consume.” The utility $U_i[x_i]$ of individual i has vector x_i with variables that depend upon the object of study. There may also be altruism with the inclusion of endowments of others. It is empirical reality that determines what matters. The quality of the study also depends upon the observational abilities by the researcher.

PM. Basically, “broad welfare” is a pleonasm. The term seems to have been coined in the Netherlands by Arnold Heertje, who rather should have said “not-narrow welfare”. In the oration Smits (2016:5) seems to understand this, as he speaks about the “Well-Being Monitor” rather than the “Monitor Broad Welfare”, but in LVGS (2018:12) we find a mal-edited sentence that nevertheless indicates that Smits is not aware of the pleonasm.

28.8.5 *Education vs ecological survival*

Smits (2016:17) has:

“The measurement framework of the CES Recommendations is inspired by the neoclassical production function, which states that output (GDP) is a function of increases in labor and economic capital. The CES

Recommendations use an augmented production function. [ftnt] This explains changes in human well-being from a growth in labor and broadly defined capital, including economic, human, social and natural capital. Even though this approach is a step forward, it leaves a lot to be desired as it is firmly rooted in the paradigm of modernity. The last part of this lecture examines some of these modernist assumptions and potential shortcomings, and tries to define a research agenda for the longer term.”

Elsewhere, Smits has allowed for the existence of “critical natural capital”. He might agree that more happiness e.g. on more free time cannot substitute for ecological collapse, though he allows that his magic indicator allows that more education can substitute for ecological collapse. Hueting finds all of this rather distractive and focuses on the vital environmental functions, or this critical natural capital and their ecosystem services. It is remarkable that Smits doesn’t highlight this, neither for his research agenda. His horizon is 1850-2050 while the flooding of the Netherlands is not expected in that time window, so that the reader starts wondering whether we are really discussing (environmental) sustainability.

28.8.6 *Methods to elicit value*

Smits (2016:18) states: “This brings us to the topic of describing the value of nature beyond the more restricted forms of economic monetization.” He mentions scaling questionnaires, “deep mapping”, and other ways to elicit preferences. Hueting (1974a, 1980) however already indicated the limited relevance of such elicitation methods. Potentially Smits agrees, when he wants to go beyond monetization, but it is not clear where he wants to go to. Economic theory takes psychological views on value as given. Smits (2016:19) uses the term “value”, but this apparently would be such that economic theory cannot take this as given. Perhaps nature might be worshipped but not saved ?

“Attempts to reveal people’s preferences concerning the natural environment are important, as they may enable us to value nature beyond the more limited economic approaches.”

The oration then returns to the issue of “intrinsic value” that we discussed. Thus Smits *thinks* for some reason or other that such methods might still work to such effect, while Hueting *proves* that they have limited relevance so that it is better to use the conditional approach.

28.9 *A so-called paradox*

LVSG (2018:9) presents a “paradox”:

“First, a well-being paradox is identified. Nowadays, compared to other countries, the Netherlands ranks high in terms of the life satisfaction of its citizens. Nevertheless, a substantial segment of society does not share this positive outlook on life. This phenomenon is not unique for the Netherlands, as indicated by the substantial rise of populism throughout the western world. This study shows that also in earlier periods, a high ranking on various ‘lists’ went hand in hand with feelings of strong discontent in society.”

Who has read or listened to H.C. Andersen's "*The princess and the pea*" would not call this a paradox. It is well-established in economic observations that people tend to get used to their wealth and tend to compare their position with those of others. It is a scandal that the serious issue of eSNI and ecological survival gets obstructed by such lack of understanding of basic economics.

28.10 SUSTAIN

Smits (2016:15) refers to research on the flow of materials from former colonies to the former colonisers. It sounds sympathetic to pay attention to research on this, including the historical roots, but it is less nice when countries do not get the proper information about eSNI. When countries get information about eSNI then they could develop more information and better policies about their resources. Now they are presented with burking and a magic graph as if this would be the state of economic science.

28.11 An unconvincing core

LVSG (2018:16) present the "Core Concepts in the CBS Measurement Framework for Well-being and Sustainable Development". This contains:

- (1) A "definition by the Brundtland Commission" but with an adaptation.
- (2) A notion of welfare as used in welfare economics for already some century but presented as "new" and "broad". In the 1930-1950 there was a period when dominant economists for practical purposes associated welfare more narrowly with production and income. (However, by 1960 it was already clear that this was an awkward convention, and the only issue is that statisticians at departments of national accounts at national statistical offices persist in relabeling production growth as "economic growth" only because of tradition, see Chapter 17.)
- (3) A notion of "capital" with a working core in the SNA and vague additions on other forms on human, social and natural "capital", with the major intellectual step that these forms are not called "resources" but "capital", so that this isn't economics but a form of advertising.
- (4) A term "ecological quality of life" that is curiously defined as "This concept focuses on the intrinsic value of nature and its ecosystems, quite apart from the question whether these have a direct economic value for humans". As discussed in Section 28.7.5, it is a confusion to see this as separate from (2).
- (5) The official name is "Monitor Brede Welvaart" but the body of the text also refers to "sustainable development" and Smits now calls it a "framework".

28.12 Other authors

Smits might not have been aware that he has been transgressing in the field of welfare economics and cost-benefit analysis. Remarkably, the other authors, with a background in physics, have not been able to support Smits in preventing such confusions. Also CBS-colleague and economist Rutger Hoekstra apparently hasn't provided such support. The reader is alerted to the email in 2013 to both Hoekstra and Smits, see Section 27.13.

Part 4. Comparison and reception outside of CBS

29. On the political economy of environmental survival versus collapse. Clarifying the work done by Tinbergen & Hueting vis-à-vis Weitzman, Nordhaus and Stern

29.1 Abstract

The Stern Review (2006) on the economics of climate change presented a cost estimate of perhaps even 20% of national income and subsequently was criticized by Weitzman and Nordhaus and others in a discussion that centered on the use of the calculus of variations and the choice of the proper rate of discount. The Tinbergen & Hueting (1991) approach deals with the wider environmental collapse, is not formulated in the form of the calculus of variations, and arrives at a sustainable level of national income of about 50% of national income. The Tinbergen & Hueting (T&H) approach appears to be neglected by Weitzman, Nordhaus and Stern (WNS) but appears to be better grounded in economic theory, mathematically richer and empirically more relevant. This paper clarifies the misunderstandings and omissions in the work by WNS on environmental economics. NB. This gives a view from 2008 and has been edited but not updated.

29.2 Introduction

The Ph. D. thesis by Jan Tinbergen (1929) – his own copy apparently for sale in 2008 for EUR 3300 at antiqbook – contains a decent amount of analysis in the calculus of variations, see Boumans (1992).²³⁶ This mathematical approach is also used by Martin Weitzman, William Nordhaus and Nicholas Stern (WNS) to discuss sustainable development and the economics of climate change.

Tinbergen (1903 – 1994) was also involved with the more practical problems of data gathering, national accounting, model formulation and number crunching. His attention in 1969 and 1990 was drawn to publications by Hueting. On Tinbergen's advice Hueting became head of the new dept. of environmental statistics at CBS Statistics Netherlands. Eventually this resulted in the Tinbergen & Hueting (1991) (T&H) paper *GNP and Market Prices: Wrong Signals for Sustainable Economic Success that Mask Environmental Destruction* – here Appendix 50. Their approach appears to be very important, but it is not formulated in the language of the calculus of variations (though some parts are).²³⁷ Remarkably, Tinbergen (1985) does not refer to Hueting's work but the explanation must be that he takes this work so for granted that it does not occur to him that a reference might be useful. Tinbergen (1985:118) discusses 'counterproduction' (sometimes also called 'double counting' but nowadays called 'asymmetric entries' by Hueting). An example would be a catalyst for the exhausts from a car: the value added in its production should not be included in national income since it only restores the clean air that existed before.

²³⁶ See also J. Tinbergen (1956), "The Optimum Rate of Saving", The Economic Journal, Vol. 66, No. 264, Dec, pp. 603-609.

²³⁷ CBS hired ir. Bart de Boer in 1991 because of his experience in both optimal control theory and environmental issues. A paper that discusses sustainability using the calculus of variations is Zeelenberg, De Boer, Brouwer (1997).

Young econometricians currently trained in environmental economics tend to focus on the mathematically elegant approach of the calculus of variations while they have come to neglect the Tinbergen & Hueting approach, and, in path-dependency, they continue to neglect it. Even the Stern Review with its ethical approach to the calculus of variations neglects the T&H approach on environmentally sustainable national income. Major critiques on the Stern Review were on the rate of discount and the ethics within the framework of the calculus of variations, but none of the widely cited economists referred to the T&H approach, see Nordhaus (2007a) and Weitzman (2007ab) themselves but also e.g. Dasgupta (2007a) and Tol (2006), and also Quiggin (2006) on this discussion itself. If this neglect of the Tinbergen & Hueting approach continues, a major resource and strand of economic thought is left unused.

This present paper wishes to clarify the situation. The best approach is to take the angle from T&H and comment on WNS. This ought to help readers of WNS – if not WNS themselves – to better understand the value of T&H. This present paper can be seen as a companion to Colignatus (2009a) – here Chapter 21 – that reviewed the earlier history of the T&H approach. The T&H figure for environmentally sustainable national income (eSNI) is about 50% of national income (NI), while the Stern Review arrives at costs of at most 20% of NI. This sizeable difference caused me to look deeper into the Stern Review and its critics.

Economists are a bit reluctant, as I myself, to think in terms of survival and collapse. Dupont (2008:47), writing in Volume 50 of *Survival*, a journal of the International Institute for Strategic Studies in London:

“In the security domain, strategic doctrines and defence budgets are frequently justified on the basis of far less observable evidence than we have about the climate future which awaits us.”

He mentions various ecological risks in the same way as will be done below, clarifying that the terms of survival and collapse are proper, and that this indeed is the framework of discussion.

The G8 in Japan July 2008 stated that emissions of greenhouse gases (GHG) should be reduced by at least 50% in 2050, though not stating explicitly from what base year, although the Chair later said to intend 2008. In that respect, one of the major steps towards recognition seems to have been taken. However, taking only the index of GHG or even temperature seems insufficient to guide policy and it seems best to have an indicator for environmentally sustainable income (eSNI) alongside national income (NI). The following discussion thus is not only important for understanding the issue of survival versus collapse but also for the selection of the proper policy indicators.

29.3 The two approaches

The Weitzman, Nordhaus and Stern (WNS) discussion has an interesting structure. In particular: (1) Weitzman (1976) determines the stationary equivalent of future consumption, which can be interpreted as sustainable income for the market sector only. Then Nordhaus (1995), referring to Karl-Gustaf Löfgren 1992, extends the calculus with non-market resources. Shadow prices follow from a well-defined production function. (2) While Nordhaus and Weitzman see no cause for

urgent action, the Stern Review (2006) advises to more active policies, emphasizing the risks of climate change, i.e. the catastrophies or events with low probability but high negative impact. The Stern Review uses a low rate of discount for the actual calculations, and subsequently Nordhaus (2007a) and Weitzman (2007a) criticize that low rate. (3) Weitzman (2007ab) concludes that the 'traditional approach' in the calculus of variations – as used by the Stern Review but in fact also developed by Weitzman himself – neglects uncertainty and risk with respect to catastrophies. The certainty calculus in the Stern Review would not fit the texts on the risks. Weitzman then actually reformulates the calculus so that we now have a variant that can deal with some uncertainty. Then the road to more active policies is open again. In sum, the Stern Review uses a 'certainty equivalent' or an 'ethical reduced form' of a mathematically proper 'uncertainty calculus of variations'. Order and decency in economic advice are restored.

The mentioned mathematical structure makes philosophical sense. Ethics has everything to do with survival. Ethical issues relate to the functioning of the group with respect to survival of the group and the species. Survival not only relates to the everyday economic chores for food and shelter, where there is always the distinction between basic needs and luxuries, but survival comes clearly to the fore in all urgency under catastrophies such as fires, floods, bad harvests and so on. Where the Stern Review apparently lacked the mathematical sophistication that Weitzman so handsomely provided the Review still made sense where it formulated the issue with the tools at hand.

The T&H approach formulates standards for non-renewable resources and eight environmental functions (space, water, soil, concentrations of nutrients, radiation, temperature, toxids, localities), and imposes those standards on the model.

"Therefore, the following procedure is proposed for correcting [the use of] GNP for environmental losses (Hueting 1986b, 1989b). First define physical standards for environmental functions, based on their sustainable use. These standards replace the (unknown) demand curves. Then formulate measures to meet these standards. Finally, estimate the money involved in implementing the measures. The reduction of national income (Y) by the amounts found gives a first approximation of the activity level which, in line with the standards applied, is sustainable. Needless to say a correction for double counting, mentioned above, must also be made. If the sustainable level is Y' , the difference between Y and Y' indicates, in money terms, how far society has drifted away from its desired goal of sustainable use of the environment." Tinbergen & Hueting (1991)

Thus, in this piece of economic advice, on one hand there is the mathematically elegant approach of the calculus of variations and on the other hand there is the more practical and statistical approach. The two schools (with Tinbergen at bottom in both) have not yet come together, causing different policy advices, and this already lasts a number of years. Between Tinbergen & Hueting in 1991 and the Stern Review in 2006, both advising strong action, there are already 15 years. In this day and age those 15 years mean a population growth of 1 billion people. Where Tinbergen & Hueting in 1991 were worried already by the past change of

the world population from 4 to 5 billion, we now are in the worries about the current change from 6 to 7 billion. Quick effective action, e.g. possibly by turning development aid into family and pension planning policies, can mean a lot for environmental sustainability. This earlier window of opportunity has now been lost, perhaps because of mathematical formulation or perhaps because of political will. With the new sophistication by Weitzman we can observe that the mathematically elegant approach confirms the precautionary but perhaps less elegant approach by Tinbergen & Hueting. Hopefully, the two schools (with Tinbergen at bottom in both) can come together and there can arise some consensus in policy advice now, and a development of the particulars of that advice.

In fact, with the new Weitzman reformulation of the precautionary principle, the Tinbergen & Hueting approach stands rather vindicated and it would at least be curious why advice with a proven track record of wisdom is neglected, not looked into, not referred to and forgotten.

Interestingly, Tinbergen was a mentor for Tjalling Koopmans (1910 – 1985), see the obituary by Scarf (not dated), and Koopmans was a mentor for Weitzman, see Weitzman (2001) dedicating that paper to him, while also Nordhaus has been affiliated consistently with the Cowles Foundation. It may be hoped that the Tinbergen and Koopmans way of doing economics finds new inspiration for their younger generations. The current neglect of the T&H analysis is not fitting to this figure in the history of economics.

A main point to observe is that the models in the calculus of variations considered by WNS are very stylized constructs that omit the prisoners' dilemma and negotiation costs of non-market resources. Precisely the latter are the very core of the environmental problem. The problem of co-ordination within a nation and between or across nations are the crucial issues here. On this count alone, economists would already focus on the T&H approach. The following comments thus are rather on the fringe, caused by the particular properties of the WNS approach, but nevertheless still interesting and relevant for graduate students in the calculus of variations and for readers desiring to understand the political economy of environmental survival versus collapse.

29.4 *Rightly scaring people*

My own way of scaring people in Holland is, see Colignatus (2007) (in Dutch), by pointing to the fact, not the risk, that in a "business as usual" (BAU) scenario the Antarctica and Greenland ice will melt, causing severe flooding of Holland.²³⁸ Raising dikes will be extremely costly, since sandy undergrounds require foundations, and more water filtering in from under the dikes anyway because of the increased pressure. The drowning of Amsterdam need not happen this current century but in BAU it does at some time. Check:

²³⁸ Addendum: In August 2008 I only mentioned the Greenland ice. A bit later, Katsman e.a. (2008) drew attention to the effect, surprising for an economist (and showing again that one cannot be careful enough), that the Greenland ice exerts a gravitational pull currently raising the sea level around Holland, so that its disappearance means a relative lowering. The overall effect is 25% of the eustatic rise. For Antarctica the effect would be 110% though. So it is better to mention both Antarctica and Greenland. (And we cannot say "polar icecaps" since only land-based ice is relevant.)

"Some temperature triggers, like 3 or 4° of warming, could be reached this century if warming occurs quite rapidly. (...) This would commit the world to increases in sea level of around 5 to 12-m over coming centuries to millennia (...)" Stern (2007)

Weitzman (2007a) is informative of the risk for this very century:

"Translated into the language of the simple model used here, such rare disasters are far out in the right tail of very high ΔT , which corresponds to being far out in the left tail of the consumption-growth random variable g . The probability distribution of long-run ΔT is disturbingly spread apart, largely because of structural-parameter uncertainty about the unknown "climate sensitivity" multiplier that amplifies GHG concentrations into ultimate steady-state greenhouse warming. The recently-released *Fourth Assessment Report of the IPCC* (2007) predicts for one hundred years from now a mean temperature change of further planetary warming (from averaging six "equally sound" marker scenarios) of $E[\Delta T] \approx 2.8^\circ\text{C}$ with a thick-tailed upper-end standard deviation $\approx 1.6^\circ\text{C}$ (Table SPM-3). This means the probability that $\Delta T > 4.5^\circ\text{C}$ is approximately 15% and the probability of $\Delta T > 6^\circ\text{C}$ is very roughly about 3%. IPCC does not extend its projections beyond 2105 on the basis that predictions into the 22nd century are too uncertain, but it seems unavoidable that the reduced-form probability of $\Delta T > 6^\circ\text{C}$ increases substantially above 3% after the next century just from the enormous inertial lags for what by then will be in the climate-change pipeline. Societies and ecosystems whose average temperature has changed in the course of a century or so by $\Delta T > 6^\circ\text{C}$ (for U.S. readers: $\Delta 6^\circ\text{C} \approx \Delta 11^\circ\text{F}$) are located in the *terra incognita* of what any honest economic modeler would have to admit is a planet Earth reconfigured as science fiction, since such high temperatures have not existed for some tens of millions of years." Weitzman (2007a)

When discussing other scare factors, Weitzman (2007a) reads like literature:

"There is little doubt that the worst-case scenarios of global-warming catastrophes are genuinely frightening. The *Stern Review* goes over several of these highly-unlikely poorly-understood threshold-crossing disasters associated with abrupt large-scale irreversible changes in the climate system: sudden collapse of the Greenland and West Antarctica ice sheets, weakening or even reversal of thermohaline circulations that might radically affect such things as the Gulf Stream and European climate, runaway climate-sensitivity amplification of global warming due to positive-reinforcing multiplier feedbacks (including, but not limited to, loss of polar albedo, weakened carbon sinks, and rapid releases of methane from the thawing of arctic permafrost). More gradual but still very serious examples of uncertain climate-change effects are: sea-level dynamics, drowned coastlines of unknown magnitude, very different and possibly extreme weather patterns including droughts and floods, ecosystem destruction, mass species extinctions, big changes in worldwide precipitation patterns and distribution of fresh water, tropical-

crop failures, large-scale migrations of human populations, humidity-nourished contagious diseases, and the list goes on and on.” Weitzman (2007a)

Dasgupta (2007b) explains that economists – well, not T&H, but their exception is not mentioned – have been deaf to arguments by ecologists:

“Proposition 4 reveals the limitations of overly formal analyses of the economics of climate change. (We should add to that the economics of biodiversity loss.) I personally believe that Humanity should invest sufficiently so as to keep global mean temperature from rising beyond another 2-3 degrees Celsius, even though I realise that the expenditure that will be required to constrain carbon emissions will be a lot bigger than the mere 2% of the GDP of rich countries proposed by Stern (2006) if advancements in global sequestration technologies and technologies using alternative sources of energy are harder to realise than is currently hoped. But I am unable to justify that belief from any formal model. Ultimately, it is a “gut feeling” about the awful things that could occur if the global mean temperature were to rise another 5 degrees that should make us very scared.

Climate change has been taken seriously by all economists who have studied the science since the late 1970s. Even the now-famous “hockey-stick”, displayed by time series of carbon concentration in the atmosphere, appeared some time ago (Bolin, 1989: fig. 5). Moreover, the Second Assessment Report (1996) of the Intergovernmental Panel on Climate Change should have made us acknowledge climate change to be one of the most significant environmental issues facing Humanity. To be critical of the “economics of climate change” is not to understate the harm Humanity is inflicting on itself by degrading the natural environment – not only in regard to the stock of carbon in the atmosphere, but also in regard to so many other environmental matters besides. But the cause is not served by misplaced concreteness, especially not when parameter values are so chosen that they yield currently desired answers.

For many years ecologists – more generally, environmental scientists – have asked economists to consider the “precautionary principle” seriously. We did not do so. I believe what they meant by the term was that we should not play down the possibility of environmental catastrophies – owing to climate change, species extinctions caused by habitat destruction, and so forth. The writings of Paul Ehrlich, James Hansen, John Holdren, Peter Raven, and E.O. Wilson have been critical here. What environmental scientists meant was that the uncertainties associated with the economic effects of environmental degradation are very great. But, as the uncertainties were meant to cover 200 years and more, no attempt was made to estimate those uncertainties. Our colleagues in the environmental sciences were correct not to have done so. Proposition 4 shows us the dangers of misplaced concreteness. (...)

Economics helps us to realise what we are able to say about matters that will reveal themselves only in the distant future. Simultaneously, it

helps us to realise the limits of what we are able to say. And that too is worth knowing, for limits on what we are able to say are not a reason for inaction. Climate change and biodiversity losses are two phenomena that are probably not amenable to formal, quantitative economic analysis. We economists should have not pressed for what I believe is misplaced concreteness. Certainly, we should not do so now.” Dasgupta (2007b)

Note that Dasgupta’s claim “Climate change and biodiversity losses are two phenomena that are probably not amenable to formal, quantitative economic analysis” is in conflict with the Tinbergen & Hueting (1991) approach, recently updated by Hueting & De Boer (2001b) and Hueting (2008). But Dasgupta does simply not refer to that line of research.

Where Dasgupta states “But the cause is not served by misplaced concreteness, especially not when parameter values are so chosen that they yield currently desired answers”: there (a) the “desired answers” are derived from an analysis of risk, which is the actual economic analysis, both proper and sound, while the mathematical model is only a tool to enhance consistency, (b) he apparently does not see that the Stern Review choice of parameters reflects certainty equivalence, where, as said, a ‘certainty calculus of variations’ has to do the work of an (at that time not yet available) ‘uncertainty calculus of variations’, (c) the odium of “misplaced concreteness” falls on the critics of the Stern Review who do not see (a) and (b).

29.5 *Possibly entertaining people*

Following the ‘stick and carrot’ philosophy, and having mentioned the scare above, it seems proper to allow for some entertainment too. Weitzman’s remark on ‘science fiction’ is tempting as well. In order to maintain the serious character of this paper, these more entertaining remarks are put in **Appendix A** to this chapter.

29.6 *Definitions of uncertainty and risk*

Weitzman (2007a) explains his notions of uncertainty and risk: “The cost of low-*g* disasters from high- ΔT scenarios more properly constitutes uncertainty in the sense of Knight or Keynes than risk, because the scale and probability of these disasters are both unknown.”

Earlier, Colignatus (1999, 2001) explained that this use of terms by Knight (or Keynes) is contrary to standard English:

“The commonly adopted definitions of risk and uncertainty generate conceptual problems and inconsistencies, and they are a source of confusion in general. However, alternative and proper definitions are: (1) First there is the distinction between certainty and uncertainty. (2) Uncertainty forks into known (assumed) and unknown probabilities. (3) Unknown probabilities forks into known categories and unknown categories. (4) Known categories forks into ‘including the uncertainties in the probabilities by explicitly assuming a uniform distribution’ (Laplace) or neglect (or use other non-probabilistic techniques). Note that the term ‘risk’ has not been used in the 4 points above, so that an independent definition is possible. ‘Risk’ can be defined as the absolute value of

probable loss, i.e. as (rho) $\rho = -E[X; X < 0]$. (...) The definitions provided here are directly in line with the Oxford English dictionary. It turns out that textbooks generally can keep their mathematics but will best rewrite their texts to these definitions. Not only the students and the general public will benefit from this sudden clarity, but eventually also statistics and economic theory themselves.” Summary of Colignatus (1999, 2001)

We can be uncertain about parameter values, but that is not uncertainty *per se*. If the word “uncertain” causes conceptual difficulties here, say “unknown parameter values”. But, of course, once this is understood we can say that parameter values are uncertain without getting confused on uncertainty *per se*.

29.7 A fat tail is not needed to get scared

Weitzman (2007a) elaborates that the uncertainty in the probabilities causes a reduced form with a fat tail, (exactly) like a normal distribution with unknown dispersion causes a Student-*t* distribution.

However, it is not true that a fat tail is required to get scared about catastrophes. It suffices to conclude that the probability is not zero, and then the extremity suffices for the impact. You may have to include above risk measure $\rho = -E[X; X < 0]$ as a separate entry in the utility function to become aware of this, though. This is precisely what Chapter 8, “*Measuring Utility*” by Colignatus (2001, 2007) does.

This discussion somewhat suffers from what Dasgupta rightly calls the fallacy of misplaced concreteness, though perhaps in a slightly different way. The point is that mostly everything is uncertain and that there may exist little certainty anyway. For example, I feel pretty certain that tomorrow the beach at Scheveningen will still be there, but, of course, neither I nor the beach may be there anymore. Where the Stern Review uses the ‘certainty calculus of variations’ it is mathematically proper to criticize it for not using the ‘uncertainty’ version, and it is mathematically impressive to create such a version, but it misrepresents the original idea that the whole exercise was intended to deal with the uncertainties of the future. It basically misunderstands that it is standard procedure in economics to use the ‘certain’ tools at hand, even while everyone knows that subject matters in economics are generally uncertain (and especially the future).

Note that pure certainty is caught in the “*Definition & Reality methodology*”, that uses definitions to say something about the uncertain future – see DRGTPE, Colignatus (2005a). That piece of analysis is in fact presented as a somewhat new approach, given that normal analyses deal with uncertainties.

In the same vein it would be incorrect to criticize T&H for not even using the calculus of variations or not inventing the right kind of calculus. It would be a valid mathematical observation but it would not be relevant for the economic analysis that is under concern. Instead of getting lost into this kind of critique, economists would do better in studying T&H and improve on the economic analysis, using adequate mathematical and statistical techniques.

With respect to the Stern Review, one of the conclusions by Weitzman is:

“However, in my opinion Stern deserves a measure of discredit for giving readers an authoritative-looking impression that seemingly-objective best-available-practice professional economic analysis robustly supports

its conclusions, instead of more-openly disclosing the full extent to which the Review's radical policy recommendations depend upon controversial extreme assumptions and unconventional discount rates that most mainstream economists would consider much too low." Weitzman (2007a)

This is a valid mathematical criticism but not correct for a professor of economics. The economic analysis is primarily in the evaluation of the risks while the mathematical implementation is only a way to enhance consistency and clarity. Perhaps the hot potato is passed on to "most mainstream economists" who have not read T&H and who have been neglecting the ecological warnings for years. But being in a majority only carries the weight of a majority and we should be more interested in some Elo-rating as in chess. Somehow, the profession has not yet found a way to define a tournament but that in itself would be a strange kind of excuse in a discussion like this.

29.8 *Facts, of the past and of reality*

Above, I used the phrase F = "the fact, not the risk, that in a "business as usual" (BAU) scenario the Antarctica and Greenland ice will melt". Some readers may object to this use of language, since in their opinion facts occur only in the past, not in the uncertain future. Even a BAU scenario might contain an unforeseen discovery of cheap energy while a sustainable scenario might contain an unforeseen collapse.

Admittedly, I like to keep my use of language as strict as mathematics itself and thus the following comments can be clarifying. The phrase "the fact, not the risk, that in a "business as usual" (BAU) scenario the Antarctica and Greenland ice will melt" is an exact verbal translation of A = "Antarctica and Greenland ice will melt (to a significant amount)" and $\pi = P(A \mid \text{BAU}) = 1$, where the BAU scenario is defined as a certainty equivalent. The statement and context are rather not an issue of risk but rather an issue of conditionality. The phrase F thus has "in a BAU-scenario" thus as a *condition*.

The colloquial term "fact" tends to relate to the past but allows also for "reality" in which there is also a future. The dictionary by Hornby (1985) gives:

"1 [C] sth that has happened or been done (...) 2 [C] sth known to be true or accepted as true (...) 3 [U] reality; what is true; what exists (...)"
Hornby (1985)

When the discussion context is the future, then people generally understand that the word "fact" is not used in the sense of referring to the past. It is reasonable to expect that people understand the word as an expression of truth and reality.

Let us consider a patient asking a medical doctor whether he will die. A generally acceptable answer is: "Eventually you will die for sure, but, *when*, my prognosis is (...)". It would be generally considered a bit of humour or sarcasm, depending upon the patient-doctor relationship, when the answer would be: "You will not die when they invent an immortality drug and you keep out of the way of fatal accidents."

Let A = “Antarctica and Greenland ice will melt (significantly)”
BAU = a “business as usual” scenario, defined as certainty equivalence
SUS = a “sustainability” scenario, defined as certainty equivalence
 u = background risk from cases and probabilities not considered
other variables defined as in **Table 21**

Table 21. Clarification of certainty equivalence

<i>Certainty equivalence, BAU and SUS</i>	<i>Uncertainty, BAU* and SUS*</i>
$\pi = P(A \text{BAU}) = 1$	$0 < \pi^* = P(A \text{BAU}^*) < 1$
$\zeta = P(A \text{SUS}) = 0$	$0 < \zeta^* = P(A \text{SUS}^*) < 1$
$p = P(\text{BAU}) = p^* \quad (\text{alt. } p = p^* \pi^*)$	$p^* = P(\text{BAU}^*)$
$q = P(\text{SUS}) = q^* \quad (\text{alt. } q = q^* \zeta^*)$	$q^* = P(\text{SUS}^*)$
$u = u^* + q^* \zeta^* - p^*(1 - \pi^*) \quad (\text{alt. otherwise})$	u^*
$P(A) = p \pi + q \zeta + u = p + u$	$P(A) = p^* \pi^* + q^* \zeta^* + u^*$

In terms of uncertainty, we would consider $p \pi$, which under certainty equivalence reduces to p . Some may hold that such certainty equivalence is not possible since the future is always uncertain. In the present state of environmental developments they are rather like a M.D. who seriously considers the chance of an immortality drug. In that case they presume a BAU* scenario as the true scenario with $\pi^* \neq 1$ and some p^* . However, we may define the BAU case with $p = p^* \pi^*$, and hence there actually is a certainty equivalence. It is clearer, though, to also include the SUS scenario and choose equal probabilities $p = p^*$ and $q = q^*$, which has been taken as the default case in the table. Note that there is a social welfare function (SWF) in each scenario so that the choice or the regime switch can be represented by a Meta-SWF(BAU, SUS), with the probabilities possibly seen as weights, see Colignatus (2000b) – here Chapter 8.

29.9 Scenario analysis and cost-benefit analysis

In this respect, there also appears to exist a crucial issue when we consider scenario analysis and cost-benefit analysis. Note that with a Meta-SWF(BAU, SUS), as just mentioned, each path has its own utility function and parameters, and that the switch is an overall-preference. Colignatus (1992, 1995) used the notation $\text{SWF}(x, I)$ where $I \in \{0, 1\}$ represents information or the regime. This approach helped me to understand the T&H approach that I encountered only after 1992. When we observe the economy of a democratic nation, it is tempting, with Samuelson, to see the results as revealed preferences. For T&H, these results may however also be revealed blockages. Prisoners’ dilemma and negotiation costs may hinder the expression of the true preferences. In fact, there is uncertainty as to what the real preferences are. By consequence, it will not do to use a single utility function, to assume that the economy is in the Pangloss optimal state and then perform a cost-benefit analysis to another Pangloss optimal state – since this would imply that the original state would not have been optimal. Instead, we have to use different utility parameters for the different paths, allow each path to be optimal, and let the costs and benefits from switching be conditional, for example, if BAU is optimal with respect to SWF_{BAU} then it is suboptimal with respect to SWF_{SUS} , and if the latter would be the true SWF, then we can calculate

the net advance from the costs and benefits of a switch from BAU to SUS. See Colignatus (2000b) for an example – here Chapter 8.

There is also an issue on taxation, and what is called the ‘double dividend’ of taxing demerits on the environment and subsidising merit goods like jobs. The widely cited Bovenberg & De Mooij (1994) and the Ph.D. thesis by De Mooij (1999) on the ‘double dividend’ use only one SWF and thus are a bit less relevant for the proper policy question. Note too that when such analyses were to be performed with the calculus of variations, that there would also be another confusion to avoid, when translating the results to the real world (or a realistic model of the real world). The simplest models use uniform taxation (without exemption) so that the marginal rate is also the average rate. It would be standard economics, and fitting to the framework of optimization, to draw conclusions on the marginal tax rate. However, for reality, we should keep in mind that tax schemes have exemptions and are indexed on inflation or the level of subsistence. Therefor, the translation should not be to the statutory marginal tax rate but to the proper ‘dynamic marginal tax rate’, that actually would be closer to the average rate, see Colignatus (1992:272) or Colignatus (2005a:140-145).²³⁹

29.10 The Sterner & Persson approach

Sterner & Persson (2007) criticize the single sector (corn model) approach in the traditional form of the calculus of variations:

“While we find no strong objections to the discounting assumptions adopted in the Stern Review, our main point is that the conclusions reached in the review can be justified on other grounds than by using a low discount rate. We argue that nonmarket damages from climate change are probably underestimated and that future scarcities that will be induced by the changing composition of the economy and climate change should lead to rising relative prices for certain goods and services, raising the estimated damage of climate change and counteracting the effect of discounting.” From the Summary of Sterner & Persson (2007)

This argument thus has the same structure as the certainty equivalent to an uncertainty calculus of variations model. In this case the true model is disaggregated but it can be aggregated into an ‘ethical reduced form’. Of necessity, these authors state: “If we were to have both low discount rates and changing relative prices, we would find even stronger support for firm and immediate abatement measures.”

Of the various papers mentioned here, the Sterner & Persson paper comes closest to the T&H approach and thus might be a bridge towards understanding.

29.11 A small note on calculating the damage

Weitzman (2007a) recalls the way how the damage due to climate change is calculated in this kind of study:

$$D(t) = Y^*(t) - Y(t) = f(\Delta T(t)) Y^*(t)$$

²³⁹ Addendum: See also Jaeger (2001, 2003) for a more traditional critique.

“where t is time, D is the total damages of greenhouse warming, ΔT is atmospheric temperature relative to the base period, Y^* is potential GDP (or NDP, no distinction being made here) in the absence of any greenhouse warming, and Y is actual GDP with greenhouse warming.” If I understand this correctly (but this may also be a formulation that is confusing to me) this approach assumes that there *might* be some autonomous growth in Y^* , say $g = 2\%$, in the absence of and unaffected by environmental degradation. Thus:

$$D(t) = Y^*(0) (1 + g)^t - Y(t)$$

However, it is a bit strange to assume that ‘no global warming’ can come about without additional costs. Only when we are prepared to make costs then we may reduce global warming. Potential growth has to take place in an environment where growth becomes increasingly difficult due to environmental change. A Holland that builds dikes (costs) has less time to paint sunflowers (which paintings might garner good proceeds).

Rather, one would prefer the Hueting & De Boer (2001b:46) approach:

“We work towards these goals by discussing a series of cases of increasing relevance to our problem: (1) preferences for environmental functions are unimportant because functions are abundant; (2) functions are scarce and preferences are such that the optimal path (computed by the model) approximates the actual path; (3) preferences for the environment are stronger than in the second case, but there are blockages preventing their full expression; (4) preferences are as strong as in the third case, but the blockages have been overcome; and (5) the special form of the last case in which preferences for sustainability are general and dominant.”

Apparently, $D(t) = Y^*(t) - Y(t)$ gives the difference between case 1 and 2, which can be denoted as $D_{1,2}(t) = Y_1(t) - Y_2(t)$, and of which $Y_1(t)$ is pure phantasy. Relevant are the costs of sustainability $D_{2,5}(t) = Y_2(t) - Y_5(t)$, where (5) creates the case that has temperature under some control.

It might be that the two approaches – either assuming some constant growth in “potential output” or the latter approach based upon the real production function – would be equivalent in practice with respect to the calculation of “costs”. But the latter approach remains more tractable and true to fact.

PM. Admittedly, there is a sense in which people regard ‘the cost of temperature rise’, as a conditional or counterfactual rather than as potential. Let us express this conditionality. Note that $Y(t) = Y(t | T(t))$. Consider another moment in time $s = 0$ or $s = t - 1$ or $s = a$ value that gives environmental sustainability, and $Y^*(t) = Y(t | T(s))$, or today’s production if the temperature only had been different. Then perhaps $D(t | s) = Y(t | T(s)) - Y(t) = f(T(t) - T(s) | s) Y(t | T(s))$. Controlled temperature might only be a potential if we were to invest in prevention, but it is not a given, something that can be seen as falling from the sky like manna. Temperature changes as $T(t) = T(t - 1) + \Delta T(Y(t))$. When production causes CO₂ exhausts and then a rise in temperature (likely with more lags), then $Y(t | T(s))$ need not be “realistic” for $s \neq t$. Hueting’s calculation of costs is more robust.

29.12 Rate of discount

(a) Note that market rates of discount (observed rates of profit) do not subtract for the non-market loss of environmental functions. For example, we would frequently like to see $r \approx g$, and the correction of g for environmental deterioration would similarly apply to r .

(b) In that sense, it may very well be that Nordhaus (2007a) who emphasizes the use of the market rate of discount too, has been less sensitive to Nordhaus (1995), who considers the non-market sector. See the next section.

(c) Addendum: Sumaila (2004) and Sumaila & Walters (2005, 2007) presented a discounting method that distinguishes the social intergenerational rate of discount (time preference) from the private intragenerational rate of discount (time preference). This definitely is an approach to consider.

(d) Addendum: Heijnen (2008) is clarifying notably on the zero rate of discount and non-renewable resources.

29.13 Nordhaus and sustainability

Professor Nordhaus has contributed importantly to environmental economics, with Nordhaus & Tobin (1971) *Is growth obsolete* and Nordhaus (1976) *Economic Growth and Climate: The Carbon Dioxide Problem* – with the apt statement “Unlike many of the wolf cries, this one, in my opinion, should be taken very seriously” – and with Nordhaus (1995) extending the calculus of variations with non-market resources, and subsequently the DICE model and geographical modeling.

There are three main points to observe.

(1) Nordhaus (1995) starts out with a promising paragraph:

“With growing concern about our crowded globe and increasing awareness of global environmental problems, environmentalists and governments have launched a crusade for “sustainable economic development”. This concept, popularized by the report of the Brundtland Commission (1987 / TC) and often adopted by critics of economic growth, was defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. The general notion here is that humanity is wasting its natural endowments – “natural capital” such as appropriated natural resources like energy resources, nonfuel minerals, and soils; appropriated renewable resources like forests and aquifers; and vital environmental resources like clean air and water, the stock of genetic material, and the present climate. The dangers range from mundane ones of trash to the more ominous ones of economic decline or even climatic apocalypse.”

Subsequently, however, the paper (i) defines a mathematical notion of “sustainable income”, (ii) fails to define and estimate environmental use, (iii) presents a notion of “knowledge” as a non-market resource relevant for “sustainability”, (iv) measures this resource from total factor productivity (TFP) that still excludes the environment, and (v) then concludes “that consumption has historically been far below sustainable income”. The reasoning is that future generations will have so much knowledge that translates in TFP that past

generations have been a bit irrational in saving so much for descendants who will be rich anyway. This approach reminds of the 1928 lecture by John Maynard Keynes *Economic Possibilities for Our Grandchildren* (included in *Essays in Persuasion* – no reference needed). Nevertheless, it is a bit absurd to start out with the problem of environmental sustainability and the risk of apocalypse and see those disappear in the discussion and the conclusion.

In sum, the Nordhaus (1995) paper is enlightening for the concepts and mathematics involved but at the same time very confusing for the issue of environmental sustainability, i.e. what the Brundtland Commission (1987), Ahmad, El Serafy and Lutz (eds.) (1989), Hueting (1989b) and Tinbergen & Hueting (1991) are concerned about.

While many economists neglected the environment, Nordhaus stands out as one who took it serious, but his serious endeavour apparently obscures the fact that he did not take it serious *enough*. **Appendix B** to this chapter clarifies this, starting with Nordhaus & Tobin (1971) and following the history of this line of research.

An important point in this appendix is: “According to Tinbergen & Hueting it is not a relevant discussion what to choose, either NI or eSNI, and economists should use both figures. The idea is to provide people with information about the state of the economy, and not to impose, as a caste of know-all economists, what kind of “income” people have to use.”

(2) Nordhaus (1995) refers to Ahmad et al. (1989) – in retrospect a major publication on implementing sustainability in environmental accounting – and he refers specifically to the first 3 chapters but not specifically to Hueting (1989b), chapter 6 in that same volume. Economic science may have missed a crucial meeting of minds here. Nordhaus (1995), in other references, refers to again other authors on sustainability but neither to Hueting’s other writings nor to T&H. Also, there is no adequate channel from T&H towards Nordhaus, as Hueting (2001d) clarifies that various of these authors have crucial misunderstandings about the T&H approach.

(3) Nordhaus (2007b), *Key Potential Improvements in Statistics and Data for Policies Concerning Global Warming: The Role of Federal Statistical Agencies*, was prepared for the US National Research Council, Committee on National Statistics. It is relevant to note that Hueting developed Dutch environmental statistics and (in a personal communication to the present author) in the past has visited the US Bureau of Economic Analysis (BEA) and found little response to his suggestions.

Appendix C to this chapter contains my own selection of Key points in Nordhaus’s Key points. Here, it suffices to restate his summary recommendation:

“(33) The summary recommendation here is that U.S. federal statistical agencies need to become even more active in the international statistical system if we are to improve international socioeconomic data for research in global warming. The quality of our models with a global public good like global warming is in a deep statistical sense a “weakest-link” technology. Obviously, the U.S. should not neglect its own data needs or improvements in its own system. However, in the global warming area, there would be a large payoff if the major federal statistical agencies could share their expertise to help countries with limited expertise and

resources to improve methodologies and data systems.” Nordhaus (2007b)

Apparently, Nordhaus considers Holland to have “limited expertise and resources” since the T&H approach was not considered relevant to look into. It is also remarkable that the recommendation is formulated in 2007 while the issue is known since the 1970’s. I don’t intend to sound humourous or sarcastic, depending upon the author-reader relationship, but I don’t think that it would be so advisable that the US comes to Holland to ‘help out’ with the Dutch environmental statistics – though it would really help out when some American students would be willing to listen and study.

29.14 Conclusion

This paper compared a Harvard – Yale approach with a The Hague – Voorburg approach. Jan Tinbergen was present at the roots of both approaches and would have wished integration.

The Stern Review (2006) scared the public and policy makers with costs of climate change that might even rise to 20% of national income. The Review also scared economists for its use of economic theory. Nordhaus (2007a), Weitzman (2007a), Dasgupta (2007a), Tol (2006) and others formulated strong critiques, see also Quiggin (2006) on this discussion and possibly Lomborg (2007) for a discussion for the larger public. These critics have a track record in economic publications on the environment and sustainability and it is striking that precisely these environmental economists have been so critical of the Stern Review.

As Aronson (1992) explains on the working of the human mind: if a smoker advises others not to smoke, then this has more convincing power than when a non-smoker does so. The assumption must be that having no vested interest increases impartiality. In the same way, environmental economists warning against the economics in the Stern Review will have more convincing power to the public and policy makers than those supporting it.

The Stern Review understated the environmental challenge by looking mainly at the issue of climate change and not the other issues that are caused by a world population possibly rising towards two-digit numbers and often aspiring at material increase. And now the state of disinformation is increased and complicated by these strong critiques.

There is a subtle difference for environmental economists between a vested interest in environmental issues and a vested interest in a research tradition. When environmental economists warn against the economics in the Stern Review then their convincing power need not really be based upon the assumption that having no vested interest increases impartiality but might rather be based upon the confusion about the vested interest.

Clearly a researcher working in one tradition will have difficulty to switch, has a right to defend it and must be respected for doing so. The situation becomes more problematic when there is not shown awareness of alternative approaches. A time honoured element in the scientific method is the discussion of approaches by others.

The only way to clarify the situation is by considering the arguments. This paper has dutifully tried to do so. We have taken a position akin to Tinbergen & Huetting

(1991), have evaluated the various points and provided some criticisms to the Stern Review, some of its critics and some of the critics of those, proceeding to the fourth level of critique. Then, while having kept an open and critical mind, we have returned to the original position: that Tinbergen & Hueting (1991) still provide the best approach, even though it is rather neglected in the economic literature.

A major point is that key authors in this debate mistook some techniques in econometrics for economics itself. This is a risk in economic research that Tinbergen has been warning about, see Jolink (2007), perhaps also out of personal experience. Historians may later judge that he helped to create a monster, namely a system of economic advice that puts higher value on technique than on content. Alternatively, they may find that such a system likely would have arisen anyway due to the Western cultural attitude to mathematical technique, but that Tinbergen managed to install some common sense – that is: if we follow his example.

29.15 Appendix A. Possibly entertaining people (continued)

Following the ‘stick and carrot’ philosophy, and having mentioned the scare above, it seems proper to allow for some entertainment too. Weitzman’s remark on ‘science fiction’ is tempting as well. Let me admit that I write science fiction on occasion, see Acapulco Jones (2007, 2012), styled after Indiana Jones but with a better beach. Readers might also enjoy Terry Pratchett (2007) on the life of a Central Banker with a A.W. Phillips machine in the basement.

One point to observe is that, with Nordhaus partly in the right court, technology may hold wonderful surprises. On the other hand, the precautionary principle is that we cannot reasonably plan to have what we cannot reasonably expect to have yet. Past rates of growth are misleading since they are contaminated by wrong accounting for the environment.

But of course, our phantasy allows all kinds of escape routes.

An example is that our skin is modified to contain chlorophyll, cutting short the food chain. An example is a subsidy for small people, who indeed require less energy. Soon, the little green men are here.

Another idea is to consider the Mediterranean, concentrate sunlight by mirrors, catch and guide the humid air in pipes towards the Sahara and let water condensate there.

Colignatus (2006) is a bit more developed and contains two extravagant ideas, just in case that the world is not interested in the Dutch problem of saving Amsterdam. One idea is to use a gigantic geothermal machine, or a myriad of small ones, to create dikes from ice (also freezing the soft underground), and also take the CO₂ out of the air that other nations put there. That might really CO₂L IT. Another is to rearrange the Rhine river, that in the BAU scenario will cause a lot of inland problems too. Perhaps these approaches can be made feasible – I am not an engineer – and perhaps there is a Coase Theorem applicable here.

All these possibilities are as serious as the Weitzman (2007a) explorative remark: “Such emergency measures are likely to be so extreme as to be defensible only for an even-more-extreme environmental catastrophe in the making – perhaps they might include painting all human-made structures on the planet reflective white and creating a “Pinatubo effect” by seeding the upper

atmosphere with metallic dust or aerosols. (footnote)". See Lomborg (2007) for similar suggestions.

Schuiling & Krijgsman (2006) are geophysical scientists who propose to grind olivine to sequester CO₂. This seems a more serious option than the statements above. Schuiling earlier suggested injecting underground limestone layers with acids to create gypsum, thereby raising the floor of Holland. The new label is "macro-engineering".

It stands to reason, though, that all such measures represent costs. These are expenditures required to restore what we had before environmental scarcity set in. When future newspapers report that Holland has an amazing "economic growth", due to the construction of dikes and similar projects, then this would derive from misguided national income accounting that masks that the Dutch are actually hurting a lot. In the work by T&H we can find ways for proper national income accounting so that such costs do not contaminate our notion of "growth".

29.16 Appendix B. Nordhaus and sustainability (continued)

While many economists neglected the environment, Nordhaus stands out as one who took it serious, but his serious endeavour apparently obscures the fact that he did not take it serious *enough*. This appendix clarifies this, starting with Nordhaus & Tobin (1971) and following the history of this line of research. It will be useful to itemize the comments.

(1) On Nordhaus & Tobin (1971):

(a) On catastrophes, they state:

"As for the danger of global ecological catastrophes, there is probably very little that economics alone can see. Maybe we are pouring pollutants into the atmosphere at such a rate that we will melt the polar icecaps and flood all the world's seaports. Unfortunately, there seems to be great uncertainty about the causes and the likelihood of such occurrences. These catastrophic global disturbances warrant a higher priority for research than the local disturbances to which so much attention has been given."

Clearly, ecologists in 1971 had different opinions. Thus, "economics alone" is not the proper reference.

(b) On the index of welfare: the inclusion of other items such as leisure is OK when the goal is to measure welfare from luxuries but the ecological discussion is about survival and no amount of leisure can substitute for a catastrophe.

(c) A more minor point, but still serious enough, is that Hueting (1974a, 1980:183-184) criticizes the approach on urbanization.

(2) Nordhaus (1976) concludes to a "little change" scenario with a horizon of 20-40 years:

"In summary, an efficient program for meeting reasonable carbon dioxide standards appears feasible and, moreover, requires little change in the energy allocation for 20 to 40 years."

But later the DICE model causes a similar conclusion – a drift of the horizon. This drift is perhaps due to the discounting, and perhaps this is like the temporal or

dynamic inconsistency that may also affect the credibility of a Central Bank. Something to look into.

(3) Nordhaus (1995) gives a laudable extension of the calculus of variations referring also to apparently a similar paper by Karl-Gustaf Löfgren 1992. PM. As far as I have been able to see, Nordhaus (1994) contains a similar argument and was published outside of the Cowles Foundation; in contrast the Nordhaus (1995) paper apparently has remained a CF mimeo.

(4) The Nordhaus paper actually agrees with the Hueting approach, also adopted by Tinbergen & Hueting (1991), that both the standard measure for national income and the Weitzman (1976) sustainable national income for markets are inadequate when there are relevant non-market resources. Statistical offices around the world must be shocked to realize this. That is, they will know, conceptually, that such definitions exist, but to actually implement them, and to accept that a shortcut made in the 1930s is no longer sufficient for our times, is another story. Statistical offices that associate 'facts' with 'the past' and not with 'reality' that includes a future, have to face that paradigm switch.

(5) The various authors in Ahmad et al. (1989), and in particular Hueting (1989b) and Tinbergen & Hueting (1991), are concerned with environmental sustainability, while Nordhaus (1995) generalizes and in fact uses "knowledge" rather than "nature" as his prime example. This generalization is alright as a mathematical exercise but the economic problem was ecological survival and the required adaptation of economic accounting procedures to facilitate survival. Nordhaus's neglect of the basic problem causes all kinds of irrelevant criticisms. For example, he criticizes various authors for not including expected growth of knowledge in their notions of sustainable income. Yet knowledge is not the problem under discussion. In the literature at that time (e.g. Ahmad et al. (1989)), "sustainable income" meant "environmentally sustainable income". It is only because of this and other misunderstandings of the term "sustainability" that now the prefix "environmentally" has had to be added (turning SNI into eSNI).

(6) Nordhaus (1995) distinguishes different concepts of "income". Here he follows Hicks (1939) in *Value and Capital*. For unclear reasons Hicks's Definition 1 is labeled the "Hicksian definition" (production for a limited period, maintaining capital, that however is defined on prospective returns) and Hicks's Definition 3 is labeled "Fisher's definition" (wealth based, condition on future income). Only the latter would be "sustainable income". This causes a curious criticism that authors who work on sustainable income and who say that they adopt Hicks's notion on income, would be inconsistent. Nordhaus also refers to the UN SNA that uses "Hicksian income" and that would become inconsistent if it would try to implement sustainability "in that manner". This is a very curious way of putting things. Rather, I find the TH position more tractable than the notion of "national income" (NI) is based upon Hicks's definition 1 and that the notion of "environmentally sustainable national income" (eSNI) differs from NI by corrections for environmental sustainability. Again, only the environment, for ecological survival, and not the luxuries.²⁴⁰

²⁴⁰ For comparison, in the 2007-2008+ financial crisis, assets dropped 50% in value. This is registered as a loss in wealth and not a loss in income. There is scope for another concept of net

(7) In the TH work we also find that the definition of NI may well have been adequate at the time of Hicks, i.e. $eSNI \approx 100\%$ NI, but that now $eSNI \approx 50\%$ NI. According to Tinbergen & Hueting it is not a relevant discussion what to choose, either NI or $eSNI$, and economists should use both figures. The idea is to provide people with information about the state of the economy, and not to impose, as a caste of know-all economists, what kind of “income” people have to use.

(8) Note that Nordhaus (1995) confirms that when the economy becomes sustainable (in his formulas $A(t)$ constant), then $NI = eSNI$, which is also the TH position.

(9) TH basically calculate only one income value of a base year $Y(b)$, based upon instantaneous adjustment in a model, and they assume constant technology given that base year. Their model would be a specific application of the Nordhaus (1995) model. Conceivably, apart from this statistical approach, a planning agency might make projections of such $Y(b)$ for $b = 0, 1, 2, \dots$, with added expectations on technology developing over time. The relation between this series of $Y(b)$ and the various $Y(t)$ with t not seen as a base year is a bit complex, see Hueting & De Boer (2001b).

(10) Nordhaus (1995) contains a very curious example of a “wayward spaceship” that contains a fixed amount of food without possibility of producing more. It does not help the discussion where he suggests that this might be the position argued by environmentalists.

(11) Nordhaus (1995) on risk:

“A second point concerns the claim in some environmental writings that the capital-intact definition should apply specifically to “natural capital”. (...) Natural capital has a claim to be maintained intact, they claim, because of risks, uncertainties, and irreversibilities in their use. These are more questions of religion than science. The fact that natural capital is misallocated means that we should use the appropriate shadow prices but surely does not imply that the appropriate policy is an absolute prohibition on declining natural stocks. Furthermore, risks, uncertainties, and irreversibilities are hardly unique to natural capital. (...) Natural capital has no natural monopoly on risk and irreversibility.”

This neglects that natural capital has a natural monopoly on survival, which is the relevant notion since we are discussing the ecological base of human existence. Thus: (a) “some writings” is unspecified while T&H give a well balanced exposition, (b) when the shadow price is infinite then prohibition ensues, (c) the risk that the Antarctica and Greenland ice melts is serious and for a long while irreversible, which is well-documented, (d) the fact that an investor can lose money is not relevant when we are discussing ecological survival. Clearly, Nordhaus (1995) did not fully understand the ecological challenge and it is striking that his references are not to ecologists directly but to economists who discuss the ecology – who need not understand the issue well either, see Hueting (2001d) who did take the ecological question seriously.

income as merely the change in wealth, either positive or negative, but rather “income” captures the inflow like the flow of energy in a wire.

(12) The T&H approach is to impose environmental sustainability by standards / constraints and let the economy develop under those standards / constraints. T&H subsequently do not need to discount to the base year, since the model allows instantaneous adaptation. This is not quite the same as the problem of discounting in the calculus of variations. Nordhaus (1995) does not take account of this and as a result, we find various statements on discounting that are confusing with respect to the notion of environmental sustainability according to the definition of Hueting as used by T&H.

(13) Nordhaus (1995) states: "Third, sustainability is an insufficient criterion for judging the wisdom of a particular economic trajectory. (...) Hence there is no normative content in the designation of a path as "sustainable"." (a) This would be a welcome support for the T&H approach, since that approach is frequently labeled as a political preference for environmental sustainability, while T&H hold that environmental sustainability is an objective notion. (b) However, there is a subtle difference. In the T&H approach, both NI and eSNI are conditional notions, based upon assumptions about the preferences of the economic agents. What the true preferences are is unknown and thus what the chosen path means is a bit unclear, except that NI is measured by the statistical office and eSNI is calculated as a model-based correction upon that (what best should be done by that statistical office too). When these figures become available as information to the economic agents, they might adjust their behaviour, with the subsequent year a new set of NI and eSNI. This is clearly a different kind of process than what Nordhaus has in mind, even though the statement still remains valid. (c) There is the notion of a Meta-SWF (social welfare function) that can bring about a regime switch, see Colignatus (2000b) – here Chapter 8. (d) T&H recognize that the Brundtland Report choice for sustainability would imply a preference. While they take sustainability as an objective notion and understand that people may have a preference for it, Nordhaus appears to deny the latter but the argument "there is no normative content in the designation of a path as "sustainable" has no bearing on a preference.

(14) Nordhaus (1995):

"Fourth, some readers have complained that our treatment of natural capital is incomplete and inadequate. We have considered cases where natural capital is a perfect substitute for knowledge, which is clearly unlikely and may be grossly misleading. (...) In addition, we have omitted depletion of natural capital and corrections for externalities (...) We have done this because there are no reliable measures of depletion of natural capital (...) However, the results should not be interpreted as a Panglossian brief for profligacy or neglect. The estimates provided here may be off base if there are sudden or unpredictable declines in economic activity because of malfunctioning markets or unforeseen events. But the best remedy for avoiding disasters is good science not bad economics."

This statement is a bit curious. (a) The Hueting, Bosch and De Boer (1992) publication at CBS Statistics Netherlands gave a decent methodology for the calculation of environmentally sustainable national income, which methodology

might also be applied to the USA. Thus there was a measure. (b) Precisely because of the unpredictable events, economic science uses the precautionary principle. Thus, based upon this principle, one makes a best estimate, or provides various scenarios, rather than fully neglecting the issue. Note that Nordhaus (1995) predates the Weitzman (2007a) analysis on uncertainty, but has the same “good science versus bad economics” attitude against the use of certainty equivalence. (c) This episode may be a case where lack or mismanagement of knowledge in 1995-2008 actually is a substitute for depletion of natural resources and environmental deterioration in 1995-X.

(15) In the conclusions section, Nordhaus (1995) provides support to T&H that the UN SNA are defective with respect to “sustainable income”. However, as said, his concept of “sustainable” contains a factor “knowlegde” based upon total factor productivity, that still neglects the environment. This is curious since the subject under discussion is environmental sustainability.

In sum, the Nordhaus (1995) paper is enlightening for the concepts and mathematics involved but at the same time very confusing for the issue of environmental sustainability, i.e. what the Brundtland Commission (1987), Ahmad et al. (1989), Hueting (1989b) and Tinbergen & Hueting (1991) are concerned about.

(16) For the apparent precursor Nordhaus (1994) we find an interesting conclusion:

“The shame of the current generation in America is, contrary to much popular opinion, that it has probably overinvested in seductive areas like pollution control, farmland protection, and military R&D while underinvesting in dull areas like training, equipment, and applied research. This investment strategy is long in plants and mortars and short in plant and brainpower.”

This conclusion is interesting in that some aspects convince by common sense (yes, better education) while other aspects are curious (worse pollution control ?). The article contains the same confusions as Nordhaus (1995) and the same lack of substantial research in the environment.

29.17 Appendix C. Nordhaus (2007b) on the role of federal statistical agencies

From the Nordhaus Key points (i) I wil select (1), (2), (8), ... for the numbers that are relevant to the present discussion. Note by the way that most of this selection of topics can already be found in the earlier writings by Tinbergen and Hueting, but we should obviously allow that also Nordhaus relates about his earlier experience.

(1) “The issues involved in understanding global warming and taking policies to slow its harmful impacts are the major environmental challenge of the modern era. These issues pose a unique mix of problems that arise from the fact that global warming is a global public good, is likely to be costly to slow or prevent, has daunting scientific and economic uncertainties, and casts a shadow over the globe for centuries to come. It is also likely to be a major public-policy challenge for the indefinite future, and therefore will require concerted efforts among natural and social scientists to understand its genesis, potential future paths, impacts, and potential strategies to slow or mitigate its impacts.”

(2) "The challenge of coping with global warming is particularly difficult because it spans many disciplines and sectors of society and the natural world. Understanding the full ramifications involves areas of geosciences, ecology, economics, political science, domestic and international law. Each of these disciplines has a well-established group of researchers who are studying the implications and effects of global warming."

(8) "Second, understanding and modeling the "downstream" ecological, environmental, and economic effects of global warming are completely dependent on the results of the "upstream" geophysical sciences. In a sense, economists are sitting by the river retrieving the pearls or flotsam, as the case may be, of results from the upstream geoscientists and their modeling. If upstream modelers do not provide high-quality scenarios for abrupt climate change or sea-level rise or river runoff, then downstream economists and policy analysts cannot incorporate high-quality results into their models. In this respect, one respondent noted, "one of the greatest data/measurement needs for better economic analysis is for more refined (i.e. geographically specific) biophysical impact estimates from the natural sciences. For example, in the case of the United States, perhaps one of the greatest economic impacts of climate change will be in terms of snow pack and hence the flow of the Colorado River, on which much of western irrigated agriculture depends." The economic analyses can get nowhere without reliable "upstream" geophysical analyses."

(9) "(...) The IPCC working group charged with assessing the underlying science has, in the Working Group 1 report of the Fourth Assessment, apparently decided to avoid any probabilistic interpretations of emissions or climatic trajectories. As one researcher commented on this approach, without temperature ranges and associated probabilities, we "cannot do risk analysis of impacts, cannot show that there are near term risks, and cannot evaluate commitment to various levels of abrupt change." Who knows what lurks in the tails of the distributions?"

(11) "Most of the researchers who responded to my inquiry about priorities for data mentioned prominently the abysmal state of our knowledge about the impacts of climate change. We can divide the terrain into market impacts and non-market impacts. In general, it is the non-market impacts that pose the major uncertainties. Within this category, we can subdivide those into managed and unmanaged systems. Human health and gardening are managed non-market activities, while ecological systems would be largely unmanaged. It seems likely that unmanaged systems are the major uncertainty. Researchers identify ecological "hot spots" as particularly vulnerable targets of climate change, particularly abrupt climate change. (footnote) Several respondents mentioned that we need, in one respondent's words, "to accelerate our measurement of the use and impact of ecosystems and ecosystems services of value to people over the short and long term."

(14) "Turning to the U.S. Federal statistical system, there is one glaring weakness – I would even say one catastrophic error of omission. This is the absence of an independent statistical agency that is dedicated to the design and collection of environmental and ecological data. Indeed, when I did a search of environmental statistics for the United States, I obtained an EPA web site that

said, "The Environmental Quality Homepage is no longer available." (...) It is hard to see how the U.S. can undertake serious research on environmental and ecological impacts without an independent statistical agency devoted to this task. The major recommendation in this area is that the Federal government move to develop an independent statistical agency that is devoted to design and collection of ecological and environmental data."

(21) "(...) I strongly urge the Energy Information Agency to take stock of its mission in providing and supporting timely domestic and international data and long-term integrated energy and economic models relating to energy and emissions trends in global warming. The EIA could take a lead role in ensuring that energy and emissions data models used in global-warming studies are comprehensive and reliable."

(22) "I mentioned above that the major gap in our understanding of the economics of global warming concerns impacts, particularly involving non-market sectors. A critical component is collecting better (or at least minimal) data on various non-market processes, particularly involving ecosystems and the environment. A second component is valuation. The third missing component is an organizing framework in which to place the quantities and values. This is the area of non-market accounts."

(23) "There are several areas where a set of non-market accounts would be useful in developing impacts studies. One respondent noted that "the environmental accounting approach, and expanding that approach to non-market activities of the household, is a useful way to frame data." Such activities as "outdoor activities, exposure, time spent in different activities – everything from caring for illness that may be environmentally related to time spent commuting – could help resolve why people make the choices they do, and how they would value having to change those choices."

(27) "Issues of non-market and environmental accounting have occupied the Bureau of Economic Analysis (BEA) and CNStat for more than a decade. The BEA produced an early version of its environmental accounts in 1994. This report contained an early draft national balance sheet that contained estimates for non-produced assets. However, shortly after this, Congress issued a stop-work order. CNStat sponsored two reports that strongly endorsed non-market and environmental accounting, but BEA has undertaken only limited work in these areas." ²⁴¹

(28) "The recommendation here is that the U.S. should move expeditiously to complete the work plan laid out by the BEA in 1994 and endorsed by two reports from the National Research Council on environmental and non-market accounting. To reiterate a recommendation from the NRC Report on this: "Extending the U.S. national income and product accounts to include assets and production activities associated with natural resources and the environment is an important goal. Environmental and natural-resource accounts would provide useful data on resource trends and help governments, businesses, and individuals better plan their economic activities and investments."

²⁴¹ This compares with the earlier decades, see Bos (2003:25).

(33) "The summary recommendation here is that U.S. federal statistical agencies need to become even more active in the international statistical system if we are to improve international socioeconomic data for research in global warming. The quality of our models with a global public good like global warming is in a deep statistical sense a "weakest-link" technology. Obviously, the U.S. should not neglect its own data needs or improvements in its own system. However, in the global warming area, there would be a large payoff if the major federal statistical agencies could share their expertise to help countries with limited expertise and resources to improve methodologies and data systems."

30. Adjusted Net Savings at the World Bank

30.1 Adjusted Net Savings f.k.a. Genuine Savings

In Section 7.10 we discussed the issue of terminology. The following continues.

In macro-economics it are the national investments that drive national savings. Economic agents may put money into the banks but when companies and government do not invest then there is no effect on production and income. The Keynesian $I = S$ equilibrium on the product market thus has I as the dog and S as the tail. The name of the “Adjusted Net Savings” (ANS) approach, formerly known as “Genuine Savings” (GS), thus is somewhat peculiar.

After the UNEP-WB project with the publication in 1989, to which Hueting (1989b) contributed, the World Bank chose for GS / ANS as proposed by Giles Atkinson and David Pearce in 1993 and by Kirk Hamilton 1994, and jointly reviewed by Hamilton, Atkinson and Pearce (1997). Hamilton around 2009-2015 was the World Bank Team Leader, Policy and Economics, Environment Department. It is encouraging to note that Lange (2003) in a World Bank publication considered the 1999 Hueting Symposium book, Van Ierland et al. (2001).

Pearce, Hamilton and Atkinson (2001) gave a succinct overview of the *Genuine Savings* method. Hueting (2001d:365-371) is a rejoinder to Pearce et al.. The latter pages 370-371 give six conditions and the conclusion: “As long as these six conditions remain unsatisfied, the genuine savings method certainly cannot serve as an indicator for environmentally sustainable development.” De Boer, Bosch & Hueting (2013:17-18) discuss GS / ANS in Dutch. Hueting (2013:96-98) returns to the issue more succinctly in English.

The World Bank report Lange et al. (2018:31) state:

“The wealth accounting approach provides two related sets of information: comprehensive wealth accounts (a stock measure in total and per capita values), and adjusted net (genuine) saving (a flow measure). Adjusted net saving (ANS) is measured as gross national saving minus depreciation of produced capital, depletion of subsoil assets and timber resources, the cost of air pollution damage to human health, plus a credit for education expenditures. The rule for interpreting ANS is simple: if ANS as a percentage of gross national income (GNI) is negative, the country is consuming more than it is saving, which will undermine long term sustainability; if ANS is positive, it is adding to wealth and future well-being.”

We infer that the methodology of GS / ANS hasn't basically changed since 2001 so that the same objections hold.

30.2 Hueting Symposium and Rejoinder on the main issue

We may wonder why the World Bank since 1999 persists in the adoption of a clearly deficient measure. Perhaps colleagues at the World Bank have only read

the Pearce et al. (2001) paper and have not read the Hueting (2001d:365-371) rejoinder.

It is necessary to repeat that Pearce et al. (2001:216) misrepresent Hueting's approach:

"Roefie's view has been that the governments represent a channel of 'revealed preference' so that the targets set by government act as shadow prices. But this presupposes a model of government rationality that is difficult to sustain. Indeed, it contains a contradiction. (...) If government was a perfect 'mirror' and conduit for those preferences we would have no more reason to use WTP as revealed by government target-setting than we have for measuring WTP directly from individual preferences. (...) But governments are well known for not acting in such a way, as the whole of public choice theory points out."

Hueting (2001d:365) files this protest:

"As was the case with Herman Daly, their paper was completed after correspondence in which I clearly stated my position on (individual) preferences. Both Daly and Pearce et al. have ignored this information and in doing so they consciously misrepresent my views on preferences. In Herman's case, I strongly suspect that he was keen to provoke a discussion on crucial issues (...). Although David et al. undoubtedly also had a reason, I cannot surmise what it might be.

It is painful to be criticised for advocating a method of (environmental) valuation that I have for 35 years attacked so vociferously in countless publications. In his contribution to the present volume Robert Goodland quotes as follows from one: "He criticized the official CBA of the construction of a polder in (...) an internationally important estuary. (...) Hueting's main objection was that the official CBA-assigned value of one hectare Waddensea estuary was set at the same value as one hectare marginal agricultural land (...) That was the value officially set for nature areas by the Netherlands Government. In his review of the official CBA, Hueting observed: 'This is not valuing at all, because it gives the Government the value which the same Government had already decided upon.' (...)" The quote is from 1978 and voices precisely the criticism formulated by David et al.: if the Government perfectly reflected subjects' individual preferences, quod non, valuation would be superfluous; economists providing such 'valuation' results make an easy living; it is circular reasoning."

30.3 *Weak versus strong sustainability*

There is the distinction between "weak sustainability" (WS), used in Genuine Savings, and "strong sustainability" (SS), used in eSNI. Simon Dietz and Eric Neumayer (2004) explain the distinction (see also Neumayer (2003)):

"The two are generally distinguished by the extent to which they assume natural and produced assets are substitutable. WS typically assumes infinite substitutability, while SS is based on the belief that natural capital

is either entirely non-substitutable, or that a portion of it – the so-called critical natural capital – cannot be replicated by man-made capital.” (...) “that despite various substantial problems, GS represents the best attempt at measuring (weak sustainability) WS so far and that it should become developed and improved over time.”

They note:

“Whether one believes in the policy-guiding value of GS depends at the outset on whether one subscribes to the WS paradigm. Admittedly, there have been moves towards dealing with the non-substitutability of natural capital within the GS framework. Atkinson et al. (...) propose that as the asset base of some natural resource is depleted up to its critical level, the shadow price of the asset should approach infinity. In practical terms, the magnitude of the term for natural capital depreciation becomes very large indeed. But there are, at present, limits to this approach. The loss of critical natural capital still needs to be measured through marginal WTP, and this is difficult enough for incremental as opposed to very large losses of welfare. In essence, we are not currently equipped to measure the welfare value of losses of critical natural capital. In that case, if one is concerned with SS, then GS results are largely uninteresting.”

This mirrors the same finding by Hueting (1974a, 1980) and forms the reason for his later development of eSNI. See also Hueting and Reijnders (2004a).

The limited usefulness of WS also transpires here, Dietz and Neumayer (2004):

“In any case, the fact that the World Bank’s main estimates of GS are reversed for some countries when another, and not inferior, method for calculating natural capital depreciation is used, sheds great doubt on the validity and reliability and, therefore, on the policy usefulness of the measure. For developed countries, GS produces the result that everywhere WS is attained. This may or may not be true. These countries are not especially resource-dependent, and do tend to invest significantly in capital formation. However, the inclusion of a more comprehensive range of environmental pollutants would undoubtedly drive GS downwards. The really interesting policy outcome that currently is difficult to ascertain with confidence is that some developed countries might be weakly unsustainable on the grounds of excess pollution.”

The general conclusion is that weak sustainability is not relevant for proper sustainability.

30.4 *Genuine Savings versus eSNI*

Hamilton et al. (1997) and Hamilton (2002) do not refer to Hueting, presumably since they consider it obvious that their interpretation of “sustainability” is different. Thanks to the 1999 Hueting Symposium we have the invited papers of Pearce, Hamilton and Atkinson (2001) and the Hueting (2001d) rejoinder. There are two key points, that hang together. The first is the emphasis of PHA on shadow prices rather than restrictions, the second is their idea that Hueting would want the government to impose such restrictions.

30.4.1 *The use of shadow prices*

Pearce et al. (2001:212) recall that Hueting considers shadow pricing (by means of Willingness-To-Pay or Willingness-To-Accept) “pointless” (in fact: impossible since the preferences cannot be determined) while their position is:

“We take a different view in this study. We suggest that shadow pricing is essential for the concept of ‘sustainable GNP’ and that attempts to construct such a concept without shadow prices are arbitrary. (...) because of the difficulties of measuring sustainability targets and because, even where they can be defined, the marginal cost of achieving the last unit of sustainability is likely to be so large as to make the measure inachievable.”

Pearce et al. want to use shadow prices but these would rise exponentially at critical levels. Pearce et al. (2001:217):

“The point here is that setting sustainability as a goal is laudable, but its achievement could be extremely expensive, so much so that marginal benefits may be well below marginal costs as the target is approached.”

Hueting rightly replies (2001b:368): “With opportunity costs we are not essentially concerned with money (...) but with a change in consumption pattern.”

In times of war and shortages, governments tend to start rationing rather than impose tariffs. A restriction, like having a minimum age of 21 years for buying liquor, creates an impossibility, such that there need not exist a price to undo that impossibility. A 16-year old kid standing in front of the liquor shop might consider the shadow price of entering either infinite, when no bribe is feasible, or, when a bribe is feasible, either expensive or too high. From the standpoint of economic theory, it would seem that restrictions are more basic and it would not be correct to hold that everything would have a price. We cannot hold that there always is a price that can undo the impossible. For human imposed restrictions, the economic situation rather is an issue of enforcement, and it need not be a strong argument that enforcement can be undone with a bribe. It is unclear why PHA maintain that there “should” be a price, and it is unclear why Hueting’s position would be unconvincing.

30.4.2 *On the imposition of restrictions*

We already discussed the main issue above, but let us look at it again, now that we have discussed rationing and restrictions.

PHA: “Roefie’s view has been that governments represent a channel of ‘revealed preference’ so that the targets set by government act like shadow prices. But this presupposes a model of government rationality that is difficult to sustain. Indeed, it contains a contradiction.” (p216). This however misinterpretes Hueting’s approach. On p212 the authors write “by, in effect, assuming” but then on p216 they turn this into “set”. In the rejoinder, Hueting (2001d) rightly protests and emphasizes that it is “assuming”. This is just the Hueting “*if ... then ...*” construction. It is non-plussing why these authors did or do not see the difference.

Misinterpretation occurred at various points in this review. Given the respect that we owe to professor Pearce I feel that some effort is required to understand his

position. Professor Pearce sadly passed away in 2005. The obituaries rightly praise him. In one obituary, Turner (2005) recalls:

“He did not believe in unfettered free markets and did see a positive role for government intervention. However, given his individualistic inclinations, he was deeply concerned by the threat posed by poorly motivated, unrepresentative and self serving government. Intervention in the economic and social life of people should ideally only be on the basis of some minimum norm ‘mutual coercion, mutually agreed upon’. The cost penalty that is carried because of inefficient, ineffective, uncoordinated over regulation was unacceptable as far as Pearce was concerned, regardless of the well meaning motivation that lay behind the intervention.”

The way that governments have treated eSNI may make one wary of governments indeed. Nevertheless, in Pearce’s frame of mind there apparently is little difference between “assuming” and “setting”. Either he did not fully understand the conditional aspect, or, in his eyes, by formulating a conditional “what if”, Hueting would make the decision on what is sustainable *depend* upon some government whim. Pearce et al. (2001:223):

“Precisely because we need checks and balances on what politicians decide it is important to keep economic valuation separate from the values implied by the political process. Otherwise there is a risk that whatever politicians decide is for the best is the best of all possible worlds, and that cannot be. Hence, for us, shadow pricing, inclusive of non-market valuation, is paramount.”

But Hueting also wants that separation and expresses it clearly. It are scientists who decide what is sustainable or not. It is not logical for PHA to infer from a “what if” position to such political dependence.

There are two elements here. First there is the Hueting and Reijnders (1998b) exposition that sustainability is an objective concept. In this case, statisticians working on national accounts do not have the liberty to second-guess ecologists but have to take the findings of other sciences as their data. (Of course never losing common sense.) Secondly, there is the political choice whether society would wish to attain such a target. Here, the scientist rightly points to the democratic process. Hueting then has the role of the scientist who provides “*if ... then ...*” information, *if* you want sustainability *then* this is where you are. This is indeed what one might expect from a national statistical office, that anyhow already publishes an incomplete measure of national income.

30.5 Costs of calculation

What transpires from this kind of evaluation is that (i) one requires a sound method, (ii) one requires sufficient means to carry through that method. “Sufficient means” imply the resources of a national statistical office. Apparently, the ANS / GS approach breaks down on both. The World Bank at some time considered the wealth indicator experimental:

"Frequently Asked Question: Do you have any data on wealth? Answer: Unfortunately we don't have a standard way of defining wealth. Wealth requires an evaluation of all productive assets, which accumulate (and depreciate) over years. This would also include measuring not just physical capital, but also human capital (education, experience, and perhaps social organization), and natural resources. This introduces additional complications of double counting (some financial assets represent ownership rights in physical assets) and offsetting liabilities (resulting from various complicated derivative-like instruments). On an experimental basis we have been publishing a measure of the additions and subtractions from total wealth. It appears in the WDI print edition as table 3.15, "Genuine Savings." World Bank website FAQ sheet, May 1 2008

Calculation of eSNI costs only 0.25% of the budget of CBS Statistics Netherlands for 2,500 people, while the Consumer Price Index costs 1.3% and the NA department itself 4.2%. Note that the 0.25% for eSNI is only possible because of the integration of work processes. The World Bank has 10,000 employees dispersed over more than 100 countries, has more jobs to do, but also relies on a "Development Network" next to a "Sustainable Development Network".

Thus, while ANS / GS are the World Bank indicator for sustainable development, there still are limited resources directed to it, not in line with what would be required for an integration with the national accounts. All this leaves aside the question whether one would adopt the measure in the first place.

30.6 Conclusion

The World Bank might be advised to extend the funds for research on this topic and not to stick to only ANS / GS, but also include eSNI, and to support the idea that national statistical offices start calculating and publishing eSNI.

31. Comparisons with other environmental indicators

31.1 Abstract

The discussion about NI itself started with the creation of NI. There are numerous comparisons of indicators for greening NI. A few are mentioned here. The use of satellite accounts only – as now happens in SNA and UN SEEA – is obviously also an approach.

31.2 Table of comparisons

De Boer, Bosch & Hueting (2013) (Dutch) constructed **Table 22** with criteria and scores for the methods of eSNI, NI-A, Adjusted Net Savings (ANS) formerly known as Genuine Savings (GS), Ecological Footprint (EF) and ISEW. The negative scores for eSNI can be appreciated in a positive manner.

Table 22. Comparison of some key Green Indicators

	eSNI	NI-A	GS	EF	ISEW
1 Directly comparable with NI	+	+	-	-	-
2 Fundamental reliance upon physical norms	+	-	-	+	-
3 Norms hold for the entire world	+	-	-	+	-
4 Measures for improvement are explicit	+	+	+	-	-
5 Assignment of values where this is impossible	-	-	+	-	+
6a Correcting current measurements of NI	-	+	+	+	+
6b Use of a simulated path alongside NI	+	-	-	+	-
7 Explicit definition of what nature is	+	+	+	±	+
8 Other welfare factors than nature and NI	-	-	-	-	+

31.3 NNI versus GDP

When Hueting started thinking about this subject, economists used GNP as the main indicator for production. Over time, economists have switched to using GDP.

These gross measures include depreciation. The measurement of depreciation had and has some drawbacks. (1) For human-produced capital the assumptions on economic decay and its time horizon might be a rule of thumb rather than a true observation. (2) For not-human-made resources there is more likelihood that there is consumption that incorrectly is counted as income, see also El Serafy (2001a), Chapter 14 below, and the analogy of the home owner in Section 4.4.

Hicksian income arises by keeping capital intact, thus El Serafy (2013:210) fnnt 1 states the common insight in national income accounting: “Strictly speaking national income is the NNP not GDP or GNP.” This has the simple logic that (i) “national income” is not “domestic income”, and (ii) “gross” cannot be “income” because one must subtract depreciation to keep income at its level. A more enlightened view though is that the National Accounts have a whole stable of notions of income with different flavours.

Hueting in 1986 chose to look at GNP minus depreciation = NNP = NNI. The calculations for eSNI have actually been calculations for eSNNI = eNNI. The results are in **Table 23** and **Figure 17**.

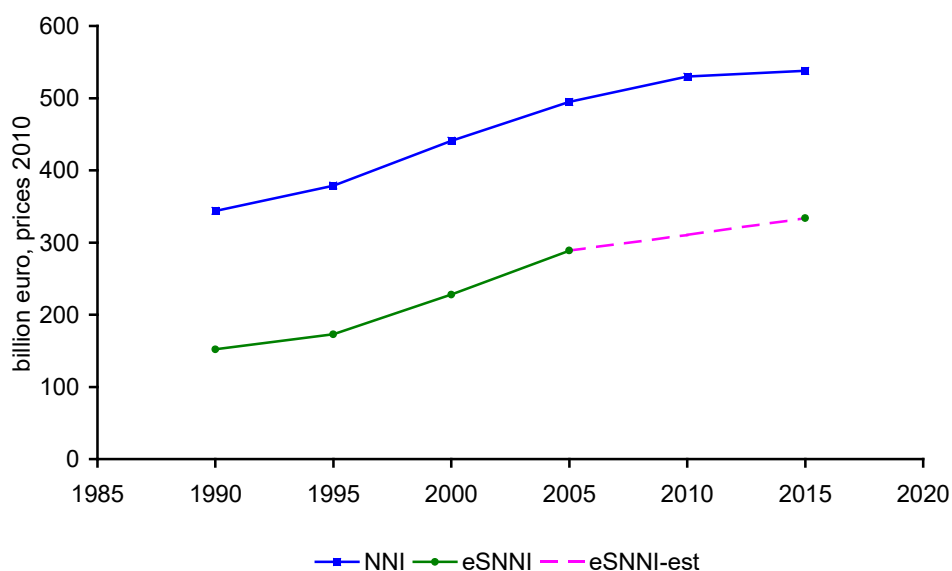
Table 23. Data for NNI and eSNNI, the Netherlands 1990-2015

	1990	1995	2000	2005	2010	2015	per year
NNI	344	379	441	495	530	538	1.8%
eSNNI	152	173	228	289		334	3.2%
Distance	192	206	213	206		204	0.2%
% eY / Y	44%	46%	52%	58%		62%	1.4%
eFootprint	2.3	2.2	1.9	1.7		1.6	

Billion euro, prices 2010. Italics: rough estimate. Y = NNI, eY = eSNNI.

Source: Hueting and De Boer (2018, 2019a)

Dutch net national income (NNI) rose from 344 in 1990 to 538 in 2015, or 1.8% per year on average. This includes a rise in population and thus is relatively low compare with the 1950-1970 period. In 1990, eSNNI was 44% of NNI, rather lower than the Tinbergen & Hueting (1991) rough estimate of 50%. However, eSNNI has been growing by 3.2% per year, and thus has been catching up with NNI to an estimated 62% in 2015. This growth was caused by a switch to the service industry, deliberate policies for environmental improvement, and the global financial crisis in 2007-2011.

Figure 17. NNI and eSNNI, the Netherlands 1990-2015, bn euro, prices 2010

For this book, we want an easier link to the discussion about “Green GDP”. We concur with El Serafy (2013:148) that it tends to be better to use a gross measure (except for the idea of actually “correcting” NI, since we think that comparison is better):

“It is not by chance that the gross product, rather than the net product, is the preferred quantity for macroeconomic analysis. And it is often used as

a denominator for crucial macroeconomic ratios, with the nominator being money supply, exports, imports, external debt, debt service, savings, capital formation and so forth. As Hicks has suggested, the concept of net income is usually eschewed because it is always arbitrary. It relies on estimates of depreciation and inventory that are a mixed bag of historical costs and estimation based upon accounting conventions, tax laws and allowances, insurance company practices, as well as subjective valuation by economic agents who do the reckoning and who have a variety of expectations about the future (Hicks, 1969; see also Keynes, 1936) [ftnt]. From this perspective, if an income correction is to be made, it should apply to the gross product itself; and it is not enough to effect the adjustment at the net product level.”

For the National Accounts, all measures like GNP, GDP, NNP and NDP are all measures for standard national income NI, in different flavours. Thus we can use the label “eSNI” as a label alongside “NI”, and for actual measurement use a base that is best for both measurement and discussion.

Because of the way how depreciation D is calculated, we assume that it is not affected by the modeling exercise. The relevant relation then is that $e\Delta = \text{GDP} - e\text{GDP} = (\text{GDP} - D) - (e\text{GDP} - D) = \text{NDP} - e\text{NDP}$. We also assume that $e\Delta$ calculated for NDP will be approximately equal to $e\Delta$ as calculated for NNI = NNP above. Thus we have $e\Delta = \text{GDP} - e\text{GDP} \approx \text{NNI} - e\text{SNNI}$. Using this result from **Table 23** we get $e\text{GDP} = \text{GDP} - e\Delta$ which gives **Table 24**.

Table 24. GDP and eSNI, the Netherlands 1990-2015, bn euro, prices 2010

	1990	1995	2000	2005	2010	2015	per year
GDP	405	454	562	600	639	666	2.0%
eGDP	213	248	349	394		462	3.1%
Distance	192	206	213	206		204	0.2%
%	53%	55%	62%	66%		69%	1.1%
eFootprint	1.9	1.8	1.6	1.5		1.4	

PM 1. The estimates of eSNI are uncertain but unknown how yet. The estimate of 2015 uses a rough approach without a model, see Hueting & De Boer (2018, 2019).

PM 2. Obviously this is a rough approximation only for the purpose of this book to link up to the commonly used indicator of GDP, using the available data for the Netherlands. Future modeling can e.g. test whether depreciation under environmental sustainability would be different in a relevant manner.

PM 3. An alternative assumption would be to presume that GNP, GDP, NNP, NDP and depreciation in the Dutch case are mostly proportional. This would give the alternative estimate: $e\text{SNI} \approx e\text{SNNI} / \text{NNI} * \text{GDP}$. In that case, Figure 4 and Figure 17 would have the same shape, and the estimate of $e\Delta$ would be affected. There is currently no reason to assume this.

31.4 El Serafy's user cost method

El Serafy (2013) explains his *user-cost method* and its applicability on resource depleting, especially when the latter distorts standard GDP measurement in the current SNA, which highly applies to developing countries. In a nutshell, the method works as follows:

- Accountants can observe that a resource is being depleted over an expected time horizon, for example 20 years.
- The expected proceeds can be translated into a perpetuity at a selected rate of discount.
- The perpetuity would be proper income.
- The difference between current proceeds during the accounting year and this perpetuity are the user cost, or the investments required to maintain the perpetuity.
- $GDP^* = GDP - \text{user-cost}$.

Chapter 14 has a small model that compares user-cost and eSNI.

From the point of view of environmental sustainability, it is a problem that El Serafy's method allows the complete depletion of the resource. The method does not take the ecological external effects into account that might be a reason to keep a part intact *physically*. While eSNI accounts for this, El Serafy calls this an "over"-correction, but this term only derives from his neglect of the issue of environmental sustainability.

This discussion clarifies that our focus is not only on "proper measurement of income" but also concerns environmental sustainability. While El Serafy wants to adapt GDP into GDP*, eSNI wants to maintain GDP as it is, since the gross expenditure flows in GDP contain the proceeds from the depletion of resources.

The team at the World Bank was inspired by El Serafy's model to develop the *Genuine Savings* method, see El Serafy (2013:186) and below.

While El Serafy and the authors of *Genuine Savings* were all at the World Bank, and there do not understand eSNI, and even misrepresent it, El Serafy points to the micro-economic 'net price method' as a rival approach:

"A rival method to the user cost, the 'net price method', has triumphed, having been backed in influential circles. Without a determined effort to extricate green accounting from its present stagnation, it will almost certainly not survive as a convincing tool for achieving what green accounting was meant for. (...) As I see it, a web of confusion and unhelpful contributions has shrouded this once promising tool (...) A *sine qua non* for such restoration would be a forceful and disinterested sponsorship by a leading institution with adequate resources and sustained determination."

31.5 MEW 1972, ISEW 1989, MBW 2018, GPI

31.5.1 Lack of awareness of what environmental sustainability means

Nordhaus & Tobin (1972) "constructed a primitive and experimental "measure of economic welfare" (MEW), in which we attempt to allow for the more obvious

discrepancies between GNP and economic welfare.” In effect: “Our adjustments to GNP fall into three general categories: reclassification of GNP expenditures as consumption, investment, and intermediate; imputation for the services of consumer capital, for leisure, and for the product of household work; correction for some of the disamenities of urbanization.” Herman Daly & Cobb (1989) presented the Index of Sustainable Economic Welfare (ISEW). CBS (2018) presented the MBW monitor of a broad concept of welfare. There is also a Wikipedia (no source but a portal) article on a Genuine Progress Indicator (GPI).²⁴²

Such issues are not our major concern, which is environmental sustainability. One cannot compensate ecological survival with working parttime. eSNI would provide the best answer from welfare economics on the issue of survival.

31.5.2 *Hueting (1974a) on Nordhaus & Tobin (1972)*

Hueting (1974a, 1980:183) footnote 40: “Nordhaus and Tobin [1972] state that they were not able to correct for encroachment upon the environment (p.49)”. See also his continued discussion of the cost of commuting.

Nordhaus & Tobin (1972:49) still expressed a view about the size of the problem: “We have not been able to make this adjustment, but given the size of the other components of wealth, we do not believe it would be significant.” In 1974 Hueting skipped discussing this. The condition of environmental sustainability is highly significant.

There is also a clear conceptual difference between (i) economic planning with sustainable (in the meaning of *constant*, not only environmentally) consumption per capita, assuming a nonzero rate of technological progress, and (ii) the statistical measurement of environmental sustainability (safeguarding the environment) without risky assumptions on technological progress. Policy makers might assume so much technological progress that environmental concerns evaporate, yet statistics cautions us to stick to what can be observed.

31.5.3 *More on Nordhaus & Tobin (1972)*

Nordhaus and Tobin (1972:14) in their section “Growth and natural resources” state:

“Calculations like the foregoing are unlikely to satisfy critics who believe that economic growth per se piles up immense social costs ignored in even the most careful national income calculations. Faced with the finiteness of our earth and the exponential growth of economy and population, the environmentalist sees inevitable starvation. The specter of Malthus is haunting even the affluent society.

There is a familiar ring to these criticisms. Ever since the industrial revolution pessimistic scientists and economists have warned that the possibilities of economic expansion are ultimately limited by the availability of natural resources and that society only makes the eventual future reckoning more painful by ignoring resource limitations now.

In important part, this is a warning about population growth, which we consider below. Taking population developments as given, will natural resources become

²⁴² https://en.wikipedia.org/wiki/Genuine_progress_indicator

an increasingly severe drag on economic growth? We have not found evidence to support this fear. Indeed, the opposite appears to be more likely: Growth of output per capita will accelerate ever so slightly even as stocks of natural resources decline.”

Such expectation depends upon different assumptions than apply to eSNI. In the calculations on the Netherlands, population growth is small, and such Malthusian scenario was not relevant. Subsequently:

“These optimistic assumptions about technology stand in contrast to the tacit assumption of environmentalists that no substitutes are available for natural resources. Under this condition, it is easily seen that output will indeed stop growing or will decline. It thus appears that the substitutability (or technically, the elasticity of substitution) between the neoclassical factors, capital and labor, and natural resources is of crucial importance to future growth. This is an area needing extensive further research, but we have made two forays to see what the evidence is. (...)”

See Hueting & De Boer (2019b) for how eSNI deals with (non-) renewable resources. Part of the optimism by Nordhaus and Tobin (1972) depends upon the market mechanism and the expectation that prices will rise when resources dwindle. They observe low prices and suggest that markets adequately incorporate future scarcity, yet above we have seen that markets can fail. They express caution though:

“On the other hand, the warnings of the conservationists and scientists do underscore the importance of continuous monitoring of the national and world outlook for energy and other resources. Substitutability might disappear. Conceivably both the market and public agencies might be too complacent about the prospects for new and safe substitutes for fossil fuels. The opportunity and need for fruitful collaboration between economists and physical scientists has never been greater. (...) Possible abuse of public natural resources is a much more serious problem. (...) There are other serious consequences of treating as free things which are not really free. This practice gives the wrong signals for the directions of economic growth.”

The idea behind eSNI is to use this caution for the construction of a statistical figure alongside standard NI. Subsequently:

“The mistake of the antigrowth men is to blame economic growth per se for the misdirection of economic growth. The misdirection is due to a defect of the pricing system — a serious but by no means irreparable defect and one which would in any case be present in a stationary economy. Pollutants have multiplied much faster than the population or the economy during the last thirty years. Although general economic growth has intensified the problem, it seems to originate in particular technologies. The proper remedy is to correct the price system so as to discourage these technologies. Zero economic growth is a blunt instrument for cleaner air, prodigiously expensive and probably ineffectual.”

We do not see ourselves as “antigrowth men”. We neither blame “growth per se” for the misdirection of economic growth. Economists can support the use of the

market mechanism, and the use of taxes and subsidies to include externalities. Within economic theory, there is a case however to be “anti” the mistaking of production growth for welfare growth. Some production can be enhance welfare, other production can be counterproductive.

31.6 *Ecological Footprint*

The environmentally sustainability footprint $e\text{Footprint} = \text{NI} / e\text{SNI}$ can be seen as an ecological footprint, as seen from welfare economics. **Table 1** shows values for the Netherlands. *The Ecological Footprint* (Wackernagel and Rees, 1996) translates to land rather than income. It is rather unavoidable that some regions are more densely populated and thus have such a large footprint. Even when the Netherlands would satisfy environmental sustainability $\text{NI} = e\text{SNI}$ then the country would still tend to have a large “ecological footprint” in the original W&R 1996 method, merely since it is densely populated. We agree with Van den Bergh & Verbruggen (1999) that this is dubious. The method cannot convince. It is remarkable that the notion still finds mention. The notion of a “footprint” is a wonderful way to express the environmental challenge for the world as a whole but may be less informative for a particular country. Also, calculation of $e\text{SNI}$ is more involved than the original “ecological footprint” and thus may still be indicative of the challenges that a particular country faces. The current estimates for $e\text{SNI}$ can be improved on the dimension of land space though. For governments it remains advisable to set up systems to monitor the environmental impact of the economy, and to integrate those data with NI to find $e\text{SNI}$.

32. El Serafy (2013) on “strong” sustainability

32.1 Abstract

El Serafy rejects eSNI via a general rejection of “strong” sustainability.

32.2 A confusing redefinition from the literature

El Serafy (2013) redefines the terms “weak” and “strong” sustainability, then adopts the position of “weak” sustainability, and subsequently criticises “strong” sustainability in general, including eSNI.

Section 13.3 discussed that El Serafy’s choice of terms does not fit with the literature. We now look at the situation that El Serafy can quote the work of Hueting approvingly, but that he directs criticism to “strong” sustainability in general, which includes eSNI.

We have also observed that this literature on substitutability is rather irrelevant anyway. Hueting & De Boer (2001b) reject the usefulness of the distinction on “weak” and “strong” substitutability for the vital functions, for which eSNI applies. Thus we better drop the use of those labels of “weak” and “strong”. Nevertheless it remains true that El Serafy criticises eSNI when he criticises “strong” sustainability.

For this “weak sustainability” El Serafy employs the exchange of goods by money. It is true in micro-economics that insurance companies may pay out sums for impairments of health and even premature deaths but this cannot convincingly be assumed macro-economically for huge sections of the world population. El Serafy would become interested when an alien race would offer to buy Earth’s oceans for an interesting sum of money, yet El Serafy would neglect that humanity cannot exist without the oceans, since an accountant would only notice this in the next period. El Serafy honestly expresses that he is no ecologist, and he regards this as an excuse to further neglect them, while there is every reason to respect this branch of science and listen to what they report. Unfortunately, the rejoinder by Hueting (2001d) did not achieve a different view by El Serafy (2013).

Here we look at the latter.

32.3 Over-correction

Hueting (1989b) and Tinbergen & Hueting (1991) – reproduced in Appendix 50 – used the expression “to correct NI”. It would have been better to have said “to correct *the use of* NI”. The term “correction” was borrowed from the tradition to continuously improve the relevance and accuracy of the System of National Accounts (SNA). However, these mentioned publications also compared NI and eSNI, and looked at their distance. Thus NI is not actually corrected itself but its *use* is corrected.

The calculation of eSNI does not involve a direct deduction concerning the decline of natural resource stocks from the conventional measures of national income – or any other correction of national income. The conventional measures (GDP, GNP and associated magnitudes) are calculated under the assumption that prices reflect collective preferences. eSNI is calculated under the assumption of a collective preference for environmental sustainability, i.e. the present and future

availability of vital environmental functions. The intention is to see whether the gap between eSNI and NI is increasing or not.

El Serafy (2001:190) correctly states: “We should keep in mind that Hueting would leave the conventional estimates of income unaltered, but would produce alternative estimates intended to show the gap between these and the conventional numbers.”

El Serafy (2013) quotes Hueting’s publications on environmentally sustainable national income (eSNI) several times correctly and approvingly. His criticism on eSNI is mostly indirect and targeted at his definition of “strong” sustainability in general. On p164 he expresses criticism also directly at eSNI:

“To make matters worse some ardent environmentalists also joined the debate on the wrong side. They suspected ‘weak sustainability’ and preferred a stronger version. As I have argued previously the ‘weak sustainability’ associated with the user-cost method is the appropriate level of sustainability that is compatible with national accounting. But its avowed ‘weakness’ branded it in the eyes of some adversaries as inferior to an ostensibly stronger sustainability. Some environmentalists seem to like the ‘over-correction’ that ‘strong sustainability’ would bring to the accounts, imagining that it must be better for environmental awareness than an accounting approach that would produce less pronounced adjustments. Using strong sustainability for greening the national accounts would deduct the *entire* decline in natural resource stocks from the conventional estimate of the flow accounts (GDP, GNP and associated magnitudes). Moreover, such adjustments to the net product if made would be entombed in extraneous ‘satellite’ accounts. It is interesting to note that in the green accounting literature supporters of this over-correction include Hueting (1989) (...)”²⁴³

Given El Serafy’s earlier statement in 2001 that expressed his understanding that Hueting compares NI and eSNI, this statement that Hueting would “correct” and then also “over-correct” NI must partly be a victim of Hueting’s choice of words around 1990. Neither does eSNI deduct the *entire* decline in natural resource stocks. However, on content there is quite some difference between eSNI and El Serafy’s user-cost method, and this is discussed in Section 31.4.

However, other authors may indeed erroneously think that Hueting wants to *correct* NI, while the proper idea is to compare NI and eSNI.

32.4 The use of a model with a sustainable path

El Serafy (2013:31):

“And accounting, to stress this point once more, is a historical, not a forward-looking process. (...) Its connection with the future is limited and is made through a narrow gate allowing consideration of keeping capital intact. For keeping capital intact, now widened to include environmental capital, ‘depreciation’ is estimated and deducted from gross income. The estimate of ‘depreciation’ of course varies according to whether strong or

²⁴³ Hueting (1989) is (1989b), the World Bank / UNEP paper.

weak sustainability is targeted. (...) extrapolation has nothing to do with accounting, and alternative assumptions may be made regarding future technology, input substitutions, the composition of demand for ultimate goods among others. While such assumptions have everything to do with sustainability, they are irrelevant to greening the national accounts, which merely *describe* what actually happened in a period that has already closed. All that the SNA can offer in this respect are estimates of income based on what has been called 'weak sustainability': a degree of sustainability based on maintaining capital so that income will not be diminished."

(i) Since sustainability concerns future generations, we cannot avoid the use of a model. El Serafy confuses forecasting and this use of modeling for the past. (ii) The SNA thus can also provide for eSNI and thus not only El Serafy's "weak" sustainability. (iii) These two points are consistent with Hicks's views on income and the distinction between fundist and materialist capital.

32.5 *Flow versus stock*

El Serafy (2013:3-4):

"A key characteristic of this approach – my approach – is that it avoids deriving the flow accounts from stock values. Important as this link is for theoretical analysis, [the stock-flow relation] becomes a curse for accounting. In my method, stocks remain important, but are firmly place in the background, to be reckoned in physical terms only. Comparing the physical stocks to physical extraction during an accounting period suggests the life expectancy of the resource from the perspective of the current account period. This life expectancy is a fundamental indicator of resource 'sustainability'.

(i) We may observe that El Serafy thus also allows for a longer time horizon, so that his later criticism on a longer time horizon by other approaches is rather inconsistent. If you allow for a longer time horizon, it is somewhat curious to put on blinders and restrict attention of resource depletion only – unless this is the exception that proves the rule ? (ii) eSNI does not focus on valuation of stocks but focuses on an estimate of the income level in current accounting period (using shadow prices).

El Serafy (2013:16-17) returns to the stock-flow problem and also discusses the issue of historical versus current prices. This seems to exclude the possibility of using shadow prices created by a model on environmental sustainability.

32.6 *So far elusive owing to a seemingly unbridgeable gap*

El Serafy (2013:4):

"The overall objective, on which most accounting 'reformers' agree, is to reflect ecological losses in the national accounts to the extent the national accounts allow; but this objective has so far proved elusive owing to a seemingly unbridgeable gap that separates economics and ecology. On

both sides of the divide there are impediments against convergence or even harmonization.”

(i) A *seemingly* unbridgeable gap would actually be bridgeable. So how can it be *proved elusive* ? (ii) eSNI provides that bridge and has a proof of concept.

32.7 Gross and net product

El Serafy (2013:11):

“And even if the adjustment were to be made only at the stage of estimating the net product (as SNA93 and UNSD have been insisting) the alleged greening will be doubly misleading. The unadjusted gross estimates will be left flawed; and the re-estimated net-product, based erroneously on strong sustainability, will be ‘over-corrected’, as this procedure wipes out from the adjusted net product all value added attributable specifically to the natural resource in question. In other words, both the gross product (that wrongly contains asset sale proceeds misidentified as value added) and the over-corrected net product will continue to be wrong.”

(i) eSNI has tended to be estimated on NNI, as eSNNI, see Section 31.3. We concur that an estimate on eGDP is better, as has been shown in Section 4.2. (ii) The argument remains that the modeling exercise still identifies which part of *mistaken value added* actually are *only sales proceeds*. (iii) El Serafy claims that $e\Delta = \text{GDP} - e\text{GDP} = \text{NDP} - e\text{NDP}$ would be too large since too much of depletion is not accepted as income, but if this happens, the modeling exercise allows us to trace *why* this happens.

32.8 When GDP = 100 and NDP = 0

El Serafy (2013:148):

“Another reason why I discarded the depreciation approach for rectifying income accounting for depletable resource activities is the fact that countries with marketable natural resources are evidently better off than those without such resources, and they can enjoy a higher and sustainable standard of living than the latter by virtue of their resource endowments. Such an advantage should be reflected in calculating the income of both groups. If we deduct from the gross receipts from mineral sales in any one year an amount equal to the depletion along the lines described above, the value of net income from this activity becomes zero. When a country derives 100 percent of its receipts from, say, petroleum extraction – an extreme case of Saudi Arabia – the depreciation approach (ignoring ...) would give us a GDP of 100 and an NDP of zero – a measurement that is not particularly edifying.”

See the email by Nordhaus to El Serafy to be quoted in Section 32.14, and see also Chapter 14 for a small model that shows the ‘depreciation method’. This extreme example nicely illustrates: (i) the distinction between income and sales proceeds, (ii) that GDP may not really be income but still contains sales proceeds that are also expenditures above means, (iii) that the user-cost method can

provide for a nonzero NDP but this itself is no sufficient criterion for quality, since we must also account for environmental sustainability.

32.9 *The environmentalists won ?*

El Serafy (2013:30):

“During the 1980s the participants at the UNEP-World Bank workshops were probably under the illusion that they all had the same objective in mind, but there were two camps with two separate motives: one environmental and the other economic. It is now obvious that the environmental group had won. Greening the accounts has now meant ‘no change’ in estimating the gross output, and adjusting for the environment has become a side environmental issue.”

This is a curious way to put it. (i) It clearly were the conventional economists and national accountants who “won” – if not-listening can be called “winning”. (ii) How can one say that the environmentalists “won” when adjusting for the environment becomes a side issue? (iii) Adjusting for the environment at best means keeping GDP as it is but also including eSNI to measure the distance to environmental sustainability. This didn’t happen and thus environmental economics clearly lost. (iv) Perhaps El Serafy doesn’t want to criticise conventional economists and accountants and perhaps hopes that he still can win them over by emphasizing that he takes the position of economics and that he is opposed to the environmentalists ?

32.10 *Substitutability revisited*

We discussed part of this already in Section 13.3. El Serafy (2013:30):

“Ultimately the split became unmistakable as disputes raged over such issues as ‘substitutability’: whether it should be weak (economic) or strong (environmental), and which greening method had implicitly assumed that natural capital and produced capital were substitutes or complements. The user-cost method had been wrongly criticized as based on infinite substitutability between natural resources and human-made capital.”

El Serafy puts the word ‘substitutability’ between quotation marks, but the true discussion is about *real* substitutability. His use of quotation marks is a misrepresentation of this discussion.

Hicks’s distinction in accounting methods between fundist or materialist capital should not be confused with the distinction in technical substitutability, as El Serafy actually does.

Another part of criticism is: (i) The user-cost method is an economic accounting method and if there has been criticism on substitutability then this criticism was a category mistake indeed. (ii) The user-cost method however is misinformative on environmental sustainability and thus there exists correct criticism. (iii) El Serafy suggests that the fundist method still can be applied even while the underlying capital is not substitutable. While there might perhaps be a tradition to think so in accounting, it would be dubious for economics of the real world.

32.11 *Flow versus stock revisited*

El Serafy (2013:31-32):

“To recapitulate, supporters of strong sustainability focus on natural resource stocks and would charge any decline in them against gross income to arrive at a greened net income. The sustainability they seek is geared to the environment and not the economy. Their outlook may further be characterised as not only stock-focused, but also long term with different assumptions regarding the future. Applying a strong sustainability approach to the national accounting, always recommended by its advocates to adjust the net (and not the gross) magnitude will wipe from net income all value added by the resource itself, while leaving the gross income uncorrected. As a result neither the gross nor the net product will be properly estimated. The superiority of weak sustainability in this regard is clear. The gross product will be adjusted downward and the net product will need no further correction.”

(i) El Serafy is fond of stating that accounting is flow-oriented and not stock-oriented. Since eSNI looks at *both* income *and* sustainable use of environmental functions and thus explicitly also stocks, El Serafy sees the latter as an error. Yet, the method derives from sound accounting. (ii) On “all value added”: see above.

32.12 *Welfare economics and SNA*

In 1999-2001 El Serafy also made a distinction between welfare economics and accounting per se, that met with criticism by Hueting (2001d:361-362). Hueting's view conforms with Hicks, yet the notion apparently did not register.

El Serafy (2013:33):

“In fact it is only through welfare analysis that the concept of the ‘Hamiltonian’ trespassed on the discussion of national income. With its versatility in the dynamic analysis of optimization problems it was brought into green accounting incongruently to further refinements of measurements which cannot be attained in pragmatic work, besides the focus on welfare which the national accounts do not pursue.”

(i) This discussion is basically in welfare economics. When the Hamiltonian pertains via welfare onto national income that it is logical that it is used, and there is no trespassing. (ii) The national accounts indeed concern production, value added and income, and not utility or welfare per se. Yet, production, value added and income can only be properly understood via welfare economics. (iii) Indeed, there are other aspects of welfare than production and environment that would distract from our present focus, like issues of happiness, and we should be wary of such distraction. (iv) That economic theory is the dominant actor and driving force here, and not some tradition by accountants, is actually acknowledged by El Serafy (2013:58):

“Output, or GDP, became the accepted quantity in mainstream economics, made up of consumption plus investment, and regarded as the fundamental magnitude that economic statisticians were to estimate.”

We can infer that the positions by El Serafy (2013) and Van Tuinen (2009) (discussed in Chapter 25) have much in common. They defend a historical origin of accounting against an encroachment by welfare economics, while there is no reason to regard history as the fountain of wisdom, see Sections 11.3 and 11.4.

32.13 *Footnote on pollution and technology*

El Serafy (2013) catalogues eSNI as dealing with “pollution”, see Section 13.5 above, and puts part of his criticism in his footnote 21 on page 39.

“Under the method proposed by Hueting (see Tinbergen and Hueting, 1992) standards are set for acceptable levels of pollution. The cost of meeting these standards may be theoretically estimated and imputed as a charge against the unadjusted GDP. Controversy, however, gets in when defining such standards, and further in respect of the technology to be applied for attaining them and, of course, technology does not stand still. If such standards are met autonomously by the polluters themselves, or forced upon them by legislation, no correction of GDP for pollution would be needed. See also El Serafy (2001).”

(i) Such controversy would be an internal discussion within science. Scientists would have different views but would tend to be able to indicate preliminary ranges and allow for greater precision over the years. When one does no research on such standards, then obviously there will be little knowledge about them, and this lack of knowledge will be a wonderful argument against the method. Instead, the precautionary principle induces the need for more research. (ii) It is curious to argue that statisticians do not have to do their job because it should be policy makers who should impose standards. (iii) On technology, we concur with El Serafy (2013:229):

“A corollary of this is that in the process of accounting no view is taken of future technological change, though if and when that change should occur, the necessary adjustment to income (via the adjustment of the capital stock) would be made in the light of the actual change.”

32.14 *Over-correction revisited, email by Nordhaus*

El Serafy (2013:168):

“The adoption of a strong sustainability stance, which appeals to environmentalists often with little understanding of national accounting, would in fact be tantamount to ‘over-correction’ because it eliminates from the net product all value added specifically pertaining to the natural resource in question. (...) This flawed approach leaves the wrong gross product unadjusted while indicating an equally *wrong* estimate of the net product. [ftnt 6] It is interesting that the chairman of the *Nature’s Numbers* Panel, Professor Nordhaus, in an email to me dated 19 December 2002, thought it was ‘going too far’ to attach no value added to extraction, obviously failing to realize that the Panel’s report actually recommended that ‘outlandish’ course which I dispute.”

(i) Hueting has had many exchanges with El Serafy and acknowledges that El Serafy might indeed be under the temptation to think that Hueting did not sufficiently refer to the definition of income by John Hicks and “thus” might be less at home in welfare theory and national income accounting. Such a suggestion however would be absurd, given Hueting’s background in welfare economics, work at CBS Statistics Netherlands, collaboration with the department of National Accounts there (e.g. Henk van Tuinen), collaboration with Jan Tinbergen who was one of the architects of national accounting in the 1930s, and the very definition of eSNI itself that fits Hicks’s framework. (ii) Indeed, there are many environmentalists who lack knowledge about national accounting, but their adoption of strong sustainability is not in direct conflict. (iii) See above for the handling of “all value added”, and see Chapter 14 for formulas.

This footnote 6 can be found in El Serafy (2013:196):

“Incidentally, it is the preferred method advocated by Roefie Hueting, then at Netherlands Statistics, who would keep the traditionally estimated gross magnitudes unchanged while insisting that without adjustment the economy was being steered by ‘the wrong compass’. He put his faith in the size of the gap that would emerge between the unadjusted *gross* product and the [over-] adjusted *net* product, viewing it as a spur for remedial environmental actions.” (our italics)

The latter is incorrect. Hueting compares GDP and eSNI (eGPD) – or originally NNI and eSNNI, see Section 31.3 – and does not compare GDP with eSNNI. Very likely El Serafy had a slip of the pen on the difference between gross and net.

32.15 Workshop by UNEP and World Bank 1985

El Serafy (2013:27) discusses the workshops by UNEP and World Bank in the the 1980s, with mention of Robert Goodland and Yusuf Ahmad in footnote 7. About the 3rd workshop in 1985 (see the year in Ahmad et al. (1989:94)):

“It was not, however, until the third workshop Paris meeting in 1986 [1985] that the SNA was identified as an ideal medium for that purpose. [fnt 8]”

Fnt 8: “This was the first Workshop I attended [thus the 3rd] and I believe it was I who directed the initiative towards using the SNA as a vehicle.”

Goodland (2001:320), quoted above in 21.7.1, reports that the link already had been made and that it was he who organised the involvement by El Serafy.

It may be remarked that the link to SNA is self-evident for any economist with a background in welfare theory and national accounting.

When we look at El Serafy’s cv then we see no practical involvement with national accounting at a national statistical office. Hueting had this background. Hueting (1974a, 1980) looked for a good method to monetise the environmental impact, and such costs would obviously be deducted from national income. It is *obvious* to look at NI and it is less obvious how to actually adapt NI or adapt the use of NI.

If Hueting at CBS Statistics Netherlands in 1974 had succeeded in adapting NI for environmental costs, say by accepting willingness-to-pay (WTP) and willingness-to-accept (WTA) as sound methods, then the world of SNA might well

have followed suit, given the position of CBS in the world of national accounting. Instead, Hueting, with scientific accuracy on the qualities of these instruments, established that WTP and WTA were deficient, and advised to keep the environmental costs alongside NI, see Hueting (1974a, 1980:165). In this manner he gave new life to the problem of the relation of SNA to the environment, so that also outsiders might discover that there existed such a problem.

Thus we can accept that linking the environment to SNA was seen by El Serafy as something that may be mentioned about those workshops, yet his comment is only of historical nature.

33. (Royal) Association for Political Economy (KVS) 1974-2019

There is the Dutch “(Koninklijke) Vereniging voor de Staathuishoudkunde” (KVS) or the (Royal) *Association for Political Economy* that traces its roots to 1849. It annually publishes a collection of “preadviezen” (pre-advice). Originally the annual meeting would vote on the preadviezen and then arrive at a joint advice, but rather early in history this vote was abolished as somewhat nonsensical. The original 1936 Tinbergen model of the Dutch economy had been presented in such a pre-advice. The KVS has no fixed issue of attention except for political economy, and there is a wide variety of topics or areas that can be selected for closer attention, from money to homes to productivity to whatever.

Looking at the list of Dutch publications by Hueting,²⁴⁴ it appears that he has never been invited to contribute to those KVS preadviezen. The environment has been relatively neglected over the years.²⁴⁵ Some preadviezen that might have included a pre-advice by Hueting are, but do not:

(i) Nijkamp & Verbruggen (ed) (1990) is about the Dutch environment in the European space. (It is mentioned in Section 39.4 that refers to here.) It contains a chapter by RJM Maas (RIVM) (born 1952)²⁴⁶ and H. den Hartog (CPB) (1934-1992) about sustainable development and the macro-economic consequences of a priority for the environment.²⁴⁷ So why not a chapter by Hueting, who in that period had been presenting his finding on eSNI ? Instead Dutch economist members of KVS are presented with chapters by Opschoor and Heertje who misrepresent the work by Hueting, see this book Chapters 34 and 38.

This blockade of Hueting in 1990 is not unimportant, because these 1990 pre-recommendations were a response to the Brundtland 1987 report on sustainable development. An important question was what should be understood by “sustainability”. Hueting (1986b) had developed the vertical demand curve, thus given an economic definition of environmental sustainability for the first time. In the literature we see this proposal discussed from that moment, with various papers by Hueting in various places. Editors Nijkamp and Verbruggen must have heard of it professionally, as they also write about standards and norms (p3). Still, Hueting was not allowed to contribute to these Preadviezen. On page 6, the editors write about a “high degree of freedom” for the authors and a “broad spectrum of views in the preparation of these contributions”, but they do not mention the lack of freedom and narrow-mindedness that Hueting hadn’t been invited as an author.

²⁴⁴ <http://www.sni-hueting.info/NL/Publicaties/NederlandsePublicatiesHueting.pdf>

²⁴⁵ <https://www.nidi.nl/shared/content/output/2016/esb-101-4726-bijlsma.pdf>

²⁴⁶ “As chair of the United Nations Task Force on Integrated Assessment Modelling Rob Maas has been involved since 1994 in co-ordinating and integrating the scientific knowledge necessary to support policies to reduce transboundary air pollution. In that capacity he studies air pollution, climate change, resource depletion and loss of biodiversity in connection with developments in energy consumption, mobility and food supply.” <https://www.rivm.nl/en/about-rivm/knowledge-and-expertise/experts-and-expertise/r-j-m-rob-maas-msc>

²⁴⁷ This chapter has special value for me, for it employs that CBP Athena model that I collaborated with, see Eijgenraam et al. (1990).

(ii) In 1997-2003, Den Butter, see Chapter 39 for his role in this saga overall, was chairman of both KVS and the steering committee for calculating eSNI, and might have encouraged attention for its report Verbruggen (ed) (2000). Calling attention to a subject is not the same as instructing people what to write about it, and thus there would have been no conflict of interest in calling attention to it. However, it might also be that Den Butter was not impressed by eSNI and advised against the idea to make a pre-advice on it. Whatever that be, we only observe the absence of a pre-advice. See Section 39.19 for questions to Den Butter.

(iii) In 2009 the topic was market and public interest (Cost Benefit Analysis, see Chapter 44), in 2010 Holland after the crisis, in 2011 the economic future again, in 2014 about pensions, and all these could have benefitted from a discussion about eSNI and a warning about “economic growth”.

(iv) Daan van Soest, Sjak Smulders en Reyer Gerlagh (ed) in 2018 was about climate change.²⁴⁸ For some of the latter authors see also Chapter 42.

(v) In 2019 Dutch economists celebrate 50 years since the first Nobel Prize in economics, somewhat nationalistically under the label of “Tinbergen Today” (thus neglecting Ragnar Frisch). For example the article by De Zeeuw (2019) is a result of this, see Chapter 41 for the deconstruction leading to a request for retraction. The KVS Preadviezen had been announced early in 2019 to look at that subject too. Eric Bartelsman (VU Amsterdam) and Esther-Mirjam Sent (Radboud Nijmegen) had been appointed as editors. A submission of a paper (in Dutch)²⁴⁹ about 50 years of Tinbergen and Hueting did not receive a response by these editors. It appears that Bartelsman had been involved in the steering committee for the VU IVM calculation in 2000, at that time as representative of the Ministry of Economic Affairs, see Verbruggen (ed) (2000) page v.²⁵⁰ Apparently Bartelsman back then did not protest against the nonsense of the Alleingang scenario. At the time of writing this, the board of KVS has been asked to mediate but has declined to do so.

²⁴⁸ <https://esb.nu/kvs/20046698/kvs-preadviezen-2018-klimaatbeleid-kosten-kansen-en-keuzes>

²⁴⁹ Dutch <http://thomascool.eu/Thomas/Nederlands/Wetenschap/Artikelen/2019-05-02-Aanpak-Tinbergen-Hueting.pdf>

²⁵⁰ <http://www.sni-hueting.info/EN/Others/2000-Verbruggen-ed-O00-10.pdf>

34. Arnold Heertje ²⁵¹

Arnold Heertje (b. 1934) ²⁵² is five years younger than Hueting and was a student of Pieter Hennipman as well. Heertje remained at the academia, became professor at UvA, and has done much to keep the memory of Hennipman alive. ²⁵³ Heertje must have found it curious that Hennipman supported ²⁵⁴ the work by Hueting while Heertje himself apparently did not. Since 1962 Heertje became author of a much used Dutch textbook on economics, ²⁵⁵ ²⁵⁶ and when Hueting's work became available over time Heertje apparently inserted a misrepresentation of it. Scores of generations of Dutch highschool students have received their education in economics with a misrepresentation about Hueting's work, and apparently it wasn't possible to do anything about it. At some point of time, Hueting and Heertje had a discussion with each a secondant, but to no avail.

Heertje (1990) is a chapter in that year's KVS Preadviezen. See Chapter 33 on the importance of this source within the community of Dutch economics.

Heertje's only claim of competence in the issue is his background in mathematical economics also about the theory of economic welfare, and some more practical research about technological progress, but he nevertheless assumes knowledge about the ecological challenge too, and ridicules the "fear that (...) causes so much ecological gloom that a next generation has no future" (p43). He subsequently suggests, though not in such words, that the utility of ecological collapse can be compensated by the utilities provided by a larger production capacity. This is similar to saying that your gasoline car will be replaced by an electric car for your greater enjoyment of driving from the cliff.

While Hueting (1974a, 1980) studied the ecological challenge and discussed the environment from the viewpoint of welfare theory and national accounting, and Hueting later adopted the IUCN, UNEP and WWF (1980) "*World Conservation Strategy*" based upon the precautionary principle, without need for complex mathematics of economic optimisation, Heertje (1990) apparently takes the opportunity to redo Hueting's thesis, and presents the environmental problem in terms of such complex methods *coûte que coûte*. He indeed thanks, with emphasis, Hennipman for his comments.

Heertje (1990) doesn't take Hueting (1974a, 1980) as the pioneering point of departure but apparently starts from a *tabula rasa*. For a reader familiar with Hueting (1974a, 1980), Heertje's chapter reads like a pastiche or a parody of how the environmental issue can be misunderstood and what sources one can find in the academic literature to support such misunderstandings. With the method of this book we would be obligated to deconstruct Heertje's article step by step, but let us now take a rain check. The following should suffice.

²⁵¹ A draft version of this text has been edited and adopted by Hueting & De Boer (2019b).

²⁵² Wikipedia is a portal and no source. https://en.wikipedia.org/wiki/Arnold_Heertje

²⁵³ <https://www.hennipmanstichting.nl/kopie-van-over-pieter-hennipman>

²⁵⁴ <http://www.sni-hueting.info/NL/Anderen/1987-Hennipman-aan-Hueting.pdf>

²⁵⁵ https://www.dbnl.org/tekst/heer039kern01_01/colofon.php

²⁵⁶ <https://www.rd.nl/vandaag/economie/arnold-heertje-doen-als%C3%B3f-is-in-een-samenleving-voldoende-1.533514>

The only reference to Hueting can be found in a footnote on page 49 that argues that Hueting (1974a) makes elementary errors (see below shortly).²⁵⁷ Heertje in 1990 does not take account of Tinbergen's support in his preface in the Hueting (1974a, 1980) translation. Heertje doesn't show that he has discussed with Tinbergen that Hueting would make such elementary errors apparently with support by Tinbergen.

Heertje does not refer to articles by Hueting after 1986 about environmental sustainability and the vertical demand curve, even though these Preadviezen concerned the response to the Brundtland Commission, see Chapter 33, and Opschoor in the same Preadviezen has such a Hueting reference.

Heertje (1990:44) refers to the world conservation strategy (to Pearce et al. 1990 instead of IUCN at al. 1980 or Hueting). This conservation discussion also provided the term "sustainability" as another word to clarify what "conservation" is about, but Heertje, apparently relying about mathematical abstraction, amends "that easily other implementations [of the notion of sustainability] can be formulated". This means that when you discuss that horses are at risk of dying and when you show pictures also of some brown horses, then Heertje will discuss that also other things are brown and not just horses, and that many of those other brown things are not at risk of dying.

Remarkably, Dutch environmental economists have been allowing Heertje's misrepresentation over at least 1990-2014 without protest and redress. The following quote from Heertje (2014) shows almost literally the same text as in 1990 (compare the Dutch footnotes) (my translation):²⁵⁸

"In this context, reference is made to the work of Roefie Hueting, who has made a very deserving contribution to the field in question. He proposed correcting national income, regarded as a welfare indicator, for the sacrifices made for the purpose of limiting environmental damage. His proposal overlooks the insight that reducing the damage apparently has a positive welfare effect that comes from the accompanied earning of income. He also overlooks the fact that the reduction of damage also has negative external effects (Hueting, 1974)."

Hueting (1974a, 1980) does not regard or present NI, NI-A and eSNI as welfare indicators but as factors that influence welfare. (NI-A would be more in line than

²⁵⁷ Dutch: "In dit verband moet erop worden gewezen dat Hueting, die zich op het onderhavige terrein reeds geruime tijd verdienstelijk maakt, heeft voorgesteld het nationaal inkomen als welvaartsindicator te corrigeren voor de offers die worden gebracht met het oog op het beperken van de milieuschade. Zijn voorstel miskent het inzicht dat het terugdringen van de schade blijkbaar een positief welvaartseffect heeft, dat gepaard gaat met inkomensvorming. Verder ziet hij over het hoofd dat schadebeperking ook weer negatieve externe effecten heeft. Zie R. Hueting, (...) 1974."

²⁵⁸ Dutch readers would look at this text in the 2014 ebook: "In dit verband wordt verwezen naar het werk van Roefie Hueting die zich op het onderhavige terrein zeer verdienstelijk heeft gemaakt. Hij heeft voorgesteld het nationaal inkomen als welvaartsindicator te corrigeren voor de offers die worden gebracht met het oog op het beperken van de milieuschade. Zijn voorstel miskent het inzicht dat het terugdringen van de schade blijkbaar een positief welvaartseffect heeft dat gepaard gaat met inkomensvorming. Verder ziet hij over het hoofd dat schadebeperking ook weer negatieve externe effecten heeft (Hueting, 1974)."

NI as such an indicator but this does not argue that NI-A is sufficient.) Heertje in 2014 might perhaps also intend to refer to Hueting (1974a, 1980) for eSNI, which thesis does not yet contain eSNI. The statistical correction, which the thesis achieves, only concerns asymmetric bookkeeping NI-A, see Chapter 12 above. For the notion of “correction”, see Section 4.8. The statistical method for correcting asymmetry consists of shifting entries from one place to another. This only involves accounting (taking costs as *costs* indeed) and does not involve assumptions about behaviour from earning income and spending this on additional consumption. Thus Heertje mistakes mere accounting for a discussion about behaviour. However, for eSNI one can concur with him that interactions and external effects must be included and internalised, which Hueting eventually did by using an economic model, and as has been done by the IVM team.²⁵⁹ For eSNI this still remains a statistical method, leaves total NI unaffected, and only affects the decomposition of $NI = eSNI + e\Delta$.

The impasse between the students of Hennipman shows in 2008 with texts by Hueting²⁶⁰ and Heertje²⁶¹ in *Reformatorisch Dagblad*, and an “Open Letter to Arnold Heertje” by Hueting.²⁶² Heertje’s newspaper article in January 2008 reflects the same misrepresentation as highlighted above.

“The merit of Roefie Hueting, founder of the sustainable national income, is that he has discussed the adverse effects of growth on the environment already at an early stage. Sad is that he has dogmatically insisted on measuring environmental functions by including them as negative corrections on national income, thinking that this results in a good measure of broad welfare. He has therefore gotten into a position outside of the scientific discussion.

In Hueting's opinion, a doctor who assists someone in a traffic accident does not contribute to welfare while the doctor does contribute who cures someone from the flu. That is theoretically indefensible.”²⁶³

Again we see Heertje's suggestion that Hueting uses NI-A and eSNI as measures of welfare. Subsequently, Heertje misrepresents Hueting about the statistical accounting of costs and benefits, see Chapter 12 above. (There we see that Hueting makes sure that NI-A moves in the same direction as welfare, but that is all.)

²⁵⁹ Check the model <http://www.sni-hueting.info/EN/Others/2000-Verbruggen-ed-O00-10.pdf>

²⁶⁰ <https://www.digibron.nl/search/detail/012dbd5ee339ff9d80fc1d9a/groei-is-de-kern-van-het-milieuprobleem/0> (January 3 2008)

²⁶¹ <https://www.rd.nl/ opinie/meten-is-niet-alles-weten-1.232463> (January 4 2008)

²⁶² <http://www.sni-hueting.info/NL/Documentatie/2008-03-OpenBriefAanHeertje.pdf>

²⁶³ Dutch: “De verdienste van Roefie Hueting, grondlegger van het duurzaam nationaal inkomen, is dat hij al in een vroeg stadium de nadelige effecten van groei voor het milieu aan de orde heeft gesteld. Triest is dat hij dogmatisch heeft vastgehouden aan het meten van milieufuncties door deze als negatieve correcties op het nationaal inkomen op te nemen, denkend dat dit resulteert in een goede maatstaf voor de ruime welvaart. Hij is daardoor buiten de wetenschappelijke discussie komen te staan. In de ogen van Hueting draagt een arts die iemand bijstaat bij een verkeersongeval niet bij aan de welvaart en de arts die iemand van een griep afhelpt wel. Dat is theoretisch onverdedigbaar.”

In April 2008 there was a joint statement including some economists ²⁶⁴ but apparently nobody thought it relevant to resolve the misrepresentation by Heertje concerning Hueting's analysis. Such would have been relevant at least since CBS in January announced a new monitor on sustainability, ²⁶⁵ and we saw in Section 21.11.1 that CBS removed eSNI from that monitor, using similar misrepresentation as if Hueting makes a first year student error of confusing income and welfare.

²⁶⁴ <https://www.rd.nl/vandaag/economie/economische-hervorming-noodzakelijk-1.79492>

²⁶⁵ <https://www.rd.nl/vandaag/economie/planbureaus-komen-met-welvaartsmonitor-1.232408>

35. Jeroen van den Bergh 1991, 2005, 2015, 2019

35.1 Introduction

J.C.J.M. (Jeroen) van den Bergh ²⁶⁶ is ICREA research professor at the Universitat Autònoma de Barcelona and extraordinary professor at VU Amsterdam. He has a long list of publications on environmental economics and is also editor of an Edward Elgar series in that field. This Chapter looks at only some papers and should not be regarded as representative, because such judgement would require a complete overview that I do not have. The following is no random sample but concerns some papers that directly pertain to the Tinbergen & Hueting approach. Van den Bergh's overview article of 2019 may be hoped to show a culmination of his research findings though. For deconstruction, we consider:

- (a) Van den Bergh (1991) gives an overview of “*sustainable development*” at the time when he was completing his thesis on such modeling. He refers to Hueting on “*sustainable national income*”. We might still allow for the possibility that Van den Bergh with his background in econometrics and operations research, and writing his thesis in 1988-1991 on modeling, had a different focus, and did not have the patience for Hueting's (more verbal) background and approach from welfare economics and national accounting.
- (b) Van den Bergh (2005) (in Dutch ESB) proposes to abolish GNP and (2007) (in English) proposes to abolish GDP.
- (c) There is the correspondence in 2005 (in Dutch) between Van den Bergh and Hueting about a draft of the paper on abolition of GNP. ²⁶⁷
- (d) Van den Bergh (2015) presents the “agrowth” approach, defined on p6 as: “*Ignoring the GDP indicator means that we will be indifferent (neutral or “agnostic”) about the desirability or undesirability of GDP growth.*” This essentially retracts abolition as unattainable and switches to neglect.
- (e) Van den Bergh (2017a) (Nature Climate Change) claims to present a review of the literature but burks the Tinbergen & Hueting approach.
- (f) Van den Bergh (2019) (in Dutch ESB) reviews the CBS “Monitor Broad Welfare”. It should be reasonable to regard this as a culmination of his experience on this issue.

We will look at these selected papers from the angle of welfare economics and political economy. See Section 7.2 for definitions that are crucial here. Van den Bergh searches for the Social Welfare Function (SWF) and emphasises that welfare is not income, or $SWF \neq NI$. The latter is a no-brainer but is stated so often that I will call it a mantra. His work doesn't show a statement of support for the Tinbergen & Hueting approach and eSNI. Thus, Van den Bergh presents the enigma of a professor in environmental economics who does not support eSNI though he agrees with Hueting that $SWF \neq NI$ and $SWF \neq eSNI$.

²⁶⁶ <https://research.vu.nl/en/persons/jcjm-van-den-bergh>

²⁶⁷ <http://www.sni-hueting.info/NL/2005-Discussie-RH-JvdB.pdf>

A researcher, and also Van den Bergh, would seem to be free to select the topic of research. If Van den Bergh wants to research the SWF and abolish or neglect the figure of national income (NI), then some people might say that he would be free to present his research findings. However, when you have studied welfare economics, see Section 7.2, and for example know that the $SWF^*[y]$ and NI would be tangent in some theoretical cases, then you would be aware that NI and SWF are two sides of the same coin, so that it is scientifically unwarranted to suggest that you research the SWF and abolish or neglect NI. It is like saying that you study people while you actually only look at men, and let women and children suffer the consequences of wrong doses of medicines (by doctors who use your work uncritically e.g. by putting too much trust in the peer review system). As an author you have some obligation for completeness (and to inform peer reviewers). Van den Bergh can only suggest that he studies the SWF and proposes to “abolish” or “reduce attention for” GDP, because apparently he has not sufficiently studied welfare theory to grasp the implications of that the two are structurally related. His references to Hueting and Tinbergen are wrong (see e.g. Section 35.10.4 on 2019), which suggests that he did not study their work properly, and so that he did not learn more about welfare theory from Hueting either. It was Hueting who put the issue on the map (long) before Van den Bergh came along, and scholarship requires the proper study of predecessors, and proper representation.

While we cannot avoid this diagnosis of an irrational element in Van den Bergh's papers, there is much that is reasonable. At CPB in 1982-1991, I drafted a text on the “horrors or real value added”, that also argued that it would be more useful to focus on the properties of the SWF and the production function than getting lost in the peculiarities of the tangent NI (compare **Figure 5**). Colignatus (2001, 2014) also indicates a lexicographic structure in the preferences, namely in the distinction between morals and common preferences. These points overlap with the view expressed by Van den Bergh, in particular when considered for practical modeling. However, it remains *practical*, with the distinction between engineers and ivory tower academics, to maintain GDP and use $e\Delta = GDP - eGDP$ for environmental policy making. However, Van den Bergh doesn't stick to this reasonable and practical domain, and presents an argument that is irrational.

In these selected papers Van den Bergh presents his readers the following *false framing*, and check how it differs from what Tinbergen & Hueting do:

- (i) $SWF \neq NI$, and given the deficiencies of NI we better focus on the SWF. ²⁶⁸
- (ii) Tinbergen & Hueting present an eSNI as alternative to SWF and NI. ²⁶⁹
- (iii) eSNI fails as a SWF (specialised on the environment) and suffers the other deficiencies like NI. ²⁷⁰

²⁶⁸ This is a non-sequitur. The SWF is a theoretical construct and practically infeasible. NI has many practical uses. Van den Bergh focuses on the criticism but doesn't state the positive aspects of NI.

²⁶⁹ eSNI was never presented as a possible SWF. NI itself was a practical approach because the determination of the SWF was and is difficult or impossible. Similarly for eSNI. It complements NI. Van den Bergh burks the information that the proposal concerns $e\Delta = NI - eSNI$.

²⁷⁰ This is only superficially correct. It is an open door, since none were presented as such. It is a misrepresentation like stating that you divorce from someone whom you haven't been married to.

- (iv) Hence, it is advisable not to pay attention to eSNI. Burking it is better.²⁷¹
- (v) This would be a scientific message to policy makers, media and students.²⁷²

Van den Bergh proposes to focus on the SWF and to neglect NI. Perhaps he then considers it logical to also neglect eSNI. Potentially he feels that supporting eSNI would be inconsistent with his focus on the SWF. In search for clarity of what is the case here, I found this discussion by Pen et al. (2006) about Van den Bergh (2005). There Van den Bergh states on p117 (translations are mine):

“If GNP is replaced by GNP corrections such as ISEW, GPI or Hueting's eSNI, there is a risk that growth fetishism will focus on these types of standards. That would be undesirable because such indicators only remove part of the seven criticisms of GDP and are therefore not perfect measures of welfare either.”

This is a misrepresentation, since it is not suggested that eSNI replaces NI, and it is irrational since it neglects the increased richness of the discussion domain, so that there is little risk of fetishism (as if such were a real topic of consideration):

- He overlooks that Tinbergen & Hueting propose to use $e\Delta = NI - eSNI$ (check their explicit statements, see Section 35.16) so that it is convoluted to focus on NI or eSNI only.
- Van den Bergh also overlooks Hueting's criticism on the term “economic growth” and its solution approach presented in Chapter 17. This other approach deserves mention, and it is burking when it is not mentioned.
- With eSNI available, policy makers have the rich environment of these variables, and thus less scope to focus on only one of them: NI, eSNI and $e\Delta$, in both levels and growth rates. (And other social and economic aspects, that Hueting also calls attention to, but does not work on.)
- Instead, Van den Bergh puts much emphasis on abuse of NI / POP, even though this ratio is rather irrelevant for the environment.

In my diagnosis, Van den Bergh throws away eSNI with the bathwater, irrationally, and with some serious errors in scholarship. It is also important that the selected papers do not state this consideration. That is, he doesn't inform his readership “there are eSNI and $e\Delta$ but we better neglect them because they come with a risk of their own growth fetishism, for such and such reasons” but he burks both them and this reasoning on burking.

The deconstruction of these selected papers by Van den Bergh meets with problems of structure and exposition.

- Many parts of Van den Bergh (2005), (2007), (2015), (2019) are copies and translations, especially w.r.t. his discussion of the Tinbergen & Hueting approach. In each case it is relevant to observe and check that he apparently hasn't much studied the Tinbergen & Hueting approach, neither originally nor with improvement over the years. While this checking is important for the historical record, it makes for tedious reading.

²⁷¹ This is a non-sequitur, since the premisses fail.

²⁷² This is not science but is quite confused and irrational.

- It would be best to put the conclusions up-front and the evidence in the appendices to this Chapter. This comes with a risk. Some readers who read a *conclusion without immediate evidence* might reject it (e.g. as “obviously unwarranted”) and to stop looking for the evidence in the appendices. To reduce this risk, it is required to burden the text with explicit links between conclusions and their evidence (quotes).

This Chapter then has the following structure:

- (1) Clarification that Hueting informed Van den Bergh in 2005 that (obviously) eSNI was not an effort at a SWF. (So why misrepresent it in 2005-2019 ?)
- (2) Clarification on the meaning of Van den Bergh’s term “agrowth”.
- (3) Clarification of the convoluted structure in Van den Bergh’s treatment of welfare economics and the Tinbergen & Hueting approach.
- (4) Highlighting the curious situation that Van den Bergh en Hueting did not succeed in having a meeting of minds, with the diagnosis that the problem is Van den Bergh’s convoluted approach and lack of studying Hueting’s work.
- (5) The conclusions up-front.
- (6) The appendices with the deconstruction of the papers.
- (7) Explicit links between the conclusions and the evidence in these appendices.

In 2005 I noticed the title of Van den Bergh (2005) – “GNP, throw it away!” (translated) – but did not consider it relevant to look at the paper since the title is preposterous and puerile. With my background in econometrics and experience at CPB 1982-1991 and participation in making and using the Athena model, it is obvious that GNP is too useful to abolish. Apparently Van den Bergh in 2019 concurs by no longer speaking about abolition but about “agrowth”.

In writing this present Chapter in 2019, I looked at Van den Bergh’s papers in basically the same order as presented in the appendices to this Chapter. Thus I deconstructed the papers of 1991, ESB 2019 and agrowth 2015 before I looked at ESB 2005 and the correspondence. When evaluating both ESB 2005 and the correspondence I was just as curious as the reader may be now, as to why these minds did not meet. It is only because of the later papers that the correspondence of 2005 appears to be more important than I originally thought. It namely shows that Hueting informed Van den Bergh that eSNI was no effort at a SWF, so that it is a *deliberate* misrepresentation by Van den Bergh in 2005-2019 when he discusses eSNI as a SWF while it hasn’t been intended or presented as such.

35.2 The correspondence of 2005 is remarkably important

See Section 35.16 for the correspondence. Relevant here is:

- (a) Hueting informs Van den Bergh that eSNI is not meant to be a SWF.

On p15: “[JvdB] In response to what you write about eSNI and GNP above on page 9 under [3]: well, I have to acknowledge (again) that a number of objections I have against GNP are also objections to eSNI, because eSNI directly follows GNP in a number of respects. So the question is actually up to you: if you support my general criticisms, how do you assess your own eSNI?”

On p16: “[RH] “(...) Ergo, eSNI is certainly not a social welfare measure as you write at the top of page 4 of the shortened version (because you have to mean eSNI). Just like production, unemployment etc. are no social welfare measures. eSNI is one of the indicators that affect welfare, in a positive or negative sense.”

One would think that this should be enough for Van den Bergh to stop misrepresenting eSNI as a SWF. However, he continues doing so in 2005-2019.

While the draft paper in 2005 was at ESB, he could have alerted the editors to delay it or write a later correction. Instead, he misrepresents eSNI in 2005-2019 as *if it would not be income but an effort at an SWF*, see Section 35.4. Basically he creates a straw man, and then rejects eSNI that it fails as a SWF, whence eSNI gets tainted. A scientist still has the freedom to try whether a car can function as a boat even when it hasn't been designed as such, but at least he should inform readers what the original design was, and that the original designers did not have that confusion.

(b) In the correspondence with Hueting in 2005, Van den Bergh p16 (see the full translated quote in Section 35.16) first states that he doesn't think that a good indicator for welfare (SWF) can be developed via the method of an “alternative NI”, and then continues with: ²⁷³

“I consider determining a green or sustainable national income to be somewhat relevant, though not as a way to arrive at a definitive welfare indicator, but to make it clear that we wrongly account that we would be rich, while the environment and nature are being affected structurally.”

However, he *doesn't* state this in the selected papers. This is burking.

35.3 The meaning of “agrowth”

Above, we quoted Van den Bergh for his definition of “agrowth”. The following will present some other quotes from his papers about what it means. Reading the selected papers, there are two logical possibilities that the quotes allow for:

- (1) A scientist is impartial or neutral, and “agrowth” (agnosticism about growth) = (welfare) economics. In this case there is nothing new, and there is no need for this new term. This is the position by Tinbergen & Hueting, who only provide information and who take the preferences as given. ²⁷⁴
- (2) A social activist need not be impartial, and “agrowth” = “indifference about outcomes of production growth” is an expression of utility, or effort at influencing views. (It is curious when this appears in scientific papers, though.)

While impartiality superficially looks like indifference, there remains a distinction between *not expressing a preference* and *expressing a preference of indifference*.

²⁷³ Dutch: “Het bepalen van een groen of duurzaam nationaal inkomen vind ik echter wel relevant, niet om tot een definitieve welvaartsindicator te komen, maar om duidelijk te maken dat we ons ten onrechte rijk rekenen terwijl milieu en natuur structureel aangetast worden.”

²⁷⁴ While Tinbergen and Hueting are personally engaged and have their own preferences, and on occasion may show this, it doesn't affect their impartial position as scientists. When they show it, it is also a disclaimer that alerts the reader.

Van den Bergh (in personal communication, for which I thank him), states that none of these two possibilities apply. While I only see two logical possibilities for his texts, he sees a third option, perhaps cell (3) still free in **Table 25**.

Van den Bergh (2015) provides a figure with technical explanation, but unfortunately this is technically deficient, see the discussion in Section 35.11.7. In personal communication, Van den Bergh did not provide clarification. Without this technical support, we are back at looking at quotes.

Table 25. Two possibilities and Van den Bergh's rejection ²⁷⁵

	<i>Impartial (neutral)</i>	<i>Partial (indifference)</i>
<i>Science</i>	(1) agrowth = (welfare) economics (Section 7.2)	n.a.
<i>Not science (but social activism)</i>	(3) Van den Bergh: neither (1) nor (2) ²⁷⁶	(2) agrowth = expression of a preference ²⁷⁷

Let me give the following quotes, and the reader may judge, and Van den Bergh might be inspired to provide more clarification (or retract some quotes).

One would assume that a scientist does not confuse (1) and (2). Since Van den Bergh (2015:17) states that agrowth is "perfectly in line" with welfare economics, I infer *that it is identical to welfare economics* (Leibniz's definition of identity):

"In other words, agrowth is perfectly in line with theoretical welfare economics and empirical happiness (subjective well-being) research: it reflects a real welfare approach."

However, in personal communication, Van den Bergh rejected this identity. When I inferred that he thus rejected scientific impartiality and expressed a preference for indifference, he rejected this too. I however see no other logical possibility. Perhaps other researchers have understood his meaning in 2005-2019 but for me these are 14 years of adding to confusion.

In the following quote, Van den Bergh (2007:20), ("abolishing GDP"), in the first part claims orthodoxy, and in the second part shows that he is unorthodox (by stating that abolition of GDP is rational while it is irrational – since GDP has useful properties for the public sphere, see Section 7.2):

²⁷⁵ This table has the equality sign as used in the earlier communication with Van den Bergh, and this clearly expresses the idea. Using strict formalism, "element of" or "implies" (\rightarrow) is better.

²⁷⁶ Personal communication 2019-04-19, in Dutch, w.r.t. a draft of this Chapter. TC: "De structuur zal zijn dat je tekst op twee manieren kan worden gelezen: (1) ofwel agrowth = economics, (2) opgeven van wetenschappelijke onpartijdigheid en adviseren dat mensen / politici hun preferenties aanpassen tot onverschilligheid t.a.v. de groei van het nationaal inkomen. En dat je per email hebt aangegeven dat het niet (1) is." Reply JvdB: "2 is ook niet correct. Beter dat je niks schrijft over agrowth want steeds maak je fouten. Schrijf dat maar met verwijzing naar onze emails. En agrowth heeft niks te maken met dni."

²⁷⁷ Social activism targeted at de-polarisation, same email exchange. JvdB: "Agrowth is een bescheiden poging los te komen v d pro/anti-groei discussie. De-polariseren. De irrelevantie van bnp vertalen naar een neutralisatie v d foute groei=vooruitgang gedachte." This is 2, not 1 or 3.

"It is easy to discard my plea as unorthodox. However, given the consistency of my position with mainstream microeconomics and welfare theory, and in view of the long list of illustrious economists that have criticized the GDP indicator (see especially the first paragraph of Section 2), my position should really be regarded as entirely orthodox. The problem is that the majority of economists have up till now been too silent, pragmatic or defensive on this issue, and therefore unwilling to draw the evident conclusion: it is perfectly rational to abolish the GDP indicator from the public sphere."

Van den Bergh (2007:19) ("abolishing GDP") implies the agnostic view on GDP, which he later calls "agrowth", apparently retracting the phrase "abolish GDP":

"Indeed, abolishing GDP would imply being disinterested in whether GDP grows or not."

Van den Bergh (2019)'s view that it is advisable to use more indicators, fits the general view from welfare economics. This fits the (2007:20) statement of unorthodoxy (yet it is curious why he does not recognise that eSNI can be one indicator among the list of indicators):

"It is unlikely that a single indicator can be constructed to undo the long list of objections against GDP [when abused as welfare / TC]. It is, however, true that each well-thought alternative will represent a better approximation of social welfare than GDP. It would therefore be a good strategy to first strive towards less misleading information and subsequently magnify the amount of correct and useful information."

PM 1. Van den Bergh (personal communication) states that the "misleading information" refers to GDP. However, GDP is correct in terms of the SNA, and only incorrect as explained in Section 11.3.

PM 2. eSNI is not presented as "alternative approximation of social welfare" but adheres to the distinction between welfare and income.

PM 3. Tinbergen & Hueting "magnify the amount of correct and useful information", *which is what Van den Bergh asks for*, but he does not support eSNI.

PM 4. It is a tautology that "each well-thought alternative will represent a better approximation of social welfare than GDP", because it all depends upon how well-thought it can be. However, it hangs in the air, because how does Van den Bergh *know* that he properly measures social welfare ? He enterily neglects Hueting's approach to the *conditionality* of the assumptions.

35.4 Convoluted structure

The following repeats part of Section 7.2 but this repetition comes with the advantage that we can apply it to the selected papers by Van den Bergh.

Welfare theory quite early in the 1900s established that national income is not identical to social welfare, or $NI \neq SWF$, though $SWF^*[y]$ and NI may be tangent.

Hueting (1974a, 1980) restated this for the environment. The New Scarcity made the measurement problem larger, but he saw no solution for improving NI except for asymmetric bookkeeping. Hueting (1986b) developed the vertical demand curve and derived eSNI. Obviously $eSNI \neq SWF$, since income still differs

from welfare. The latter still is a no-brainer. Hueting clearly wanted to keep NI since he wanted to see the development of over time of $e\Delta = NI - eSNI$. For the link to the SWF, his insight on the *conditionality* of the assumptions is crucial. At least $e\Delta$ provides relevant information, and it is up to policy makers to decide how they will respond to and use this information.

For GDP we have the level and its growth:

- Some economists might abuse the level of GDP to calculate GDP per capita, and then rank nations in performance. This is a questionable practice, but not Hueting's topic of research.
- Hueting ran into the problem that GDP growth was labeled as "economic growth", which is a wrong definition, and detrimental to the environment. See Chapter 17 how this can be resolved.

Thus, for environmental policy making, GDP remains a relevant variable and it is only required (i) to get $eSNI$ to get $e\Delta$ and (ii) to repair the current wrong use of the label "economic growth". Then the work by Hueting and Tinbergen on this aspect is respected in proper manner, and researchers can proceed with new research while standing on their shoulders.

Van den Bergh (2005) in Dutch and (2007) stated a search for an indicator for SWF:

- He revived the no-brainer that $NI \neq SWF$ and suggested to abolish NI since many people still mistake NI for welfare. This neglects the useful aspects of NI. A better solution for GDP growth is given in Chapter 17 above. The abuse of GDP per capita may require another solution of its own.
- In his list of options for a possible SWF, he also included $eSNI$, see the quotes in Sections 35.14 and 35.15 This was erroneous, since $eSNI$ had not been presented as an SWF, and since Hueting had clearly stated that one should not mistake income for welfare. Thus, Van den Bergh misrepresented Hueting's position. (We might repeat the car versus boat issue here.)
- He doesn't mention Hueting's conditionality on the assumptions for the preferences (SWF). His interest in a SWF concerns an indicator only, with the presumption that there might be objective criteria to establish that it has been found.
- While abolishing NI, Van den Bergh also rejected $eSNI$: (i) ostensibly since it failed as a SWF (for which it wasn't intended), (ii) perhaps since it was an income measure too.
- Van den Bergh's later "agnosticism" is rather selective. He is not really impartial to NI and $eSNI$, since he also burks information about them. It is still an "abolishionist agnosticism". He doesn't say "okay, give the information, but be neutral or indifferent about it", he instead burks Hueting's $eSNI$. There is a fundamentalist attitude here, that he might not even allow people to use $eSNI$ if they would deem it useful. He doesn't want to mention that there might be good uses of NI and $eSNI$ because he is afraid that others might not be able to stick to this good use and fall victim to growth fetishism. This is not really scientific impartiality and (wide) agnosticism but some form of fundamentalism

presented as “agnosticism” because it sounds sophisticated, while it is very selective.

- Thus, as a professor in environmental economics, Van den Bergh has a dominant interest in welfare *on other issues than the environment*, and he maltreats eSNI that has been designed to improve national income accounting *w.r.t. the environment*. However, ICREA also looks at technology and innovation. Van den Bergh (2007:19-20) then makes a bit more sense, see the quote following below. Overall, though, his position remains an enigma.

Table 26 describes the convoluted structure in Van den Bergh’s treatment of welfare economics and the Tinbergen & Huetting approach. Van den Bergh is clearly blind to the political economy in this issue (this book), while Huetting doesn’t much write about this political economy, but at least provided the information for, say, *The Old Man and the eSNI*, see Chapter 21.

Table 26. Comparison of positions on welfare, NI and eSNI

	<i>NI and the environment</i>	<i>Other factors of welfare</i>
<i>Huetting</i>	Theory and practical estimation of eSNI and $e\Delta = NI - eSNI$	Mentioned for theory, but no effort at practice
<i>Van den Bergh, claim to look at SWF only</i>	Straw man misrepresentation of eSNI, just like NI, as an “indicator of welfare”, while it is a no-brainer that $NI \neq SWF$. Focuses on eSNI instead of $e\Delta$. Blind to useful aspects of NI. Doesn’t even accept eSNI as an indicator while he accepts other indicators	Puts emphasis on these other factors (and not on the environment). Looks for a SWF while it is rather impossible. (Somewhat blind to the practice that policy making therefor already uses many indicators)

Van den Bergh (2007:19-20):

“Because of these realities, we are in fact facing a situation known as ‘lock-in’ of a non-optimal configuration, in this case of the erroneous idea that GDP growth means progress. By definition, it is extremely difficult to escape from a lock-in situation. At least a large shock is needed. Economists could cause such a shock, by pleading together for the removal of the GDP indicator from the public sphere. Such a strategy is evidently not a plea against welfare growth, quite the contrary. Neither should it be confused with being against economic growth under all circumstances or against innovation. Indeed, abolishing GDP would imply being disinterested in whether GDP grows or not. For innovations which increase GDP but not welfare will receive less support, while innovations which increase welfare (regardless of their effect on GDP) would receive more support.”

35.5 No meeting of minds

We will look into this enigma as follows. A paper from 1991 might provide a good start. Then a recent paper from April 2019 shows Van den Bergh’s culmination of experience. A paper from 2015 provides clarity on Van den Bergh’s current

“agrowth” approach. Only after these steps we look at the earlier suggestion to abolish NI, since, looking back, we only need to identify some key aspects.

How can it be that authors on the topic of environmental economics, in a small country at risk of being flooded due to climate change, cannot come to easy agreement? Hueting has been a proper scientist. Van den Bergh since 1991 has been maltreating Hueting’s analysis, with burking, selective and badly referring (see the quotes above and e.g. Sections 35.9 on 1991 and 35.10 on 2019, and misrepresentation (suggestion that eSNI would be a SWF, see the quotes in Sections 35.14 and 35.15). Still, in 1988-1991, Van den Bergh was working on a thesis on *sustainable development* and Hueting had published on *sustainable national income*. It is curious that the minds did not meet on *environmental sustainability*.

The proposal to “abolish GNP”, Van den Bergh (2005), did much damage to eSNI. See Section 35.14 for the misrepresentation by Van den Bergh in 2005. In 2009, Rutger Hoekstra at CBS, who had written his 2003 thesis under supervision by Van den Bergh, by way of argument referred *uncritically* to this article (specifically a longer version that was not published but available from its author), to remove eSNI from the *Monitor Duurzaam Nederland 2009*, see Section 21.11.1 for 2009 and the link there. Amazingly, CBS, CPB and PBL agreed to this, and did not properly respond to Hueting’s protest.²⁷⁸

The correspondence between Van den Bergh and Hueting in 2005 started when Van den Bergh sent Hueting a draft of his ESB 2005 paper and kindly requested his comments. One might say that it is an correct gesture to do so. However, when this amounts to “please do my work for me, because I did not study your work well enough and perhaps you can correct me where I am wrong but likely I will not listen”, then this is asking for problems in communication. In 2005, Hueting had retired for 11 years, and had reached the age of 75. Van den Bergh (born in 1965, then 40 years of age) was a professor in environmental economics and looked into the area that Hueting had been working in. Not only his wrong referencing is shocking, but the whole approach and attitude, and also way of communication. (I did not look into the editing process at ESB, that published the misrepresentation.)

35.6 Conclusions up-front

The conclusions till April 21 2019 can be given up-front, and (some) direct links are given to the evidence in the quotes in the appendices to this Chapter:

- (1) Van den Bergh 1991-2019/today has not properly studied Hueting’s analysis. He refers to Hueting’s work but at crucial points erroneously or incompletely, e.g. Section 35.9 on 1991 and 35.10 on 2019. For English readers he may still refer to 1974a only, though the thesis is in Dutch. For eSNI, Van den Bergh (2019) refers to Hueting (1974a, 1980) but eSNI was by Hueting (1986b). This is no simple error but part of the pattern. He may refer to IVM but not to Hueting’s protest about their misrepresentation on the Alleingang scenario.
- (2) In 2005 Van den Bergh wanted to abolish GNP. Since 2011 he prefers the “agrowth” label, with the non-scientific position described in **Table 25**. He may

²⁷⁸ <http://www.sni-hueting.info/NL/index.html#Monitor>

refer to Hueting's work if an argument might indicate negative qualities of GDP. But he neglects (or burks the positive point) that Hueting requires GDP for $e\Delta = \text{GDP} - e\text{GDP}$. Essentially Van den Bergh *misrepresents* Hueting's analysis. (Van den Bergh (2007:14) appears to be aware of the relevance of the development of $e\Delta = \text{NI} - e\text{SNi}$ over time, but apparently he is not aware that this gap is the very reason to construct eSNi, and its essential message, see Section 35.15. The other papers 2015 and 2019 no longer mention it while it is key. Hueting mentions the importance of the gap in the correspondence of 2005, see Section 35.16, but it is not mentioned in the article of 2005 (and an editor at ESB who published this paper should regard this as a major failure in the editing process. Perhaps the direct correspondence actually bypassed the peer-review ?).

- (3) Van den Bergh refers to welfare economics and suggests that Hueting proposes eSNi as a compound indicator for welfare, but Hueting does nothing of the sort, and actually protests that one should not mistake income for welfare (the no-brainer), see Section 35.16. Van den Bergh does not seem to understand (i) welfare theory, (ii) the statistics of national income accounting, (iii) Hueting's work. If he had studied Hueting's work (see the problem with referring), Van den Bergh could have arrived at better understanding of welfare theory and national accounting. This is a problem since 1991.
- (4) For economists, it is a no-brainer that $\text{NI} \neq \text{SWF}$, or that GDP must not be mistaken for welfare. see Section 7.2. Van den Bergh has nothing new here, only repeats this as a mantra. (Readers who haven't studied welfare economics might think that Van den Bergh is at home in the field, but then are wrong-footed.)
- (5) Van den Bergh suggests that his emphasis on searching for a SWF (something practically impossible) would be helpful for environmental policy too, like generating more attention for various environmental indicators (potentially including eSNi), but his misrepresentation, burking and explicit rejection of eSNi (as "welfare") and lack of support for $e\Delta = \text{GDP} - e\text{GDP}$ actually are destructive for the provision of information about the relation between economics and the environment.
- (6) Van den Bergh's point (in the papers and also emphasised in personal communication about a draft of this Chapter) that he looks at the SWF (and not eSNi as income), overlooks that SWF and income are related, which he could have known when he had better knowledge of welfare economics. A welfare economist would not make such statement.
- (7) The misrepresentation by Van den Bergh may have sidetracked his Ph.D. student Rutger Hoekstra, later at CBS, see Section 21.11.9. While Van den Bergh is at VU he might have made a helpful statement about the IVM / VU misconception of the Alleingang scenario, see Section 21.9.12, but didn't.
- (8) On the topic of welfare economics and the SWF, Van den Bergh has not reported anything new that wasn't already known in welfare economics. Potentially his papers provide some overview of the literature. However, the Tinbergen & Hueting approach is also relevant here, and on this aspects his papers clearly fail. Van den Bergh appears to be incompetent on welfare economics and national income accounting, and fails on essential scholarship.

- (9) Van den Bergh (2015) makes a technical error w.r.t. his figure 1 there, see Section 35.11.7. In the personal communication in April 2019 this was not resolved. Van den Bergh referred to other expositions but the question was on this particular figure in this 2015 paper. I found this response evasive, unhelpful and disrespectful of my clear question on something that should be easy to resolve technically.

There are more points in the appendices.

35.7 PM. Communication breakdown

The personal communication with Van den Bergh w.r.t. this Chapter of April 21 breaks down with an email by him of April 23, my reply of 24 and his closure of the exchange on April 24 2019.

(a) TC states: "The proposal to" abolish GNP ", Van den Bergh (2005), did much damage to eSNI." On April 24 JvdB states: "I am very surprised about this. I think you overestimate the influence of my article. Wasn't my goal. Hueting has had enough time and opportunity to sell his idea and one article cannot be considered as a death sentence." TC replies: "(1) It is useful that you have been informed, thus. (2) It is not just this article, it may also be the attitude over the years. (3) For this specific article, there was a discussion with Hueting [see Section 35.16], which clarifies that you could not have written that article in such manner, or should have corrected shortly soon. (4) It was CBS who referred to your article. It is up to them to decide how much damage a single article can do." No reply.

(b) On April 23, JvdB states that he considers Van den Bergh (2017ab) as his best statements on "agrowth". TC states: "In this case, again, you want me to read again much about agrowth that I already read. It would be helpful if you provided a quote, that should have been in the 2019 review article, that resolves the problem w.r.t. the misrepresentation of the T&H approach, and please explain why you did not include it." JvdB did not reply to this. For completeness: (b1) these articles do not contain the criticised figure 1, (b2) (2017a) does not refer to Hueting, (b3) (2017b) refers to Hueting and Tinbergen in the same manner as (2015).

(c) On April 23 JvdB writes: "Why do you speak about "Tinbergen & Hueting" all the time? That is abusing Tinbergen's reputation. Everyone knows that it is Hueting, although he managed to get Tinbergen in his bandwagon once (he also tried that with me, and got angry when I was not interested in it. I even had to return a book he had previously given to me)." TC replies: "See above [Section 1.3]. This wasn't a one time event, and this was no abuse of Tinbergen by Hueting. Please explain precisely why Hueting requested the return of the book. It might make sense if you would not read it, if it had been given for that reason."

(d) TC states: "GDP is not the issue, since production can be a component of welfare, and GDP is required for the distance $e\Delta - A = NI - A - eSNI$." JvdB states: "The aforementioned distance has no clear meaning - it is not income and it is not welfare - it is simply a fabrication without clear interpretation." TC answers: "I am amazed that you do not see this. With Keynesian $Y = C + I$, $sSNI = eY = eC + eI$, and $e\Delta = Y - eY$. You hadn't seen that eSNI has the word "national income" in it, so that these terms are additive ? See THAENAES Figure 3 page (...) for a graph of that distance. This is also in Hueting's NA & eSNI. This would be obvious for who knows about national income accounting."

(e) TC states: "Van den Bergh burks the information that the proposal concerns $e\Delta = NI - eSNI$." On April 23 JvdB states: "But what is that information, this is never clarified." TC answers: "This would be obvious for who knows about national income accounting. See the explanation above, though."

(f) TC states: "Van den Bergh focuses on the criticism but doesn't state the positive aspects of NI." Not true – see my article "The GDP paradox", section 5. A fair treatment of the work by others is required here." TC replies: "I clearly refer to the selected papers. Please provide a quote. I cannot read all your work (and read my disclaimer)."

(g) TC states: "NI and SWF are two sides of the same coin, so that it is scientifically unwarranted to suggest that you research the SWF and abolish or neglect NI." On April 23 JvdB states: "But you then say "no-brainer that $NI \neq SWF$ ". That seems inconsistent." TC replies: "This is not inconsistent. The two sides are not equal."

(h) There are some more of these efforts at communication. On April 24 Van den Bergh closes the exchange with a statement that includes: "You lack relevant experience in terms of original academic research and relevant publications." Which supposedly is not ad hominem but a statement on competence, but which, because its contortion, still is ad hominem because it is an abuse of a statement on competence. Since I am not at the academia (except for Erasmus University / Erasmus MC in 2002-2004) the reference to "original academic research" might be tautologous. The reference to "relevant publications" however can only imply that he has studied my work in perhaps a few hours. His criterion of peer reviewed articles is not relevant here because he would have to do peer review on the spot in order to make a statement on competence.

35.8 Appendices to this Chapter

In addition to the papers mentioned above we will include some more, that were not useful for the overview above.

35.9 A paper at VU 1991

It might be that *time* plays a role in this. Van den Bergh graduated at Tilburg 1988 in econometrics with a specialisation in operations research (OR). This background (including macro-economics and national income accounting) apparently still does not guarantee that he is aware that SWF and NI are closely linked. He did his thesis in economics at VU in 1991, with the title "*Dynamic Models for Sustainable Development*", but I have not found this thesis online and stopped looking for it. At that time, 1991, Hueting had published about eSNI but the paper with Tinbergen and the CBS methodology M44 came available in parallel over the year. Van den Bergh (1991) gives an overview, and on p13 the word "also" indicates that he mis-attributes eSNI to 1974:

"Finally, we mention Dutch studies dealing with sustainable development. Hueting (1974/1982) provides for a conceptual link between economic growth and the loss of environmental functions. He proposes to value the latter and correct for them in the GNP figure (see also Hueting, 1990)." [here 1990c] [note the "also"]

The 1991 attribution of eSNI to Hueting (1974a, 1980) indicates that Van den Bergh would not have studied the issue properly in the first place, already in 1991.

Van den Bergh (1991) suggests more extensive modeling on sustainable economic development, also using methods of optimal control. We thus see a difference in interest between Van den Bergh's modeling for the future and Hueting's statistical focus on national income accounting.

PM 1. At VU there is the tendency to refer more often to Opschoor at VU than to Hueting at CBS. Van den Bergh (1991) does so too. PM 2. Opschoor's "environmental space concept"²⁷⁹ is a *later and other name* for Hueting's environmental functions, as also Opschoor indicates²⁸⁰ (but likely not frequently enough), see Chapter 38. PM 3. Potentially, the book by Kuik & Verbruggen (eds) (1991) (that I haven't read) gives more information for tracing the history of these ideas.

35.10 A paper in ESB on the CBS Monitor Broad Welfare 2019

Van den Bergh (2019) is most recent, in Dutch, on the CBS "Monitor of Broad Welfare" (MBW). See Section 21.11.9 on this MBW. We may presume that Van den Bergh's experience culminates here to a large extent, on April 21 2019.

Van den Bergh (2019) only reviews the MBW and does not claim to present something new. His analysis might have been written 50 years ago in 1970, except for the actual data 1970-2018, and except for the added volume of references to papers or reviews on similar types of indicators.

Van den Bergh (2019) states that "GDP is an information-fiasco of macro-economic proportions". His argument is deficient.

35.10.1 Key points are overlooked

Van den Bergh (2019:62) states that GDP is deficient as an indicator for "welfare or progress". This is a no-brainer a.k.a. an open door, see Section 7.2, and this is repeated by him as a mantra. Perhaps Van den Bergh's repetition of the mantra suggests to himself and others that he would be at home in welfare theory and national accounting, but this would be an awkward misunderstanding.

He does not see Hueting's key analysis that GDP also misstates the level of income, namely the environmentally sustainable level, and thus is *deficient in national accounting as well*, see Section 11.3.

Van den Bergh (2019:64) correctly states that eSNI focuses on the environment, but he does not explain that (i) the environment may belong to the subject matter of economics, even though the term "externalities" indicates that market prices are inadequate, (ii) so that eSNI is a crucial aspect of national income accounting, (iii) so that such focus is a great advantage for this purpose.

²⁷⁹ <https://www.eea.europa.eu/publications/92-9167-078-2/page003.html>

²⁸⁰ In Dutch: Bernard Mazijn (ed) (2000) "Duurzame ontwikkeling meervoudig bekeken", pag 31: "Ook in de literatuur over de "milieugebruiksruimte" wordt het milieu steeds beschreven in termen van functies, waarbij men het begrip nog steeds invult zoals Hueting dat deed. "De functies kunnen we ook "milieugebruiksmogelijkheden" noemen", zeggen Opschoor en Van der Ploeg (1990) [in Commissie Lange Termijn Milieubeleid] in een uiteenzetting van het concept "milieugebruiksruimte". A (unnecessary) new name may distract from the original author.

Van den Bergh doesn't mention the key point $e\Delta = NI - eSNI$. See Section 35.7 point (d) that he does not understand its clear meaning: "The aforementioned distance has no clear meaning - it is not income and it is not welfare - it is simply a fabrication without clear interpretation."

35.10.2 A so-called GDP paradox

A paradox is a seeming contradiction. Van den Bergh (2019:63) suggests that it is *paradoxical* that (i) GDP differs from welfare but (ii) still plays a role in society. Why would this be a *seeming contradiction*? Why would it *seem to be a contradiction* that a *factor in welfare* plays a role in society? Thus this is not really paradoxical. His own discussion already shows that there is no paradox.

35.10.3 Misrepresenting eSNI as an indicator for welfare

Van den Bergh (2019:64) discusses welfare and "four types of alternative indicators", of which a green GDP would be one type. There he mentions eSNI.

However, Hueting presents eSNI as an alternative measure of income, and not as an alternative indicator for welfare itself. Hueting agrees that GDP and eSNI can be factors within welfare, but stated from the beginning, around 1965, that income should not be confused with welfare.

Thus, Van den Bergh misrepresents eSNI.

35.10.4 Wrong reference and burking

Van den Bergh (2019:64) refers to Hueting (1974a, 1980) for eSNI, but eSNI was only given by Hueting (1986b). (He doesn't use the word "also", that might cause confusion about the attribution, as in 1991.)

Van den Bergh (2019:64) also refers to the calculation by Gerlagh et al. (2002) but does not mention that his colleagues at the VU Amsterdam misrepresent eSNI w.r.t. the Alleingang scenario, see Section 21.9.12.

Van den Bergh (2019:63) laments that news media, policy makers and even the general public focus on GDP, but he does not take responsibility that he as a scientist since 1991, thus over 28 years, has been maltreating Hueting's analysis, with burking, selective and badly referring and misrepresentation.

35.10.5 Other indicators

Van den Bergh (2019:64) discusses the *Genuine or Adjusted Net Savings* method, and suggests that the "value" of depletion is subtracted, but does not alert readers to the dubious method how the World Bank estimates this "value". While Van den Bergh (1991) mentioned serious modeling, he allows the World Bank to still avoid such modeling. He mentions the modeling on eSNI but does not emphasise that this constitutes a *proof of concept* for the approach.

Van den Bergh (2019:65) suggests that ISEW / GPI might be more general than eSNI, but he doesn't mention the criticism on weak sustainability. He mentions the latter criticism only for *Genuine or Adjusted Net Savings*. This is unbalanced.

Overall, readers are not presented with the relevant properties of the indicators.

35.10.6 *The no-brainer mantra and a supposed threat to GDP*

Van den Bergh (2019:65) states that no indicator threatens the position of GDP. Apparently he means that GDP would be seen as an indicator of welfare, which it cannot be, so that he creates a straw man.

He suggests that this straw man then would be “replaced” by a proper indicator. Instead of such effort at replacement, he refers to his own agrowth approach, see the definition in Section (7), and the following Section. Thus there is no replacement by better information but a management of the preferences on production growth.

Obviously, when you misrepresent eSNI and misinform others, then you must deal with the practical usefulness of GDP and your own (stated) wish of measuring welfare (but lack of effort to actually measure it). But it is curious to suggest that GDP would be more than a *factor* in welfare.

Subsequently, there is the problem with the term “economic growth”, see Chapter 17. However, Van den Bergh does not arrive at this solution approach.

35.10.7 *“Agrowth” presented as an information policy*

In his 2019 article, readers are only informed that “agrowth” would be “reducing attention for GDP”, which is at best an *information policy*, see Van den Bergh (2019:65-66). He suggests that “in the long run this can result into sustainable development”. Thus: (i) This replaces science (studying the work of others like Hueting and proper referring) by some (ill-defined) information policy. (ii) There is no proof that such information policy can work (for ill-defined targets), except that it might sound seductive for some (also because it is tautologous: A if and only if B: it “works” iff you can find an excuse to declare that it is a success).

Van den Bergh (2019:65) suggests that this “agrowth” approach “need not lead to a radical anti-growth position”. This is vague. For readers of this 2019 article he does not clarify (i) what a “radical anti-growth position” is and (ii) why it would be relevant. He also states that the “agrowth” approach might appeal to more people. Perhaps few people want to be “radical”, and thus “agrowth” might appeal to 99% of the world. It still remains vague here. (Since it apparently appeals to himself nowadays, he better explains why he did not see this non-radical approach earlier, and why he burdened the discussion by his earlier proposal to “abolish GDP”.)

This 2019 article was input for the overview discussion above in Section 35.3, about what Van den Bergh means by the term. Originally I thought that Van den Bergh (2019), writing for ESB, presented a scientific view, and originally I inferred that he did not clearly state that his term “agrowth” = “(welfare) economics”, i.e. option (i) in **Table 25**, see Van den Bergh (2015:17), also quoted below in Section 35.11.14. However, after his rejection of this reading or interpretation (personal communication April 19 2019), apparently the “agrowth information policy” is targeted at influencing preferences, which is an activist position (option (ii)), that still got printed in ESB. But he rejects this too, so what is it, or rather, what remains of it when the confusions are removed ?

35.10.8 *Straw man that GDP and its alternatives are deficient*

We already discussed this point, but it useful to review the whole article. Van den Bergh (2019:66) states that “GDP and its alternatives are deficient” but then

misrepresents eSNI, since eSNI is a valid correction for GDP w.r.t. national income accountnig and the environment. Only if you want income to measure welfare (and not only be a factor), then there is such “deficiency”, but nobody has been proposing such. You are creating a straw man when you suggest that an economist would have seriously proposed such.

35.10.9 *Suggesting superior knowledge without an indicator*

Van den Bergh (2019:66) suggests that studies on welfare suggest that the rich countries have reached a plateau in welfare, so that not only (1) increases of GDP will contribute little to welfare, but also that (2) it is not needed “to use an aggregate indicator of welfare”. This is a curious statement. You only know that there is such a plateau if you have such an indicator.

Van den Bergh doesn't provide an econometric estimate of that plateau, but still knows it. Van den Bergh reduces himself to a high priest who received a message from his misrepresentation of the literature. Perhaps it would be an idea to ask him in the future whether we are still on the plateau or not. This would save the world from a lot of extensive modeling that he advised in 1991 but that he has lost interest in (eSNI) and that he no longer requires (World Bank).

Nevertheless, while Holland floods, it could still be a valid research question for researchers on the SWF, whether welfare indeed has reached a plateau, at least when they can clarify how they know that their indicator indeed measures welfare.

For serious research, see Colignatus (2018a) on complications w.r.t. democracy.

35.10.10 *Focus on two issues*

Van den Bergh (2019:66) suggests that economists concentrate on issues of inequality and world environmental problems. He suggests that these issues already have “concrete indicators that receive wide support”. Focusing on these issues would be better than “developing an indicator for broad welfare that must replace GDP”. The latter again uses a straw man, and the argument is a waste of time and attention by readers.

This misrepresents the position by Tinbergen and Hueting again in another way. These authors *already look* at inequality and world environmental problems, and for the environment they have developed the indicator of eSNI that would be very relevant, and that is being misrepresented, also by Van den Bergh, so that it need not surprise that there isn't wide support yet.

There is no need to replace GDP since we must look at $e\Delta = \text{GDP} - e\text{GDP}$.

35.10.11 *The mantra answers to ritualistic needs e.g. at journals*

In this article Van den Bergh again shows that he has nothing new to say on this subject. His mantra that GDP should not be confused with welfare, $\text{NI} \neq \text{SWF}$, is a no-brainer for economists. Apparently economic journals want to reprint this mantra, and it must appeal to ritualistic needs. (Authors can refer to new publications by other authors who state the same no-brainer, with a seeming advance, only measured by publication dates.)

Journal editors may also want to print something new. The new term “agrowth” is suggestive of something new. If it is science then it merely means (welfare) economics, and then this is phraseology (in the same way as Opschoor used the

term “environmental space” as if it would be something new, see Chapter 38). If it is not science, then it is activism, but please keep it out of the scientific discussion.

If you repeat it often enough then there may be others who refer to you, and there may be some who explain what you mean by it, including some who forget to say or perhaps do not notice (e.g. non-economists ²⁸¹) that it apparently is confused, as shown in Section (7).

(Van den Bergh refers to questionnaires but I am afraid that he did not properly explain the issue so that it would be “garbage in, garbage out”. I did see no reason to look into this additionally, since, when Van den Bergh makes so many errors in these few selected articles, then it would be strange to expect a proper exposition elsewhere, like on such questionnaires.)

35.10.12 Overall conclusion on 2019

My impression is that Van den Bergh in his daily work would be busy with quite different things, like supervising Ph.D. students. He may regard his comments on GDP and welfare as on-the-side and off-the-cuff, as a service to the world, when the world apparently is confused and might be in need of some clarification by a professor in environmental economics. Thus, I presume that his comments are only intended as helpful, and the present deconstruction about what they really mean might peruse them beyond their intention. Still, his 2019 paper is intended for a serious audience and discussion, and the paper only increases confusion.

Van den Bergh (2019) misunderstands and misrepresents the analysis by Hueting and Tinbergen. In 2005 Van den Bergh had “abolish GDP” and now he wants to leave matters as they are, only try for some “information policy” (no quote) that must cause the world to pay less attention to GDP. Van den Bergh seems willing to adopt any curious position, as long as (i) he doesn’t need to properly study Hueting’s work and look at $e\Delta = \text{GDP} - e\text{GDP}$, and (ii) then must acknowledge that he was already incompetent on welfare theory and national income accounting in 1991, and did not properly study and refer in 1991 either.

35.11 A paper on agrowth 2015, presented at the OECD

Van den Bergh (2015) does not mention eSNI. He refers to Hueting (1974, 1980) and Tinbergen & Hueting (1991, 1992) but *only for criticism w.r.t. GDP*. He refers to Hueting (2010a) but *only* for the dependence of services upon polluting industries.

The abstract of the paper is, and the deconstruction will be done below on the paper itself:

“The debate on growth versus the environment is usually summarized as optimists believing in limitless growth versus pessimists seeing environmental and resource limits to growth. This opposition defines the main strategies: namely, striving for green growth versus some anti-growth approach. In this paper I argue that we should not feel obliged to choose between these polarized opinions, as there is in fact a third option. I call this the “agrowth” strategy, and it offers a way out of the impasse that characterizes the growth-versus-environment debate. I will

²⁸¹ <https://phys.org/news/2017-03-theory-economic-agrowth-contributes-viability.html>

define this agrowth strategy, motivate its rationality, and examine its premises, implications, advantages, political feasibility and practical steps. I suggest that an agrowth strategy follows logically from accepting the shortcomings of GDP (per capita) as an indicator of social welfare. It will be graphically shown that both anti-growth and pro-growth goals represent avoidable, unnecessary constraints on our search for human betterment, which lead to lower realizations of social welfare than are in fact feasible. I will further discuss the idea of green agrowth, notably in the context of avoiding dangerous climate change. Finally, a pragmatic approach to selecting alternative macro indicators is proposed.”

35.11.1 *Providing information versus advising on preferences*

Tinbergen and Hueting (1991) have the objective to provide *information* on the state of the economy. The decision whether a society wishes to conserve or destroy the environment is up to society.

Van den Bergh (2015) deals with *preferences* – on limitless growth or limited-growth, and he proposes a middle position that he calls “agrowth”. Basically this is an issue of politics. It is conceivable though that a scientist provides policy makers with more details about the political position that they wish to choose. In fact, Chapter 8 on the social welfare function (SWF) has this meta-perspective too. But this falls under welfare economics, and Van den Bergh rejects this position (personal communication), see Section (7).

Thus this distinction in approaches must be noted: science that improves the quality of information about the actual development *versus* the activist position that advises on the preferences. Van den Bergh states that there is a third position, but does not explain what it would be.

35.11.2 *The relevance of extreme preferences*

On first reading of the abstract, it is remarkable that Van den Bergh refers to rather extreme positions: limitless growth (Julian Simon (1932-1998) ?, Bjørn Lomborg ?) and limited-growth (perhaps Tinbergen & Hueting (1991) ?), so that perhaps 99% of the world would tend to be for the middle ground called “agrowth”, which destroys the usefulness of the term and the relevance of his article. This conclusion does not change when we read the whole article instead of the abstract.

35.11.3 *What is this discussion about ?*

Part of the issue seems to be that *decline* = *negative growth*, and that this doesn't seem to be an attractive notion, so that the novel term “degrowth” is used. (Dutch has “krimp” for shrinking.)

Who has criticism w.r.t. the term “economic growth” apparently runs the risk of being seen as advocating “economic decline” ? Let us assume that people are not so simple-minded.

Nevertheless, Chapter 17 above on the term “economic growth” clarifies that the issue is rather different than Van den Bergh suggests in 2015. It is entirely feasible that economic welfare rises when production declines.

Part of the Tinbergen & Hueting approach is that we maintain a clear vocabulary. For many people the current confusion on the term “economic growth” causes muddled thinking, and it seems that Van den Bergh with his “agrowth” has fallen victim to this too, albeit in the peculiar manner of first wanting to “abolish GDP” and now proposing “agrowth”.

There may be a community that rather talks than takes responsibility.

35.11.4 A limited awareness of a key point

Van den Bergh (2015:4) states: “As a result, GDP suggests we are richer than we really are.” This is part of Hueting’s analysis that standard NI can be deficient in terms of accounting for national income. This is a key point referred to above.

Remarkably, Van den Bergh does not further dwell on the issue. He did not copy the point to Van den Bergh (2019), discussed above. We may surmise that Van den Bergh did not think it relevant enough to mention it in 2019, though it is a key point. *Perhaps he did not like the inference that proper income accounting is relevant, so that GDP requires an eSNI ?*

In this article of 2015 Van den Bergh apparently feels it safe not to mention eSNI. Without mention of eSNI there is no risk of comparing GDP and eSNI on richness.

Most likely, Van den Bergh simply doesn’t see this key point in national income accounting, and this burking of eSNI in 2015 need not be deliberate but may only occur out of habit.

35.11.5 A so-called GDP paradox, and other issues

The so-called GDP paradox is mentioned in 2015, discussed above. This discussion is now enlarged with a discussion of employment, productivity and stability. To discuss this would lead too far, The references that Van den Bergh provides may cause discussion about selection and completeness. Van den Bergh’s background (and rejection of GDP) suggest that he also is not at home in macro-economics.

35.11.6 GDP as a proxy

Van den Bergh (2015:6) seems to provide a better indication of what he means by his “agrowth” approach than he summarised in Van den Bergh (2019) above, namely not only have an information policy but also adopt a position “indifferent (neutral or “agnostic”)” – and this has been used as input in Section (7) too:

“The various shortcomings of GDP as a welfare or progress indicator documented in Section 2 suggest that we should ignore the GDP (per capita) indicator in public debates and policy-making, and focus instead on more direct indicators of employment, equity and the environment. Ignoring the GDP indicator means that we will be indifferent (neutral or “agnostic”) about the desirability or undesirability of GDP growth. This is expressed by the term agrowth.”

The weak point is that Van den Bergh again refers to GDP as an indicator of welfare while GDP is only the level of production and a factor in welfare. He

creates his own straw man, and repeats the no-brainer mantra to show that he saves the world from this straw man. But, positively, as a paraphrase (no quote):

Do not use GDP (growth) as a proxy when you have an indicator of the real thing that you want to approximate, like employment, equity and the environment.

The latter is sensible, and actually already done by (good) economists. We do not need a new term “agrowth”. It suffices to use the term “economics”. Remarkably, Van den Bergh (2015:17) himself gives “agrowth” = “welfare economics”, see Section 35.11.14, but (in personal communication) again rejects that it is only another word for (welfare) economics.

There remains the issue of aggregation.

- For employment we might refer to the number of jobs or personhours or other, and for some purposes there might be a reason to look for an aggregate indicator. For equity = equality there are also various possibilities. Given the many choices, it need not be amazing that economists tend to use the single figure of GDP growth if it tends to correlate with most of these indicators. There is always reason to check on this correlation though.
- The “environment” is a huge issue, and it is not without reason that CBS Statistics Netherlands developed the NAMEA accounts. Overall, also for the environment we would tend to require some balancing of CO₂ and other aspects. Hueting points to the fact that you need standards if you want a proper definition of what you mean by “environmentally sustainable”. For the overall relation between standard production and the environment, there is the useful indicator $e\Delta = \text{GDP} - e\text{GDP}$, since $e\text{GDP} = e\text{SNi}$ can be compared to GDP directly. At this point in the paper there is an excellent opportunity for Van den Bergh to draw attention to $e\text{SNi}$, namely to defuse the misplaced attention for GDP. Remarkably he does not jump to the opportunity, for unclear reasons, and it is unclear since in the correspondence with Hueting in 2005 he has expressed somewhat support for a calculation of a green income, see Section 35.16.

35.11.7 *Begging the question by using a figure from fantasy land*

Van den Bergh (2015:6-8) presents a figure to clarify what he means by agrowth. I reluctantly reproduce it in **Figure 18**, since discussing it would not be understood otherwise. O = other factors in welfare, PPF = production possibility frontier, SW = social welfare indifference contour. See **Figure 5** for a comparable situation. Van den Bergh (2015:6):

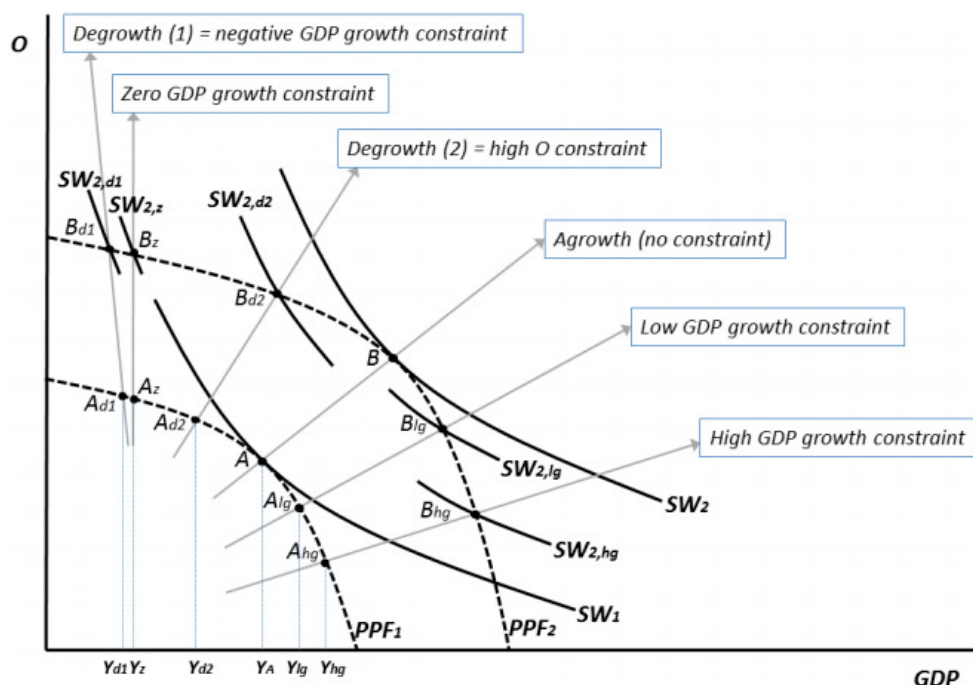
“Anyone with a basic training in optimization theory – part of the educational baggage of economists – will see that adding a constraint to an optimization problem results in the objective function (in our case: social welfare) reaching a lower or at best equal optimal value, but never a higher one. So adding a constraint that economic growth must always be positive or at least 2% cannot contribute to a higher level of social welfare, and most likely will result in reducing social welfare. This counterintuitive effect on welfare is of course not the intention of

economists and politicians who believe that striving for GDP growth is a useful social aim. But it indicates that they have misunderstood and misjudged the welfare consequences of their focus on growth per se.”

It is true that including a constraint cannot increase the optimal value. However, if the social welfare function (SWF) has an optimum at “positive or at least 2% growth” then including this constraint does not generate a lower SWF value, as Van den Bergh suggests (“most likely will result in reducing social welfare”).

Thus Van den Bergh’s reasoning depends upon an assumption that he knows *what the SWF is*. We may assume that he knows it indeed, in the same way as we may ask him each year whether welfare still is on the plateau or not.

Figure 18. Van den Bergh (2015): “Figure 1. Social welfare implications of an agrowth strategy compared with those of growth, degrowth and zero growth strategies”



Van den Bergh (2015) has these notes to **Figure 18**:

“Notes: This shows the counterproductive effect of a constraint of minimal (low or high) GDP growth in terms of social welfare over time; similar counterproductive effects of zero-growth and two degrowth strategies are illustrated as well; only agrowth, which involves no constraint on social welfare search, is able to reach the high level of social welfare in each period. The arrows representing the growth, degrowth and zero-growth strategies can be seen as due to constraints (not separately shown) that coincide with these arrows.”

Van den Bergh achieves an order in welfare levels of (i) *Degrowth*[1] < *Zero Growth* < *Degrowth* [2] < *Agrowth* and (ii) *High GDP growth* < *Low GDP growth* < *Agrowth*, but this assumes an SWF for which this holds, namely with an optimum at *Agrowth*, which is begging the question (logic: *petitio petiti*).

Without such supreme knowledge, it may also be the case that the overall optimum may be at any other location. Some society at some moment in time might prefer *Degrowth*[2] and then the whole ranking changes. Fortunately for us, Van den Bergh knows what the true SWF is (and presented this at the OECD).

In all likelihood, societies would tend to prefer less extreme positions, but the meaning of the Tinbergen & Huetting (1991) paper is that societies currently are misinformed, so that societies may not really know what they want. Their approach is to provide society with the relevant information. This differs from Van den Bergh's approach of presenting as truths what are only his own assumptions.

Overall, Van den Bergh's figure is convoluted and unconvincing. (The reader is alerted to **Figure 5** for a consistent and relevant exposition.)

By consequence also his exposition on *agrowth* suffers. He still might maintain the verbal exposition though, and drop the attempt at formalisation.

PM. Van den Bergh (2015:7) has this statement that is technically curious. Optimisation of the SWF under a PPF and additional constraints would (under common assumptions) generate shadow prices, and a shadow budget line, so it is curious to suggest that there would be no such prices. Perhaps Van den Bergh wants to do optimisation but also doesn't want an association with neoclassical economics ?

"Finally, one might criticize the figure to be limited for representing a conventional "neoclassical economic" choice problem. However, one should realize that the analogy of the figure is not with utility maximization under a budget constraint (which would assume relative prices for the O and GDP alternatives). Instead, the figure involves a production possibilities frontier, which does not include prices in any way."

35.11.8 Other criticism on GDP

Van den Bergh (2015:9) proceeds with other criticism on GDP, with reference also to "Keynesian and new classical or monetarist" approaches in macro-economics. We may wonder why all this criticism is needed. His website states a position in environmental science and economics: "ICREA Research Professor at Institute of Environmental Science & Technology, Univ. Autònoma de Barcelona. Also Honorary Professor of Environmental & Resource Economics in School of Economics & Business and Institute for Environmental Studies, VU University Amsterdam (VUA)." Thus, when Tinbergen & Huetting (1991) have a proposal relevant for environmental economics, namely *eSNI*, then one supposes that this would be relevant for Van den Bergh. Since they have mentioned the relevant criticism why GDP needs a compensating figure on *eSNI*, then there does not seem to be any need for Van den Bergh to provide all kinds of other criticism w.r.t. GDP, and it would seem to be fitting for his job description to explain to others

about the properties of eSNI. Van den Bergh might help out in resolving the misunderstandings by his fellow researchers at IVM at VU about the Alleingang scenario and his Ph.D. student Rutger Hoekstra about uncritically referring to Van den Bergh (2005). However, we see none of this, and we see Van den Bergh collecting and creating ever more criticism about GDP, even though we already have established the no-brainer in the early 1900s that $SWF \neq NI$. Perhaps it is seductive to gain popularity in circles who want to hear ever more criticism about GDP. Really, I do not understand why a professor in environmental economics does not focus on environmental economics, and ventures amateurishly in other avenues like macro-economics only for the pleasure of giving another kick to a dead horse.

35.11.9 False trade-offs

Van den Bergh (2015:10) returns to the challenge of climate change:

“These represent two important reasons to believe that under serious climate policy the rate of economic growth will fall. By ignoring growth effects, an agrowth strategy will facilitate the acceptance of such, urgently needed, climate policy. Note that agrowth, no longer worrying about GDP changes, will not itself be the solution, but it will help to improve the social and political feasibility of solutions. It will remove false trade-offs between GDP growth and other goals by removing the constraint of (priority for) GDP growth.”

Thus: “no longer worrying about GDP changes, will not itself be *the solution*, but it will help to improve the social and political *feasibility* of solutions” ?

Thus, for example, if consumers are confronted with a (rise in) carbon tax, then this may generate *the solution* of lower emissions of CO₂, and this carbon tax will become socially and politically *feasible* because politicians and consumers have stopped worrying about the effect of the carbon tax on GDP ? Really ?

Obviously, we need not doubt this, since Van den Bergh with his figure 1 has shown us that agrowth (stop worrying about GDP) is socially optimal. And now it appears that this agrowth also overlaps with the objectives on climate change that come with low or zero GDP growth (though figure 1 suggested a difference).

A critical reader may think otherwise. Consumers tend to worry about their disposable income. Politicians tend to worry about voters. A carbon tax is relevant for this causal process. GDP growth has little relevance in this process. GDP growth has a role in *standard analyses* on income, consumer satisfaction and voter behaviour in the political business cycle. Introducing a carbon tax is not standard. Van den Bergh mixes up the political business cycle of “business as usual” (BAU) with the structural changes required by Climate Change.

The challenge to the environment requires informing people about the true state of the economy, the precautionary principle and future generations. This includes information about GDP and its growth. Providing this information boils down to explaining economics as well.

I get the impression that Van den Bergh might want to do the same, but he invents the label “agrowth” apparently to package his message, but also overlooking that it is either plain old welfare economics or unscientific

management of preferences. Perhaps he indeed has developed some convoluted way of thinking that indeed requires a new name. Nevertheless, it would seem to be clear that the introduction of a carbon tax is not necessarily made more *feasible* when consumers, voters and politicians “stop worrying about GDP”, since voters would still worry about their own income and politicians would worry about such voters.

35.11.10 *Green or sustainable growth*

Van den Bergh (2015:11) discusses “green growth (or sustainable growth, the more common term in the 1990s)”. Section 7.17 discussed “green growth” too, and showed that CBS Statistics Netherlands recently adopted this approach, without referring to the work by Hueting.

In 2007, Hueting started using the term “environmentally sustainable” but used this for the level of national income, and not for growth. When $e\text{SNI} = e\text{GDP}$ grows then this would not necessarily be green growth, since we look at the distance $e\Delta = \text{GDP} - e\text{GDP}$. In Hueting’s view there can only be environmentally sustainable growth of GDP if $e\Delta = 0$. This is still called “production growth” and not “economic growth”, see Chapter 17.²⁸²

Van den Bergh (2015:11) is critical (in his own words: cynical) about the prospects of the OECD “green growth” approach:

“In view of the foregoing arguments, it is difficult to avoid the cynical conclusion that talking about green growth is merely populist, effectively coming down to giving little weight to environmental and climate risks. This does not deny that many writings on green growth are subtle or even sophisticated, richly garmented with theoretical notions, mathematics and empirical considerations (see, e.g., Hallegatte, 2012). But they do not convince in terms of overall empirical evidence, which should come as no surprise as the history of growth is very far removed from being green. This, of course, does not mean that green growth is impossible, but any claims that green growth is a real option need to build in provisions and uncertainty to reflect a careful and honest scientific approach. Surprisingly, writings on green growth, whether by organizations like the OECD or individual academic researchers, tend to express unconditional bold optimism and virtual certainty that green growth [is] feasible.”

Van den Bergh (2019:64) classifies $e\text{SNI}$ as a “green GDP” and maltreats it. Earlier in 2015 he advises against the approach of “green growth”. Might it be that he confuses “green growth” = “growth of green GDP” ?

The optimism behind green growth seems to derive much from expectations about technology. Hueting is conservative w.r.t. technology because statistics requires the assumption of observed technology of the past. When Van den Bergh is forward-looking then we would expect more clarity by him about the contest between technology and the environmental challenge.

²⁸² Hueting: “Sustainable growth” (without the “environment” prefix) might not be feasible. The production is a physical notion (we namely discuss its real or deflated value), and it is doubtful whether something physical can grow forever at the same rate.

Van den Bergh (2015:11) refers to empirical results, and it is a pity that he does not refer to the empirical results on eSNI, with its implications for “green growth”. Remember that Hueting only wants to provide statistical information with a sound concept of national income. Van den Bergh looks into policy preferences. Still, people would get a clearer idea about their preferences when they also receive better information, which Van den Bergh apparently does not want to provide them with. (See Chapter 8 on a structural equivalence when modeling information and preferences.)

Van den Bergh (2015-12-13) mentions discussions with proponents of “degrowth”. Apparently some members of this group have such preferences that they do not mind to reverse the causality, namely first reduce GDP and only then look what happens with the environment. While this degrowth group might have convoluted logic, it may not help them to have a discussion with Van den Bergh with his own convoluted logic. Unfortunately, Van den Bergh doesn’t state whether he informed them about eSNI and its more transparent reasoning, and they will likely not get this information from the selected papers that we looked at.

35.11.11 *Why is an agrowth strategy preferable?*

Van den Bergh (2015:14) poses and answers the question: “*Why is an agrowth strategy preferable?*” This discussion does not enlighten us on the ambiguity discussed in Section (7).

This discussion in the paper need not be a political position but merely a scientific advice to politicians, to improve in consistency and economic sense. What Van den Bergh calls an “agrowth strategy” has the outward appearance of common economics, namely not to use GDP growth as a proxy where it fails as a proxy. In that case, politicians are advised to better listen to (good) economists. However, it may be doubtful whether he regards agrowth as economics only, see Section (7).

Van den Bergh (2015:14) repeats the rejection of “green growth” as it still has *growth* as the target value, even under the constraint of the environment. He would rather see a target on the environment and other social goals, and forget about worrying about growth.

All this is too simple. The standard economic model optimises the SWF and not income, because, as the no-brainer, income should not be confused with welfare. In multi-criteria analysis (as commonly used in Operations Research) there may be different criteria or targets, but one cannot avoid trade-offs. Thus the distinction between common economics and “green growth” might very well disappear when both approaches use both the SWF and the “green” constraints on the environment. If agrowth = (welfare) economics, then this would fit the fold, and there would be no reason for criticism.

If agrowth = social action towards preference indifference on (production) growth, then we must await whether such social action has any success. Perhaps though we might assume an special agSWF that imposes indifference on growth (if that were possible; likely any production level would do too) ?

As long as Van den Bergh doesn’t specify his model, then this is an exercise in verbiage. However, in this paper in 2015 he claims to know that the SWF is “agrowth” and in 2019 that the SWF is at a plateau w.r.t. GDP (zero growth), so

with all this supreme knowledge he apparently does not feel a need to specify the model.

35.11.12 *Feasibility and macro-economics*

Van den Bergh (2015:14-15) discusses whether it is feasible that politicians and policy makers adopt “agrowth”. Given the ambiguity, see Section (7), it might be adopted by different groups for different reasons, who then may wonder whether other groups adopted the true agrowth. He observes:

“My personal experience is that particularly many macroeconomists show an almost instinctive, unconditional loyalty to the GDP and tend to dislike criticism of it. Perhaps GDP information is so central to their education and empirical studies that it is emotionally difficult to distance themselves from it. This would suggest that growth economics is not free from ideology and that unprejudiced analysis is very difficult. This is supported by the fact that most other economists (and non-economists) seem to be less upset about GDP criticism or proposals to relax about growth. Perhaps then such less indoctrinated economists should play a more important role in relevant public decision-making and debates on growth, which are currently dominated by growth-indoctrinated economists.”

Remarkably, Van den Bergh (2015:9) discussed macro-economics, and now he confesses that he should have properly studied it. With proper study he could understand why the growth of production (falsely called “economic growth”) plays such a role in macro-economics. With this better understanding of macro-economics he might also better appreciate that the main bottleneck here is the terminology, see Chapter 17 on the term “economic growth”.

Nevertheless, had Van den Bergh properly studied Hueting’s work, and provided support for Hueting’s correspondence with CPB, see Appendix 52, then this might still have made a difference, in the situation overall, and for this correspondence.

In 2005 Van den Bergh proposed to “abolish GDP” and now he wants to “reduce attention to GDP”, which is clearly at odds with macro-economics. Hueting has GDP, eGDP and $e\Delta = \text{GDP} - \text{eGDP}$, which are clearly macro-economic variables. Thus macro-economists could be interested, with a proper distinction between CPB for planning and CBS for recording the outcomes.

35.11.13 *Indicators complementary or alternative to GDP*

Van den Bergh (2015:15-16) discusses indicators that are “complementary or alternative to GDP”, and remarkably doesn’t mention the Tinbergen & Hueting (1991) suggestion, even though the paper is in his list of references (only for its criticism on GDP). One can only be perplex.

Remarkably, he also speaks about “GDP information” without the possible distinction between (i) GDP as national income, (ii) GDP as a factor in welfare, and (iii) GDP as a (no-brainer-wrong) indicator of full welfare. With his term of “GDP information”, GDP might easily be complemented by $\text{eGDP} = \text{eSNI}$.

PM. Tinbergen & Hueting (1991) write about Net National Income = NNI and their alternative indicator can be called eNNI (name) or eSNNI (abbreviation).

There is no reason to assume that Van den Bergh would not be able to see the link between NNI and GDP. We have diagnosed already that he is weak on national income accounting but it would lead too far to consider even this.

35.11.14 His 2015 conclusion

(a) When we substitute “agrowth” = “economics” then Van den Bergh (2015)’s conclusion reads as an open door. Van den Bergh (2015:17) even admits that he is merely using a new word for something that is already well-known, see the term “perfectly in line”. However, given the personal communication on April 19 2019 about this statement in 2015, we arrived at the diagnosis that this perfection meets with ambiguity, see Section (7).

“In other words, agrowth is perfectly in line with theoretical welfare economics and empirical happiness (subjective well-being) research: it reflects a real welfare approach.”

(b) Van den Bergh (2015:17)’s conclusion has been shown to be false:

“It was shown in the theoretical diagram of Figure 1 that agrowth is able to reach a higher level of social welfare than growth and degrowth strategies, simply because it does not impose any ex ante constraint on GDP or its growth.”

(c) Van den Bergh (2015:17) is deficient in macro-economics. Though I do not regard myself as “pro-growth”, rather agnostic, I still presented an approach to improve economic stability, see Colignatus (2000a, 2011), and my position is counter to Van den Bergh:

“No single macroeconomic school adhering to the pro-growth view has offered a structural solution for this problem. (...) However, economics as a discipline has turned out to be a slow learner, which is due to having employed a narrow-minded, unscientific pro-growth dogma.”

(d) Van den Bergh (2015:17) has a statement that makes it even more mysterious why he does not properly study the Tinbergen & Hueting (1991) approach. We can observe a loss of 28 years w.r.t. the meeting of minds and providing analysis and policy advice, see also the CPB (1992) long term study 1990-2015:

“It is easy to talk about green growth if one thinks about environmental challenges only superficially and optimistically. One should recognize the huge, unprecedented ambitions needed to avoid dangerous climate change: namely, reducing the average carbon intensity of output (GDP) with more than 80%, net of all energy rebound and carbon leakage effects. One should further realize it is very likely that stringent climate policies associated with this ambition will severely limit the growth of carbon-intensive, technology-intensive sectors which tend to be relatively productive. This can then easily translate in a reduction of the growth rate of the economy as a whole. At worst, a green growth view reflects that biodiversity loss, dangerous climate change and a range of other environmental challenges are simply not taken seriously. In this case

green growth is merely paying lip-service to the environment. I wish it was not true, but I fear this is exactly what is behind many declarations in favor of green growth.”

(e) Van den Bergh (2015:18)’s closing statement again is an open door, which becomes clear when we substitute “agrowth” = “(welfare) economics”, and he only paraphrases economists like Hueting in 1970 though without the convincing power of Hueting & Tinbergen (1991). Earlier he said that his view was very unorthodox, and this makes sense when agrowth is simply (welfare) economics, so that the revolution that he speaks about would be for politicians and social activists to accept the impartiality of scientific advice:

“Of course, the change in mindset underlying an agrowth strategy, removing the GDP growth constraint from our search for a better future, may be seen as a radical, even revolutionary, change. The motivation for it is simple and strong though: deliberate agnosticism about growth is a rational response to the GDP information failure. Agrowth provides a third alternative next to unconditional pro- and anti-growth that deserves to be further explored and developed.”

However, given the personal communication on April 19 2019 about this statement in 2015, we must infer that he doesn’t intend that “agrowth” = “(welfare) economics”, even though it walks and quacks like it. If he means social activism at changing people’s preferences, then it might be radical, even revolutionary indeed, depending upon the view of other activists, though then it becomes unclear why he also called it unorthodox. In the personal communication on April 19 2019 he also rejects this social activism targeted at making people feel indifferent about production growth. See Section (7) for his choice for an unclarified third position, that thus must be both radical, even revolutionary, and still unorthodox too. My best understanding of this third position is one of total confusion.

35.12 Modeling 1996

Van den Bergh & Hofkes (1996) at IVM do a survey of economic modeling of sustainable development, and refer to Keuning (1993) on NAMEA. Since the NAMEA has been created jointly with Hueting, perhaps Hueting should have been the co-author here. However, Keuning (1993) misrepresents eSNI, and potentially this might have affected the view by Van den Bergh & Hofkes. Remarkably, though, when IVM after 1996 got the subsidy to calculate eSNI, they did not take a model from this survey, and extended the Keller model with the environment. Obviously a forecast of future development (with dynamics) differs from the statistical exercise on the past (with comparative statics).

35.13 Van den Bergh as editor at Edward Elgar

Van den Bergh (ed) (1999), “*Handbook of Environmental and Resource Economics*”,²⁸³ does not contain a chapter by Hueting. At this time, IVM did not have their calculations yet, but the reproduction of Tinbergen & Hueting (1991) would have been a good option. In my view, see this entire book, this is a crucial

²⁸³ <https://econpapers.repec.org/bookchap/elgeebook/801.htm>

article, yet Van den Bergh as editor of this *Handbook* might think differently. In his review introduction, Van den Bergh (1999:24) explains: "Other topics have been omitted. I will mention some of them, and make a few reading suggestions. First, institutions and property rights are not discussed in a separate chapter here (see Bromley, 1991 and 1997). Green GDP has not received much attention either (see Chapter 49), although a related topic on natural resource accounting is discussed in Chapter 77 (see Aronsson et al., 1997; Daly and Cobb, 1989; and Hueting et al. 1992). (...and more topics)" [here 1992d, the methodology] Curiously he sees "valuation of ecosystems" as a separate topic.

Van den Bergh was also Series Editor ("*Advances in ecological economics*") for El Serafy (2013). Its discussion here shows that much deconstruction is required to clarify what El Serafy really says. An editor could have been stricter on clarity. Perhaps Van den Bergh missed this because the discussion concerns national accounting. Perhaps he was happy that El Serafy at his age at least stated his mind.

35.14 Abolishing GNP, in ESB 2005

This is the crucial article that had such a negative impact, see Section 21.11.1. See Section 35.16 for the correspondence between Hueting and Van den Bergh on a draft of this article. I haven't seen this draft and thus do not know whether it contained the paragraphs that we will discuss here. I doubt that they did, because then the correspondence likely would have been different.

(a) Van den Bergh (2005:504) (the published ESB article) states:

"A correct economic welfare approach only regards changes as progress if they are accompanied by a sustainable use of the environment and nature. Hueting (1974) realized this early on and his elaboration of a social welfare measure is based on precisely this insight."²⁸⁴

This is massively imprecise and misrepresentative. Errors are:

- (1) It is false that "a correct economic welfare approach only regards changes as progress if they are accompanied by a sustainable use of the environment and nature." This is only a possible assumption.
- (2) Hueting never presented a social welfare measure (or an "elaboration" of one). Hueting always explained that welfare differs from income, and that NI may be only a factor in welfare.
- (3) Hueting (1986b) and not Hueting (1974a, 1980) gave eSNI, which is a measure of income and not of social welfare.
- (4) Hueting did not "realize" in 1974 what Van den Bergh attributes to him.

(PM. In 1974 "sustainability" referred to the OECD goal on income that did not include the environment, see Section 7.14. The word "sustainable" or its variants does not occur in New Scarcity. Hueting refers to future generations though. Hueting (1980:ix-x) states: "The central idea of this study is as

²⁸⁴ Dutch: "Een correcte economische welvaartsbenadering bestempelt veranderingen pas als vooruitgang, indien ze gepaard gaan met een duurzaam gebruik van milieu en natuur. Hueting (1974) heeft dit reeds vroeg ingezien en zijn uitwerking van een maatschappelijke welvaartsmaat is gebaseerd op precies dit inzicht."

follows. Economic theory does not call for continuing growth of production. Economic growth can mean nothing more than an increase in welfare. This depends not only on goods and services produced but also on environmental goods that have become scarce.” Thus when the OECD emphasis “sustainable production” then Hueting *by implication* only refers to “sustainable welfare”, with a role for the environment, but he does not use such terminology.)

- (5) Hueting since 1986 explains the relation between welfare and environmental sustainability by *conditionality* in the assumptions. He does not merely select one particular point of view (though at one moment he suggested that the Brundtland criterion could be seen as an expression of absolute preference).

NB. Pen et al. (2006) discuss Van den Bergh (2005), and there is no correction of these errors. In the correspondence with Hueting, Hueting (then 75 years of age) might feel intimidated, and writes to Van den Bergh (p20):

“I understand that you do not appreciate it when I respond to your article in a positive manner, not even to protect you against – in particular to in my opinion justified – criticism. Okay.” ²⁸⁵

- (b) Van den Bergh (2005:504) states:

“GNP can therefore be seen as an abstraction invented by people without direct physical significance. In other words, the GNP concept is active in the domain of perceptions, theories and idealism. Only through this way does it affect the real economy.” ²⁸⁶

This is the point of view that an “average length of 100 people” would not really exist if none of those 100 people has precisely that length. This is a discussion about the methodology of economic modeling and not about GNP itself.

The reasoning runs counter to macro-economics. NI is a macro-economic variable, and it is a key insight in macro-economics that such variables may matter. Keynes had $C = c Y + c_0$. Obviously there is the micro-macro discussion, basically about conditions, when macro-economics can do without the details of micro-economics, or when micro-economics can model the (macro-) feedbacks without such aggregates. This micro-macro discussion indeed indicates that, while economic modeling might have more details, human understanding of aggregate developments still is served by aggregate variables. This however does not preclude the usefulness of a model with aggregates that assumes that they “exist”.

In the correspondence, Hueting stated that GNP is a physical quantity, given that we (obviously) look at the volume or deflated value. It doesn't seem though that this discussion is truly about the physicality of GNP. It rather concerns the methodology of economic modeling.

²⁸⁵ Dutch: “Ik begrijp dat je het niet op prijs stelt wanneer ik in positieve zetting op je artikel reageer, ook niet om je te beschermen tegen – m.i. terecht – kritiek. Okay.”

²⁸⁶ Dutch: “Het bnp kan dus worden gezien als een door mensen uitgevonden abstractie zonder directe fysieke betekenis. Ofwel, het bnp-concept is actief in het domein van percepties, theorieën en idealisme. Uitsluitend via deze weg beïnvloedt het de reële economie.”

It remains true that there indeed is an impact via the wrong label “economic growth”, see Chapter 17.

(c) Van den Bergh (2005:505) correctly mentions that the current discussion about environmental policy (climate change) is often framed in terms of a trade-off with “economic growth”, while the latter only is production growth, and future generations will tend to, at least in optimistic expectation on technology, be richer in the production level anyway. He suggests that other factors in welfare will be more important than income (production), because of diminishing marginal utility. This repeats points in the known discussion.

In sum: In Section 21.11.1 the negative impact followed the misrepresentation in (a), and in particular that eSNI would be an (encompassing) social welfare measure. But there was also reference to an article of 2006 (actually 2007).

35.15 Abolishing GDP 2007

This concerns Van den Bergh (2007), the English version “Abolishing GDP”. Potentially this is also the longer version than the abridged ESB version of 2005. Its abstract is:

“Expectations and information about the growth of GDP per capita have a large influence on decisions made by private and public economic agents. It will be argued here that GDP (per capita) is far from a robust indicator of social welfare, and that its use as such must be regarded as a serious form of market and government failure. This article presents an update on the most important criticisms of GDP as an indicator of social welfare and economic progress. It further examines the nature and extent of the impact of GDP information on the economy, revisits the customary arguments in favour of the GDP indicator, and critically evaluates proposed alternatives to GDP. The main conclusion is that it is rational to dismiss GDP as an indicator to monitor economic progress and to guide public policy. As is clarified, this conclusion does not imply a plea against growth, innovation or national accounting.”

(a) This paper thus repeats the no-brainer mantra that $NI \neq SWF$ (though $SWF^*[y]$ and NI can be tangent, see Section 7.2). It raises the question why a professor on environmental economics would want to kick in an open door and bury a useful indicator on the environment like eSNI.

(b) The 2007 paper has properties that we already saw above for 2015, which suggests that 2015 rewrites 2007.

- He refers for eSNI to Hueting (1974a) and (1996) that do not discuss eSNI.
- Van den Bergh refers to Gerlagh et al. (2002) and Hofkes et al. (2004) for information about eSNI, who misrepresent eSNI with the Alleingang scenario.
- He refers to Tinbergen & Hueting (1991, 1992) but only for criticism on GDP, and he doesn't refer to them for eSNI.

(c) Van den Bergh (2007:14) appears to be aware of the relevance of the development of $e\Delta = NI - eSNI$ over time, but apparently he is not aware that this gap is the very reason to construct eSNI, and gives its essential message:

“Differential time patterns for SNI and GDP would be of more interest. (...) Nevertheless, the gap between NNI and SNI remains considerable.”

(d) Van den Bergh (2007:9) rephrases the massively wrong statement of 2005:

“A correct economic welfare approach would only characterize changes as real progress (welfare improvement) if they are accompanied by a sustainable use of environment and nature. Hueting (1974) already recognized this early on, and his elaboration of a measure of a green or sustainable income is based exactly on this insight (Gerlagh et al., 2002).”

See Section 35.14 for its deconstruction. In addition to the points mentioned above: Gerlagh et al. (2002) do not explain this history of ideas from 1974 to 1986 in such terms. Van den Bergh in 2007 shows great trust in his colleagues at IVM while he could have known about Hueting’s criticism about their misrepresentation on the Alleingang scenario.

(e) Van den Bergh (2007:13-14) is incorrect since he only refers to 1974a (in Dutch) and doesn’t refer to a paper by Hueting that presents eSNI (in English), and uncritically refers to Gerlagh et al. (2002):

“Recalculation of a GDP with externalities ‘internalized’ is not a simple matter, as it implies a completely different set of prices in the economy. It is not surprising, then, that there have been few empirical exercises aimed at calculating a green or sustainable income. The best known of these is Hueting’s Sustainable National Income (SNI), which has been developed for the Netherlands (Gerlagh et al., 2002). It is based on the conceptual work by Hueting (1974) and can be seen to reflect the basic notion of ‘sustainable income’, as expressed by Hicks (1948). The SNI approach uses a general equilibrium model that calculates the impact on national income of imposing sustainability constraints for the nine most important environmental themes (for the Netherlands): (...)”

(f) In one sentence, Van den Bergh (2007:15) (i) expresses the no-brainer mantra $NI \neq SWF$, (ii) misrepresents eSNI as if Hueting has proposed $eSNI = SWF$, and (iii) infers that eSNI also fails (perhaps also because $eSNI \neq SWF$):

“Comparing the aforementioned alternative indicators of social welfare in light of the main points of criticism of GDP as noted in Section 2, it turns out that, at present, there is no perfect alternative available.”

(g) This apparently would be (similar to) the statement that Hoekstra also abused to drop eSNI from the MDN 2009, see Section 21.11.1. Van den Bergh refers to sensitivity and arbitrariness of the environmental standards, without any evaluation what would be wrong. He propounds about sustainability, without any empirical definition. That eSNI has a focus on the environment is only a

“disadvantage” because Van den Bergh himself wants to include other variables, because he wants a SWF that includes all, which is practically impossible, especially when you must prove that it *really* gives welfare.

“Comparing SNI [eSNI] with ISEW (and GPI), it becomes clear that the first has the advantage of taking into account general equilibrium effects of corrections, but the disadvantage of restricting itself to environmental and natural resource issues. ISEW and GPI correct for a much wider array of GDP imperfections, even though in a partial manner that is likely to involve mutually inconsistent corrections. Furthermore, the SNI results are sensitive to the exact specification of the sustainability condition for each environmental theme, since the marginal abatement costs are sharply rising for low values of pollution or resource use. It is, however, fair to say that the arbitrariness of sustainability conditions also affects the ISEW value, but in a less extreme way.”

(h) Thus, after misrepresenting eSNI, it can also be burked and discarded.

For a welfare economist, the following is a non-sequitur. The SWF is a theoretical notion, and practical measurement meets with huge difficulties. Instead, because of its practical properties, eSNI is highly relevant. eSNI has not been presented as a SWF and it is a misrepresentation to reject it as a SWF (like divorcing someone you are not married with). It is curious to infer, with the following “reasoning”, that a SWF must be rooted in happiness and subjective well-being: utility already has been defined as subjective, and the new research on happiness can best be seen as a revival of thinking about utility. (It would be curious to speak about objective well-being.)

“In conclusion, an ideal indicator of social welfare is not available. This would require an approach that takes its starting point in the findings of research on happiness and subjective well-being.”

In sum: I look at this now for the first time in 2019 and find Van den Bergh’s paper(s) difficult reading because of the convoluted terminology and reasoning. There is a clear lack of competence in welfare economics, macro-economics and national accounting. It is shocking that Van den Bergh doesn’t properly study his topic before propounding upon it.

35.16 Correspondence with Hueting 2005

In 2005 Van den Bergh sent the draft of his paper on abolishing GNP to Hueting and kindly requested his comments. This resulted into a correspondence.²⁸⁷

Hueting’s first reply is on September 18, the paper appeared in ESB on November 18, and the correspondence closes after November 20. Hueting gave Van den Bergh copies of “New Scarcity” (1974a, 1980) and Van Ierland et al. (2001). In the papers that I have seen Van den Bergh never refers to Hueting & De Boer (2001b) in that volume, though it essentially reviews eSNI.

²⁸⁷ <http://www.sni-hueting.info/NL/2005-Discussie-RH-JvdB.pdf>

The draft paper had already been submitted to ESB and the correspondence may have had little effect on the published text.

PM. In the correspondence, Hueting writes to Van den Bergh on page 13 that Van den Bergh is the first fellow economist who responds to his approach on assumptions on preferences. This is incorrect, see e.g. Van Ierland et al. (2001) and Colignatus (2001b), here Chapter 3. Also, Van den Bergh apparently doesn't understand the conditionality of the assumptions.

In the correspondence page 20 (on November 20 2005), Hueting clearly points to his main target of the development over time of $e\Delta = NI - eSNI$. One wonders why he did not state this at the very beginning. However, a large part of the correspondence concerns Van den Bergh's no-brainer mantra that $NI \neq SWF$ (apart of the special tangency), thus about whether NI or eSNI are indicators of welfare or mere factors of welfare, and whether such a factor may work out positively or negatively. It only becomes an issue of discussion and confusion because Van den Bergh does not clearly state that it is a no-brainer.

While Hueting confirms that $NI \neq SWF$, he doesn't state that this is a no-brainer. He also confirms to Van den Bergh that it cannot be explained enough.

Hueting is aware of the risk that Van den Bergh, with a wish to get a SWF, uses $NI \neq SWF$ to also bury $eSNI \neq SWF$. Indeed, what Van den Bergh does would be an irrational thing to do, for any welfare economist, and certainly for a professor in environmental economics, yet Van den Bergh does it.

It is only on page 15, when Van den Bergh asks about the relation of eSNI to NI and the SWF, and page 16, when Hueting replies on 2005-11-13, when we see Hueting explaining the no-brainer that he does not present eSNI as a SWF:

"[JvdB] In response to what you write about eSNI and GNP above on page 9 under [3]: well, I have to acknowledge (again) that a number of objections I have against GNP are also objections to eSNI, because eSNI directly follows GNP in a number of respects. So the question is actually up to you: if you support my general criticisms, how do you assess your own eSNI?"

"[RH] "(...) Ergo, eSNI is certainly not a social welfare measure as you write at the top of page 4 of the shortened version (because you have to mean eSNI). Just like production, unemployment etc. are no social welfare measures. eSNI is one of the indicators that affect welfare, in a positive or negative sense."

One would think that this should be enough for Van den Bergh to stop misrepresenting eSNI as a SWF. However, we have seen that he continues doing so in 2005-2019. This observation has been repeated in Section 35.2.

PM. In a later statement, see below, Hueting translates "eSNI is an indicator that affects welfare" into "eSNI is a partial indicator of welfare". "Factor" might be better.

Van den Bergh's main statement is on page 16. Since Van den Bergh looks for a SWF, and with $NI \neq SWF$ (encouraged by Hueting), Van den Bergh also arrives at

eSNI \neq SWF, so that he starts rejecting eSNI as an interesting avenue, at least for his quest for a SWF. In a way this step in the reasoning is rational, but the overall reasoning is irrational, because Van den Bergh presumes that he will be able to find such a SWF, while welfare theory has pointed to a great number of pitfalls. Hueting responds in the same way. It is also curious that he doesn't even accept eSNI as one of the factors that affect welfare.

The correspondence at this point is on page 16 (2005-11-13). A part has already been quoted in Section 35.1 above. The layout of the email exchange is somewhat problematic. The translation is mine:

Quote

[JvdB] To be honest [a dubious expression / TC], by writing this piece I have reached a point where I believe that correcting GNP may not be the way to arrive at a meaningful social welfare indicator.

[RH] But that road [towards a meaningful SWF /TC] does not exist because constructing a single indicator for the course of welfare is impossible. I consider attempts to bring the factors that influence welfare in a positive or negative sense to be extremely undesirable; among other things because welfare cannot be measured cardinally, subjective weights must be assigned, see for a parallel the article by Lucas and me in E.E. October 2004: those broad sustainability indicators are fraudulent things that obscure pure information about environmental sustainability.

[JvdB] The only reason I could think of choosing this path is purely pragmatic, based on two 'stylized facts': we never lose GNP (compare it with knowledge to make atomic weapons), and the GNP methodology has been implemented consistently throughout the world.

[RH] For comment, see my postscript.

[JvdB] But of course I did not write this article to resign myself to this state of affairs. So such pragmatics is not for me.

[RH] Very well ! [A curious statement, as eSNI is practical / TC]

[JvdB] I consider determining a green or sustainable national income to be somewhat relevant, though not as a way to arrive at a definitive welfare indicator,

[RH] Because that is impossible on the basis of arguments published by others and me. Sometimes I conclude from your texts that you agree with this and sometimes that you think that such an indicator could exist. This is a point that seems to be easily resolved.

Question: would you like to give a statement on this?

[JvdB] but to make it clear that we wrongly account that we would be rich, while the environment and nature are being affected structurally.

Unquote

Van den Bergh at first is not really explicit on the issue whether it is impossible to construct a SWF. Subsequently, w.r.t. a phone call of November 20, Hueting records:

I am glad that we agree that a comprehensive welfare indicator cannot be constructed. But what about two of the partial indicators, NI (for production) and eSNI (for sustainability)?"

Van den Bergh does not provide this clarity.

In 2019, his "agrowth" position (with the ambiguity in Section 35.3), that it is advisable to use more indicators, suggests that he has accepted that it would be a *tour de force* to try to create a SWF. However, the "agnosticism" with respect to GDP apparently transfers to eGDP.

In 2005, Hueting in his "naschrift" (epilogue) (p19) observes that Van den Bergh does not express support for eSNI and will not publish such support. I haven't found a text yet where Van den Bergh expresses support for eSNI indeed.

In this correspondence, Van den Bergh's final statement (no date) is, which makes us wonder why he is looking for an (objective ?) SWF when he accepts that such would be impractical to make:

"Thanks for this response. We really don't disagree. I do not believe – just like you apparently – that a definitive social welfare indicator can be constructed. We therefore cannot avoid working with a number of indicators – perhaps linked to my categorization of criticism of GDP as a measure of welfare. Unfortunately, the aggregation / weighting of these indicators is subjective."

35.17 In Nature Climate Change 2017a

See my comment about this article in Section 35.7 above. The abstract of Van den Bergh (2017a) is:

"Climate change has revived debates around the concept of limits to growth, 45 years after it was first proposed. Many citizens, scientists and politicians fear that stringent climate policy will harm economic growth. Some are anti-growth, whereas others believe green growth is compatible with a transition to a low-carbon economy. As the window to curb warming at 2 °C closes, this debate will intensify. This Review critically reflects on both positions, providing an overview of existing literature on the growth versus climate debate. Both positions are argued here to jeopardize environmental or social goals. A third position, labelled an 'agrowth' strategy, is proposed to depolarize the debate and reduce resistance to climate policies."

As stated: (i) This article claims to provide a review of the literature, but it doesn't mention the approach by Tinbergen & Hueting. The article claims to present a "review" but is a vehicle for the promotion of this misconception of this "agrowth". In addition to this: (ii) The article adopts the term "economic growth" instead of showing that it is a wrong label. In this manner, it creates a false discussion space of growth versus degrowth. Apparently this false discussion space is only required because otherwise there is no reason for a "third option". If Van den Bergh would have provided clarity, following Tinbergen & Hueting, then he would have no need for mentioning this "agrowth".

36. *Kate Raworth's doughnut 2012*

Raworth's website states: "She holds a first class BA in Politics, Philosophy and Economics, and an MSc in Economics for Development, both from Oxford University. She is a member of the Club of Rome and serves on several advisory boards, including the Stockholm School of Economics' Global Challenges programme, the University of Surrey's Centre for the Understanding of Sustainable Prosperity, and Oxford University's Environmental Change Institute."

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Schokkaert (2019) is a review of Raworth's book on "doughnut economics". I am not going to read that book since its summaries and the discussions about it already indicate what Schokkaert (2019) clarifies too: (i) that Raworth, while discussing economics, still has mainly a moral story and no econometric modeling, (ii) that her putting down of mainstream economic thinking is counterproductive since it is economics itself that brings clarification, exemplified here by the work by Tinbergen & Hueting (1991).

We may be dismayed that Raworth apparently doesn't refer to Tinbergen & Hueting (1991) and related work by Hueting. It is counterproductive for science when precursors in a field are not referred to. Apparently Raworth has few scientific but mainly moral intentions. Apparently she presents as new what already is quite common knowledge in a general sense,²⁸⁹ while the true problem for economists lies in the details of both theory and econometric modeling (for which she apparently has no contribution, and would rely upon the "planetary boundaries", see elsewhere). This moral crusading can be counterproductive to science, since it draws away attention from the actual contribution to economic science by the Tinbergen & Hueting (1991) approach.

The icon of the doughnut is only a visual gimmick. There are no measurement units on the doughnut. Ecological restrictions and social justice (SWF) would be two dimensions (2D), and those are conventionally modeled differently. Potentially it might be feasible to transform the conventional 2D presentation into the shape of a 2D doughnut (or project into a doughnut that is evenly wide around) but it is not clear why you would want to do so, and what would be so clarifying about the doughnut icon itself. The doughnut can be cut in rays of different dimensions like a spider web and then is basically a spider web.

It might actually be a deceiving format. Raworth suggests that there would still be freedom of choice with respect to the ecological restrictions, but the analysis by Tinbergen & Hueting (1991) indicates that those restrictions are already overshot, whence the true situation would be a negative doughnut, that is, if one would regard the doughnut icon as informationally useful.

Best would be that Raworth first discusses the book by Hueting & De Boer (2019b) and considers retracting her book, before more is said about it.

Schokkaert (2019) also refers to the problem of social decision making, and readers then are referred to Colignatus (2000a, 2011) (DRGTPE).

²⁸⁸ <https://www.kateraworth.com/about/>

²⁸⁹ For Dutch readers: http://www.deleunstoel.nl/home.php?artikel_id=5717

37. *Wouter van Dieren at the Club of Rome 1995*

37.1 *Introduction 1972*

Holland is known for its wooden shoes. When you are milking cows in a soggy meadow then wooden shoes keep out the dampness and water much better than leather, while stuffing the shoes with hay make for a comfortable fit. When there is a nasty surprise, then the Dutch language provides for the important saying “now my wooden shoe breaks”.

Presently, my wooden shoe breaks when discovering what social-psychologist Wouter van Dieren has been doing with the Club of Rome.

It is commonly recognised that Van Dieren (born 1941) in 1972 “played a major role in promoting” the Meadows et al. (1972) “Limits to growth” report.²⁹⁰ Quite likely the time for this report was ripe and Van Dieren overstates his role.²⁹¹ He clarifies that he did not conform with the wishes of the Club of Rome about the publication strategy, even suggesting that the events took their own momentum outside of his own power:

“Aurelio [Peccei] responded negatively to our propositions about launching the story in full. Although he and Alexander King had deep worries about the predicament of mankind, and their choices were revolutionary, they also wanted to keep the course of a proper scientific publication, due for 1972. (...) Yet, the drama began to create the planned noise, and we decided to set the trip to fame into motion.”

For NRC Handelsblad 30 januari 2006 Cees Banning and Arjen Schreuder mention that Van Dieren eventually became a member of the Club of Rome in 1990, but against opposition about what he had done here, quoting Frits Böttcher.

²⁹²

37.2 *The book “Taking Nature into Account” 1995*

In 1993-1995, Van Dieren set himself up as editor of the book “*Taking Nature Into Account. A Report to the Club of Rome Toward a Sustainable National Income*”, Springer 1995.²⁹³ The Springer website has this “about” explanation:

“Indicators used to direct economic policy (GDP, national income, etc.) are based on a number of factors but nowhere in their calculation is there an acknowledgement of the degradation of natural resources. The numbers may look good, but continued deterioration of the environment

²⁹⁰ <https://web.archive.org/web/20190220081444/https://www.clubofrome.org/member/wouter-van-dieren/>

²⁹¹ Van Dieren 2015, <https://web.archive.org/web/20190701125933/http://www.heteilandendewereld.nu/how-the-club-of-rome-became-a-world-agenda/> Mark Oltshoorn (Grenoble) 2016 falls for the story (in Dutch): <https://web.archive.org/web/20190824131459/http://www.heteilandendewereld.nu/vijftig-jaar-milieuactivisme/>

²⁹² <https://www.nrc.nl/nieuws/2006/01/30/in-groen-zit-ook-groot-geld-11076300-a797687>

²⁹³ <https://link.springer.com/book/10.1007/978-1-4612-4246-8>

is leading us closer to crises; meanwhile, policymakers and the public are basing decisions on dangerously incomplete information. In *Taking Nature into Account*, a number of the world's leading experts make the ethical, historical, economic, and ecological arguments for including environmental factors when measuring fiscal health. Initiated by the Club of Rome (an international group of influential businesspeople, statesmen, and scientists), and written in cooperation with the World Wide Fund for Nature, the report reviews existing methodologies and makes recommendations for adjusting the way we think about and measure the economy.”

This clearly concerns the subject area studied and developed by Jan Tinbergen (1903-1994) and Roefie Hueting (born 1929). In 1991/92 the issue was essentially solved with the publication of Hueting et al. (1992d), M44, the methodology. It is entirely unclear why Van Dieren as a social psychologist would think that he himself was better suitable to edit such a book than Hueting and fellow economists. Formally anyone can write a book, and formally Van Dieren mentions all people who contributed. However, in terms of science this book is inexcusable as plagiarism-by-the-editor since Van Dieren did not develop those ideas himself, and did not have the training to properly understand and defend them. He only selected interesting results by others, but those others already knew that their work was interesting, otherwise they had not spent time on it. The book page xviii mentions that Reynt-Jan Sloet van Oldruitenborgh²⁹⁴ actually managed that editing team, but Sloet has a background in business economics and not in welfare economics and national accounting either.

The book was basically stillborn. A Google gives only one review and Springer counts 33 citations. The book lacks the scientific quality and coherence from editing by economists who are knowledgeable about this topic of welfare economics and national accounting. Perhaps economists in the world recognised that Van Dieren was no economist and thus were inclined to neglect the volume. As such, this book was a major disaster, because it destroyed the opportunity for Hueting and his fellow economists to write a proper report to the Club of Rome.

37.3 *Awareness about the role by Hueting but almost no chapter*

The 1995 preface clarifies the key role by Hueting, but does not clarify why Hueting himself was not allowed to be editor of the volume:

“This report is about a major necessary correction factor in the world economy: the need to calculate environmental degradation, in the widest sense, within the system of national accounts. Every since the Club of Rome published *Limits to Growth*, we have pleaded for information systems on the world economy that produce correct data, proper figures, and honest predictions. Growth, as we have defined it, is the expansionist activity of ever more production, activities which are formally measured as the gross national product (GNP), the outcome of the accounts. However, economic growth in the formal definition of welfare theory is the

²⁹⁴ <http://www.sloet.com/auteur.htm>

reduction of scarcity. Hence, if production is creating scarcity rather than reducing it, economic growth is negative.

Over time, many economists have pointed at the risk for the future of the world if indeed the use of natural resources is not accounted for as a loss, but on the contrary, as income. Yet, this is today's practice: consumption, abuse, and even depletion of natural resources – the very basis of life – is formally registered as growth and income. To a large extent, the early work of Dr. Roefie Hueting - whose *New Scarcity and Economic Growth* (1974) is a milestone in pointing at the paradoxes of economic theory and daily use - paved the way for a mainstream of economists who now advocate the need for drastic change. In this report, we often refer to Hueting, who is now studying the corrected national income, when we discuss research into the conditions of a sustainable demand-and-supply systems theory.

The editor of this report, Wouter van Dieren, chairman of the Institute for Environment and Systems Analysis, has been largely responsible for the success of the publicity around *Limits to Growth*. Ever since, he has worked as an environmental-economics pioneer, as such publishing *Nature's Price* in 1977 (together with M.G.W. Hummelinck), based partly on the work of Hueting, a book for the World Wildlife Fund (now the World Wide Fund for Nature).

He has invited a range of the best environmental economists around the world to contribute to this report. In the Preface, the specific contributions of each specialist are described.

It is our wish that this strong plea for changing the prime information system of the economy is heard globally.

We have to know the facts. We cannot create a sustainable future if we keep dragging a veil over reality, not only ignoring depletions and the collapse of life support systems, but actually counting this as progress. The limits to growth will then hit us even faster.

Dr. Alexander King"

When asked about all of this, Hueting relates that Van Dieren and his team visited him and that he clarified for a day what the structure and contents of the book should be. However, Van Dieren originally did not give him a chapter in the book. After his protest, Jan Paul van Soest (then director of CE Delft) was asked to at least write about the methodology of eSNI. After three drafts and criticism by Hueting, Van Soest recommended that Hueting became the responsible author. This became chapter 13 in the 1995 book. Hueting clearly had the minimal strategy that the book at least contained a good discussion about eSNI.

37.4 A 1998 review of the book

Adams (1998) is the only review of Van Dieren (ed) (1995) that Google finds. The following quotes are from the online 1997 text.

"It is a frustrating book. Twenty-five well-known environmentalists, mostly economists, are listed in the preface as contributors, with van Dieren described as the editor, but it is frequently unclear who is responsible for

what. This makes life difficult for a reviewer interested in accurate attribution, especially since the editor admits that the contributors sometimes quarreled, and that not all of them "necessarily agree with every conclusion."

In a scientific publication, the editor would have provided for clarity about the opposing views with their substantive argumentation. Frustration would make place for interest in the intellectual challenge, which a reviewer could indicate.

Subsequently, it appears that we already discussed an earlier book by Adams (1995), see Section 5.6. As observed there, Adams is no economist but professor in geography with a focus on transport and expanding onto risk in general. This background may cause doubt at times whether he fully understands an economic argument, or can correct errors by economists. In the 1998 review, Adams quotes economist Paul Ekins, and in the following quote Ekins is at risk confusing income and utility (welfare), but since it is unlikely that Ekins would be confused on this, then it is more likely that Adams has some confusion here: "But earlier, chapter 5 (attributed to Paul Ekins), acknowledges the "difficulty and arbitrariness of attaching money values or appropriate weights" to components of welfare, such as nature, and concludes that "the search for a single index of welfare is misguided." (80)".

In his review in 1998, Adams builds upon his 1995 "Risk" book, see Section 5.6 above. He comments about Van Dieren (ed) (1995):

"The book's main "recommendation" is a call for "the experts to reach a consensus" on a methodology that will capture "value changes of nonproduced natural assets" in order that an "Environmentally-adjusted Domestic Product (EDP)" might be calculated. (294) This appeal is either naive or disingenuous. There is a well-known and insurmountable problem standing in the way of such a consensus: there is, and can be, no uncontentious method of monetary valuation that can cope with environmental losses. The problem has been endlessly, and fruitlessly, debated by economists seeking to resolve environmental controversies with cost-benefit analysis. The conclusion to this debate, which economists have been reluctant to accept, is that there is no objective value of nature waiting to be uncovered by clever measurement techniques."

Adams's conclusion is curious. In his thesis, Hueting (1974, 1980) already rejects WTP and WTA as techniques for the valuation of vital environmental functions, see the restatement in Hueting & De Boer (2019b:84-86), and the actual 1995 chapter 13 with its references. Thus, Adams criticises the book while that criticism is already in Hueting's analysis in the book.

It is remarkable that Adams missed this, but it might also be concluded that Van Dieren's editing in 1995 was so unscientific and frustrating that Adams might be forgiven. Potentially a major cause was that David Pearce in the earlier period did not refer to Hueting's work.

Hueting's approach might actually be enlightening to Adams. Adams's "Risk" book concerns the validity of measurements, when "statistical measures" are actually the outcome of more complex behaviour. For example, a lower mortality

of children in traffic accidents need not imply that the traffic itself has become safer but might merely mean that parents avoid that children partake in traffic. This can be paraphrased along the lines by Hueting as follows. The "objectivists" whom Adams observes at the Royal Society assume that the "statistical measures" are valid unconditionally, as "observations per se". Instead, these statistics are conditional upon assumptions. The circumstances when these data are gathered have changed and one cannot simply assume that they haven't changed.

Thus, by Van Dieren's unscientific editorship, also a flow of information from Hueting to Adams was blocked. This does not necessarily mean that Adams would agree with the approach by Hueting.

37.5 Conclusion

Stiller (2006), on 40 years of Van Dieren's involvement with sustainability, likely doesn't report on these events.

Of the Club of Rome, Dixson-Declève, Randers and Wijkman (2018) reflect on the Nobel Prize for William Nordhaus. They are advised to first correct what the Club of Rome has been doing itself as discussed here.

38. Hans Opschoor and his term “eco-space” 1987-2019

J.B. (Hans) Opschoor (born 1944) received his masters in economics in 1968 in Rotterdam. He was a researcher there till 1971 and moved to VU Amsterdam where he got his PhD in 1974 with Lambooj and Linnemann, with the title (translated): “*Economic Valuation of Environmental Degradation*”. He was professor in environmental economics at VU in 1987-2009 and director of VU IVM in 1982-1990, succeeded by Harmen Verbruggen. Then he was professor in economics of sustainable development at the Institute of Social Studies, The Hague, in 1996-2009, and its rector in 1996-2005. He is since 1998 member of the Royal Dutch Academy of Sciences (KNAW). His resume lists honorary professorships, “With other IPCC associates and Al Gore: 2007 Nobel Peace Prize”, and much involvement in Dutch environmental research planning and co-ordination

We start with Opschoor (1990) since this allows an educated evaluation of Opschoor (1987).

38.1 Preadviezen 1990 and Opschoor (1990)

Chapter 33 discusses the Dutch KVS Preadviezen and their importance for the Dutch community of economists. That chapter also clarifies that Hueting has never been asked for a contribution²⁹⁵ even though his work would be relevant for it.

The KVS in 1990 considered a response on the Brundtland Report (WCED) of 1987. The editors were Nijkamp and Verbruggen at Opschoor’s department at VU. Opschoor (1990) is his contribution to this edition. We may presume that Opschoor knew from his close colleagues that Hueting hadn’t been invited to contribute to this very edition either. It is unclear whether Opschoor has protested against that, but at least we can observe that his text in the volume contains neither such protest nor expression that Opschoor found the editors biased.

The 1990 Preadviezen were an opportunity for at that time still much neglected environmental economists to inform the mainstream economists at KVS about the importance of the environment and their field of research. Though Tinbergen & Hueting (1991) wasn’t available yet, the environmentalists could have referred e.g. to Tinbergen (coord) (1976) for the support on the environment. However, no author in these Preadviezen refers to Tinbergen.

38.1.1 Weaknesses

Opschoor (1990) contains some weaknesses to start with.

On page 17 Opschoor mentions time preference. A high time preference means favouring current to later consumption (higher rate of discount), and a low time preference means relatively more weight for the future (lower rate of discount). Opschoor suggests that the effective time preference is high and would generate a malthusian scenario with potentially radical changes at the brink, and that WCED targets a low time preference that would cause that prices would include future scarcities that would allow for a more gradual process. Weak is that Opschoor seems to suggest that 1990 is not at the brink yet. He does not provide for any

²⁹⁵ <http://www.sni-hueting.info/NL/Publicaties/NederlandsePublicatiesHueting.pdf>

measurement so that anything that he suggests about the brink hangs in the air. WCED may say that it targets “sustainability” but the relatively relaxed attitude in the report is precisely evidence of the (indeed effectively) high time preference that neglects the real challenge, see Hueting (1990c) who criticises the report severely and who provides his alternative. One might argue that the period 1990-2019 still would indicate enough leeway so that 1990 wasn’t at the brink yet, and that the proof of the pudding lies in the eating, i.e. requires evidence of revolutions in the World’s capitals, and wars and dictatorships: but Malthus and the environment are not quite the same, and much of the environment may already been gone before mankind as we know it goes too.

On page 18 Opschoor *accepts* ambiguity in the term “economic growth” while an analyst would protest against it, and would highlight that the ambiguity is abused for policies that are damaging to the environment, see Chapter 17: ²⁹⁶

“It has already been noted above that economic growth is [sic] an ambivalent notion: theoretically it refers to the increase in welfare per capita in a society; in practice it is used as a description of increase in consumption, income, production.”

Within the example of climate change, Opschoor (1990:22) does not take account that Hueting (1974a, 1980) showed that the environment belongs to the subject matter of economics: ²⁹⁷

“Internationally, this attitude has led to delays in the development of concrete policies after the Noordwijk Conference in 1989. From the environmental point of view, this is a risky strategy; from that of politics (and economics [sic]) in the short term it is risk-avoiding.”

In his conclusions Opschoor (1990:37-38) does not clearly distinguish statistics and policy making. Whatever he might formulate in terms of advice for policy making (or “perspectives”) he could have remarked that the statistics on environmental sustainability, also as suggested by Hueting, could be supported, and he doesn’t say so. The following compounds confusions (my footnotes): ²⁹⁸

“Whether a certain macro-economic development deserves the predicate sustainable, cannot be determined one-dimensionally; a reliable and

²⁹⁶ Dutch: “Hierboven is al opgemerkt dat economische groei een ambivalent begrip is: theoretisch slaat het op de toename van de welvaart per hoofd van de bevolking in een samenleving; in de praktijk wordt het gebruikt als omschrijving van toename van consumptie, inkomen, productie.”

²⁹⁷ Dutch: “Internationaal heeft deze houding geleid tot vertragingen in de ontwikkeling van concreet beleid na de Conferentie te Noordwijk in 1989. Vanuit het milieu bekeken is dit een risicovolle strategie; vanuit die van de politiek (en economie) op korte termijn een risico-mijdende.”

²⁹⁸ Dutch: “Of een bepaalde macro-economische ontwikkeling het predicaat duurzaam verdient, valt niet een-dimensionaal vast te stellen; een betrouwbare en geloofwaardige maat voor duurzame welvaart ligt bepaald nog niet klaar. Ook hier speelt onzekerheid ons parten: van veel denkbaar en ook wel voorgesteld beleid zijn de kosten vaak ‘harder’ dan de baten en dat roept discussies op inzake de wenselijkheid van zulk beleid. Opnieuw dient dan te worden gediscussieerd in termen van prudentie en de wenselijkheid van een ‘precautionary approach’.”

credible measure of sustainable welfare ²⁹⁹ is certainly not yet available. Here too uncertainty plays a part: the costs of many conceivable and also proposed policies are often more certain than the benefits, and this leads to discussions about the desirability of such policies. Again, there must be discussion in terms of prudence and the desirability of a 'precautionary approach'."

Comments: (i) $e\Delta$ and $e\Delta = NI - eSNI$ are based upon the precautionary motive. (ii) The standards for environmental sustainability define what the notion means, see Hueting (1990c) published in *Ecological Economics* in September and available for Opschoor (1990) conventionally published in November. (iii) There is a distinction between statistics and policy making. Discussions about policy allow a continuous evaluation of precaution or not, but such setting of policy making should not be confused with a scientific definition of what environmental sustainability means.

38.1.2 Way of referencing

Opschoor (1990:18) refers to papers with Hoevenagel 1989 and 1990 co-authored with Verbruggen and Opschoor about contingent valuation. These papers apparently cover work done by Hueting (1974a, 1980). Hueting's conclusion was that methods of contingent valuation are inadequate to come to grips with the ecological challenge. Apparently few researchers arrive at this conclusion, and, though the literature on contingent valuation is huge, this merits that Opschoor in 1990 also refers to this work by Hueting (that he must know).

Opschoor (1990) refers 8 times to himself, 5 times to other authors at VU, and 3 times to Hueting, namely (1970), (1974a), *not* the English translation (1980) with the prefaces by Meadows and Tinbergen, and (1987).

Hueting & Leipert (1987) is a WZB Berlin working paper, later published in *The Environmentalist* 1990. This was perhaps a hard-to-find source at the time, and Hueting had written more about his design of the vertical demand curve at that time, see above Dutch publications but also the English ones ³⁰⁰. It would have been more logical if Opschoor had referred to more accessible sources too (and had encouraged that Hueting would be asked by the editors for a contribution too).

For a relevant step in the argument Opschoor also refers to his own 1989 OECD discussion paper "*Towards sustainable development: Environmental change and macro indicators*", which paper would not have been in the library at that time and even today is not online yet.

Opschoor (1990:17-22), his section 3.3, discusses valuation of nature and national accounting. His own thesis of also 1974 (still not online) was also about environmental pricing but the link to national accounting is the Tinbergen & Hueting approach and it would be more sensible to ask Hueting to write about this aspect. At that time it must have been known in such circles, and also Opschoor must have known, that Hueting with the advice by Tinbergen had been appointed at CBS in 1969 in order to correct the figure of national income for damage to the

²⁹⁹ The Tinbergen & Hueting approach looks at income and has indicated that it is overly ambitious to try to develop a measure of welfare here.

³⁰⁰ See also <http://www.sni-hueting.info/EN/SelectedPublications.pdf>

environment. However, Opschoor does not mention this connection to Tinbergen when discussing the topic.

Opschoor (1990:22-27), his remaining section 3, discusses aspects of the development of standards for environmental sustainability, i.e. what was suggested in the WZB paper. Remarkably, Opschoor (1990:23) formulates a proposal that is quite the same as what Hueting does, namely, to use the precautionary motive on conservation to develop standards in order to define environmental sustainability:³⁰¹

"Based on the concept of sustainability, I want to propose a prudent approach (see Ciriacy-Wantrup, 1952; James, 1989): (...)"

The reference to another author like Ciriacy-Wantrup might come with the suggestion that Opschoor does not have to rely upon Hueting's references in order to suggest that he has developed the same idea. Remarkably Opschoor does not refer here, like Hueting, to Kapp (1950) and the IUCN, UNEP and WWF (1980) *World Conservation Strategy*. But Opschoor (1990) has Kapp (1950) in his list of literature so Opschoor shows that he hasn't overlooked Kapp. It is a pity that Opschoor's thesis 1974 is not online so that we cannot check easily whether Kapp has been mentioned there already, as Kapp is referred to by Hueting (1974a, 1980). Part of the problem here is that Opschoor does not quote Hueting about how he wants to derive such standards while Opschoor instructs the readers how this must be done (he might suggest: from an academic point of view).

38.1.3 Opschoor (1990) about Hueting and the vertical demand curve

Let us consider again the importance and impact of the finding of the vertical demand curve. Hueting (1974a, 1980) had concluded that there was no useful option for correcting the figure of NI, except for the asymmetric bookkeeping $A = NI - NI-A$. Suddenly in 1986 he had found an acceptable manner, that got discussion at the UNEP workshop. If we regard Opschoor as a main researcher in environmental economics, important enough to be asked as a major contributor to these KVS Preadviezen, then surely Opschoor would have understood the importance of this finding. Normally he would have asked Hueting to send him all his available papers, but those could also be asked more anonymously via the library. In fact, the discussion in Section 38.3 below about Opschoor's inaugural lecture in 1987 suggests that he already had heard about Hueting's finding at that moment though he does not refer to it explicitly.

Opschoor (1990) discusses Hueting's proposal with now some form of reference. Remarkably, Opschoor (1990) speaks about a "hypothetical sustainable national income". *This term does not occur in the WZB paper or the other 2 works by Hueting that Opschoor (1990) refers to.*

- Opschoor must have invented the term himself, which is less likely
- or he used another source for the term, but did not refer to that source, and instead referred to a less accessible paper.

Section 9.5 has used this case to highlight the problematic manner of referring by the VU environmentalists.

³⁰¹ Dutch: "Vanuit het concept duurzaamheid wil ik een prudente benadering voorstellen (zie Ciriacy-Wantrup, 1952; James, 1989): (...)"

Opschoor rejects eSNI with two arguments, namely uncertainty about the assumptions for the standards and that such a figure would lack details regarding actual developments. The latter is logically bizarre because the approach precisely looks at the difference between NI and eSNI, *also per environmental aspect*. eSNI is an aggregate but does not destroy the underlying data, which remain available for further details for policy making. The standards are indeed uncertain, but scientists want to investigate that uncertainty. Opschoor does not act as a scientist here.

Opschoor (1990: 21): ³⁰²

"It seems neither necessary nor desirable to invest all expectations and research funding in the search for a so-called green GNP or a sustainable (environmental degradation corrected) national income as a new, exclusive measure of social well-being. In addition, for other reasons, current GNP is rather a useful indicator. "

Comments: (a) This is an abuse of the word "all". Of course you do not spend the entire GDP on calculating eGDP. The subsequent paragraphs show that Opschoor does not want to spend any research money on eSNI. Thus he better states so directly instead of abusing the truth of "all" to make it appear as if he is only telling truths. (b) eSNI is not intended to be an "exclusive measure" for "well-being". eSNI is intended as an income measure and to be used for the environmental indicator $e\Delta = NI - eSNI$ as the distance to environmental sustainability. Opschoor misrepresents eSNI, and editors Nijkamp and Verbruggen also don't give Hueting the opportunity to explain what the intention of eSNI is. (c) Of course, GNP is useful. You even need it to calculate the distance $GNP - eGNP$. Hueting has never claimed that GNP has no useful aspects. Opschoor misrepresents the position of Hueting again. (d) Opschoor (1990) refers to Den Butter (1990) with a proposal for principal components, but see Section 39.5 for deconstruction of its econometric limitations.

38.1.4 Opschoor and Heertje 1990

The Preadviezen 1990 give us Opschoor and Heertje in one volume, and they would have a joint discussion at the annual meeting of the KVS. This would have allowed Opschoor to criticise Heertje's misrepresentation of Hueting's work, see Chapter 34, and Heertje could have criticised Opschoor's misrepresentation as we have done here. It is unknown whether they did, but we can observe that the misrepresentations continued, even after publication of the Tinbergen & Hueting (1991) paper or the Verbruggen (ed) (2000) *proof of concept*.

38.1.5 Evaluation of 1990

The misrepresentation by Opschoor (1990) is incomprehensible if we look at the subject matter only. He expresses concern about the environment but we find at

³⁰² Dutch: "Het lijkt noodzakelijk noch wenselijk om alle verwachtingen en researchgelden te investeren in het zoeken naar een zogenaamd groen BNP of een duurzaam (voor milieudegradatie gecorrigeerd) nationaal inkomen als nieuwe, exclusieve maat voor maatschappelijk wel en wee. Bovendien is het om andere redenen zo dat het gangbare BNP wel een nuttige indicator is."

best gross ignorance about and lack of interest in Hueting's work and at worst deliberate misrepresentation also using papers not listed in the references. I keep wondering whether the real problem lies in the fact that both presented their theses in 1974 and that Hueting received more acclaim (see Section 21.6.1). If this is the real cause then let Opschoor just acknowledge this publicly. The environmental problem is too important to make the scientific analysis on this subject dependent upon such academic envy of 45 years ago.

38.2 Definition of eco-space

An environmental function comes with the notion of its limits. Thus it is not suggested that the functions have no limits. In the early 1970s, Hueting (1974a, 1980) already referred to the purity or availability ("space") of the functions, and see e.g. Hueting (1980:14 & 144) for the search on (moral) limits and standards.

In **Figure 5** on page 42 (that uses comparative statics) the proper environmental (utilisation) space (EUS) ("ecospace") is the rectangular area between the origin and point S, provided that one indeed adopts the given environmental standards for sustainability and the assumption on technology for eSNI. Other assumptions would generate other spaces. A steady state or sustainable space properly seen is *not* the Production Possibility Frontier (PPF) through point S, because the points on the PPF other than S are not environmentally sustainable. Thus the ecospace cannot be compared *directly* with the PPF in standard welfare economics.

In March 1986b Hueting presented the vertical demand curve, first based upon standards set by a government (Indonesia), but in the next years based upon the conditional hypothesis of preferences for environmental sustainability, and thus with the requirement to derive sustainability standards. Different assumptions create different environmental spaces (rectangles), provided that one can make sure that there are no restrictions to possibilities for future use.

It is instructive to consider the notion of "space" in general. An object that may take all possible positions and make all possible movements in n directions is situated in a n -dimensional space, and conversely. Semantically, *space* and *possibility of position and movement* are identical. Thus, semantically, the environmental functions (possible uses), *if* restricted to environmental sustainability, are identical to the *environmental utilisation space* (EUS). Thus we have only a different name for the same notion. The functions remain a more general concept since they also allow the description of *unsustainable* use.

Since March 1986b Hueting discussed his idea to *define* environmental sustainability by such standards, and to use this to correct NI. It is not clear at this moment whether Opschoor heard about this or whether Opschoor developed an independent idea to do a bit of the same (but in impractical manner).

38.3 Inaugural lecture 1987

Part of the following has basically been indicated in Section 35.9 but it remains useful to recapitulate it separately.³⁰³

³⁰³ This text was submitted in draft to Hueting & De Boer and included with their edits in Hueting & De Boer (2019b).

In his inaugural lecture, Opschoor (1987) adopted the term “environmental utilisation space”,³⁰⁴ referring to Siebert (1982). Today Opschoor uses the term “ecospace”. Opschoor states his intention to translate from what he regarded as a more theoretical notion into something for *practical policy making*. The Siebert space is constructed as follows: the use of environmental functions is distinguished in source and sink, in mutual dependence, and their regeneration is dependent upon these two aspects. The Siebert space (not necessarily sustainable, pre-Brundtland) actually differs from the definition of the EUS or ecospace (sustainable). Mazijn (ed) (2000) looked at various authors who explicitly defined the term “environmental (utilisation) space”. They diagnosed that those definitions basically have the same content. Mazijn cs quote the definition of “environmental space” by Opschoor 1995 in a Dutch article:

“the possibilities that nature and the environment provide to society for present utilisation without restricting future options for usage”.

We find:

- *These are Hueting’s environmental functions under the conditions of eSNI.*
- The reference to Siebert is only makeshift when the final definition for the EUS or ecospace actually differs from Siebert and appears to be a sub-aspect of Hueting’s notions.

For *practical policy making* (Opschoor’s stated intention) only point S is relevant, and the other points of this ecospace (rectangular area) are suboptimal and too restrictive. In other words, when we are in the present world situation that is so inoptimal that the imposition of standards for vital environmental functions causes them to be binding, then it is dubious to suggest that the *practical* ecospace would be larger than this single point S. Given that there is only one point, it is rather useless to have a discussion about an “eco-space” or to think that it would be a useful concept. The relevant discussion would be about the derivation of the standards, that namely provide the empirical definition of environmental sustainability (steady state).

In English, Opschoor (1995) provides this definition, using the term “steady state” instead of “sustainability”:

“[Ecospace is:] The locus of all feasible combinations of environmental services that represent steady states in terms of levels of relevant environmental quality and stocks of renewable resources. It is a dynamic “utilisation possibilities frontier” comparable with the production possibilities frontier in standard welfare economics.”

This notion of ecospace or environmental space 1987 thus focuses upon a single element in Hueting’s definition of eSNI since 1986b. For the term “functions”, Opschoor (1995) refers to R.S. (Dolf) de Groot 1992 instead of Hueting (1974a, 1980) (while De Groot refers to Hueting). This manner of referring by Opschoor and the clear difference between Siebert space and ecospace suggests that the reference to Siebert (1982) is only makeshift.

³⁰⁴ Dutch “milieugebruiksruimte”. Dutch “ruimte” means space, area or volume.

This book has found evidence of structural *false referring* by the mentioned researchers at VU Amsterdam, see Section 9.5. A working hypothesis is that Opschoor in 1987 heard about Hueting (1986b) and the vertical demand curve and standards for environmental sustainability, and then looked for an article in the academic literature for a similar notion, found Siebert (1982), and then referred to Siebert so that he could avoid a reference to Hueting but still discuss the same aspects as if he had thought about this himself. There is no proof of this but this way of referring fits with the cases when there is proof. The finding by Hueting (1986b) and subsequent development is so important for national accounting and environmental economics that an independent academic researcher would normally give pride of place to further dissemination while referring to all pertaining works by Hueting on the subject, while the treatment by Opschoor is quite the opposite.

Mazijn cum suis did not analyse the semantics of the issue. They noted the reference by some authors to Hueting (1974a, 1980), but they did not identify the identity of the notions. Hueting did not write about “a definition for the term environmental space”, and apparently for only that reason, Mazijn cum suis did not consider environmental functions and their application to environmental sustainability as a possible definition: but semantically and analytically these approaches are identical.

While we have only a conjecture with respect to Opschoor’s reference to Siebert (1982), a definitive piece of evidence is: It is not clear why Opschoor himself in 1987-2019 did not see the identical meaning of his ‘eco-space’ and Hueting’s definition of environmental functions with the inclusion since 1986 of the standards for environmental sustainability. Why has there, apparently, been so little effort on his part to discuss and refer to and even support Hueting’s research on eSNI, while it would fit his *only truly practical* point S ?

38.4 *Alleingang scenario since 2000*

Since Opschoor is at the VU and the IVM team is at the VU, Opschoor was asked by De Boer, Hueting and Sigmond (2008), and again in January 2019 for the purpose of their book, to consider helping to resolve the issue of the Alleingang scenario, see Section 21.9.12, but he has declined to do so.

38.5 *Compiling Opschoor, Verbruggen & Van Egmond for the MDN 2009*

See Section 21.11.1 and Chapter 40 for a deconstruction of Opschoor (compilation) et al. (2009).

38.6 *At a 2013 session*

Section 27.13 contains a statement about Opschoor at a colloquium in 2013, and this book may now quote itself: Policy makers are liable to refer to disagreements among researchers and then say that there are no funds for the information they would rather not hear. A researcher like Hans Opschoor is inclined to tell politicians that eSNI is subject to uncertainties, and in such manner deter them from giving a subsidy. It would be more correct if he told politicians that there should be a grant so that the researchers can do what they would very much like to do: to map the uncertainties.

38.7 *Maltreatment of the Tinbergen & Hueting approach since 1974*

The implication of this Chapter is that Opschoor not only systematically maltreated Hueting's work but in fact the Tinbergen & Hueting approach (with the objective to correct the national accounts for the damage to the environment). Whatever Opschoor's personal feelings about his own 1974 thesis and Hueting's 1974 thesis, Opschoor must have known how and why Hueting got appointed at CBS Statistics Netherlands. Subsequently Tinbergen wrote a preface to the English translation, there was the Tinbergen & Hueting (1991) paper, and then there was the Verbruggen (ed) (2000) *proof of concept*. Opschoor must have known that the Tinbergen & Hueting approach fitted in with Tinbergen's programme since 1930 in measuring the economy, and that his own obstruction had a wider impact than only whatever he wanted to achieve w.r.t. Hueting.

At VU, Opschoor founded a department that structurally misrepresented the Tinbergen & Hueting approach. A culture of misrepresentation can propagate itself. Chapter 39 looks at Den Butter and Verbruggen. Jeroen van den Bergh (Chapter 35) had his thesis with Nijkamp and Opschoor,³⁰⁵ and Rutger Hoekstra (Chapter 27) had his thesis with Jeroen van den Bergh. At CBS (Section 21.11.1) Hoekstra worked with Jan-Pieter Smits (Chapter 28), from the section on economic history at VU. Apparently these researchers from VU did not mind to destroy the scientific reputation of CBS and Tinbergen as long as it served the misrepresentation of Hueting's work. Sic transit gloria.

³⁰⁵ <https://www.tinbergen.nl/phd-thesis/64/dynamic-models-for-sustainable-development>

39. *Frank den Butter and Harmen Verbruggen 1990-2019*

39.1 *Introduction*

The Dutch Ministry of Economic Affairs around 1997 selected VU IVM for the calculation of eSNI. IVM-deputy-director Harmen Verbruggen became the lead researcher with a team at VU IVM and Frank den Butter at the VU economics department became chair of the steering committee with members from CBS, Ministries and academia, see Verbruggen (ed) (2000) (pdf online since 2019).

Den Butter & Verbruggen (1994ab) (BVab) already had denounced Hueting's eSNI. Hueting wrote Den Butter and asked how he could square his (impartial) chairmanship with this predisposition. An exchange of letters generated some mollification, see Den Butter (2001), and it might still be a good idea to try to retrieve and publish that exchange of letters. However, it remains problematic that later Den Butter and Dietz (2004) (BD) and Den Butter, Kocsis and Tieben (2014) (BKT) return to abusive misrepresentation of eSNI in conflict with both mollification and Den Butter's role as (impartial) chairman of the steering committee.

A key issue is that no paper by Den Butter contains a reference to Tinbergen & Hueting (1991), even though Hueting & De Boer in their chapter in the final report Verbruggen (ed) (2000) refer to the article. Assuming that Den Butter reads his own report, he must have known about it since 2000. Why would Den Butter structurally be silent about Tinbergen's support for Hueting's work ?

The Tinbergen & Hueting approach is a no-brainer for econometricians. There is tension between this no-brainer property of eSNI and the mental blockage shown by Den Butter and the IVM team. The IUCN, UNEP and WWF (1980) "World conservation strategy" only requires that vital environmental functions are maintained, and this practical period-to-period (statistical) approach does not require command of the calculus of variations for future generations (though Tinbergen and De Boer had this command).

- In fact, Den Butter (2001) (in Dutch) clarifies that he prefers the formulation with a Social Welfare Function (SWF) while Hueting prefers the direct imposition of standards, and then Den Butter states: "Both views do not have to exclude each other. After all, when the environmental quality below a certain limit value in the welfare function receives an infinitely large negative weight, this lower limit automatically becomes a precondition." *Comment:* So, what is wrong with deriving standards for environmental sustainability from the scientific literature ?
- Den Butter (1992) already recognises (repeated by BVa:188): "Of course calculation of both the actual GNP and green GNP implicitly defines an environmental index. However, this monetized index will only be equal to the 'true' index in case the (implicit or explicit) price determination of the environment has been fully correct. In practice such price formation which fully reflects environmental damage seems impossible." *Comment:* (i) "fully" is

vague, since by what criteria would you be able to establish that the true value has been found ? Econometricians would be familiar with the notion of an *estimate*. (ii) If you want to remain practical, Hueting formulated a “practical approach for an unsolvable problem”, namely the imposition of standards of environmental sustainability. This a solution approach is *possible*.

At the publication of the report Verbruggen (ed) (2000) about the calculation of eSNI, Verbruggen was interviewed by a magazine *Milieudefensie* 2001-10 p29:

"Verbruggen acknowledges that he was initially very critical of the" eSNI according to Hueting ". "I expressed that criticism in 1994. I found the sustainability standards in particular problematic and uncertain. The eSNI largely depends on those standards. Since that time I have been in discussion with Hueting and he has always succeeded in refuting my objections, so that I have started to think in a nuanced way." ³⁰⁶

The term “refute” is strong. Verbruggen states that after refutation he has no objections against eSNI any more. But he uses the term sloppily, for in the subsequent sentence he only indicates “nuance”. (The interviewer allows the ambiguity, which is a sloppy way to “defend” the environment.)

Hueting likely would not have said something else to Verbruggen than in his articles. Thus Verbruggen could also have studied Hueting’s articles in the first place. The latter is not a superfluous remark: for the articles by Den Butter and Verbruggen have remarkably few references to Hueting’s articles. Apparently they do not think that others would be advised to read those articles too.

In January 2019, drafting Hueting & De Boer (2019b), the latter two authors kindly requested Den Butter, Verbruggen and the IVM team to correct or withdraw the Alleingang scenario, with arguments provided, see Section 21.9.12 and the Verbruggen (2018) self-contradiction in Section 39.18. Obviously, with their (2019b) going to be published, this new book would benefit from lifting the burden of the Alleingang scenario and the need to show why it is deficient, including the burden of the needless fuss that scholars cannot agree.

Verbruggen in a 2019-01-25 email to Hueting, copied to Den Butter, IVM team, Colignatus and Opschoor: ³⁰⁷

“We have done everything we could to model and calculate eSNI, according to current economic standards. (...) Let me now say that your lack of insight into economic theory and literature, and knowledge of mathematical economics, in particular modeling, trips you up [here ?]. So there is no point in further discussion, it is directed to deaf ears.”

³⁰⁶ Dutch: “Verbruggen erkent dat hij aanvankelijk zeer kritisch tegenover het ‘DNI volgens Hueting’ stond. “Die kritiek heb ik in 1994 verwoord. Met name de duurzaamheidsnormen vond ik problematisch en onzeker. Het DNI hangt voor een groot deel op die normen. Sinds die tijd ben ik in discussie met Hueting en hij is er steeds in geslaagd mijn bezwaren te weerleggen, waardoor ik er genuanceerd over ben gaan denken.”

³⁰⁷ Dutch: “(...) We hebben er alles aan gedaan om het SNI modelmatig te berekenen, volgens de gangbare economische standaarden. (...) Laat ik nu eens zeggen dat jullie gebrek aan inzicht in de economische theorie en literatuur, en kennis van de wiskundige economie, modelbouw in het bijzonder, jullie parten speelt. Verdere discussie heeft dus geen zin, het is aan dovemans-oren gericht.”

This statement by Verbruggen is *ad hominem*, and in contrast to the earlier agreement by Den Butter, quoted above, that the mathematical treatment is okay.

Verbruggen had been reminded of the criticism not only by Hueting but also by Van Tuinen (“nonsense”) about the Alleingang scenario, see Section 21.9.12. Verbruggen had been reminded of the econometric background, also with modeling at CPB, by Colignatus, who supported Hueting & De Boer. Verbruggen still did not retract the *ad hominem*. In his email, Verbruggen had the discussion about the Alleingang scenario in mind but this statement is so grand that it cannot apply only to this issue. It must hold more in general, and likely over more decennia. Observe: in the 2001 quote in *Milieudefensie*, Hueting had to convince Verbruggen instead that Verbruggen took the effort to study Hueting’s work.

We can only conclude: Verbruggen does not take Hueting serious *since he regards Hueting as not qualified* (perhaps not at the academia ?), even though Hueting contributed to economic theory and environmental economics and statistics, and collaborated with econometricians (including Jan Tinbergen) in able manner, by clarifying his role as economist and statistician.

The *ad hominem* email of 2019-01-25 was cc Den Butter, the IVM team and Opschoor, and none of them reacted to this *ad hominem*, while a protest would seem to be in order. We may speculate whether they agree, or see it as something by Verbruggen privately, or whether there are group-processes, but it does indicate lack of respect for the Tinbergen & Hueting approach and lack of integrity of science concerning such *ad hominem* put-down that clearly requires a protest. Perhaps, if the *ad hominem* is removed, then the IVM-team would have to admit that further discussion about the merits of the Alleingang scenario would be relevant, and none of them wants this ? This however blocks a discussion on content with improper means. When Den Butter, Verbruggen and the IVM team fail to respond on content to the criticism w.r.t. the Alleingang scenario, and Verbruggen responds with such *ad hominem* that is not protested to, then something is structurally amiss, even while the IVM team must be complimented for the quality of the work on eSNI itself.

It may also be observed that these researchers hardly refer to their own findings on eSNI. They do not see it as work that they continue upon themselves. Subsequently, attention must be given to the retirement speech by Verbruggen (2018), in which he contradicts himself about the Alleingang scenario, see Section 39.18. The latter is perhaps the most absurd and nihilistic element in this.

In the face of such observed bias the reader may understand that I myself am extra careful not to entertain bias myself. The papers by Den Butter and Verbruggen that we look at here received a fresh and unbiased reading.

Section 21.9.12 above discusses the Alleingang scenario invented by the VU IVM team and apparently accepted by chair Den Butter as an economically meaningful scenario. The irrationality of its creation, and unwillingness to retract it after sound criticism, even in 2019, warrants a look at earlier papers by Den Butter and Verbruggen to check whether the inventors of this scenario entertain some preconceptions that block an openness of mind. The scenario already established confusion but there may also be bias and perhaps some incompetence. It must be

said that the IVM team did a recommendable job on the modeling and calculation of eSNI itself, and our criticism here thus concerns only the critical points.

Also, in the light of basic econometric methodology, see Section 7.4, the use of sensitivity analysis and variants or scenario's is only recommendable. Criticism about the Alleingang scenario is only that the IVM team presents it as some kind of eSNI while it is no eSNI. As an econometrician, Den Butter should be interested in research on the uncertainties in the eSNI estimates, but curiously he blocks all research. (See footnote 132 on page 219 that the Alleingang scenario cannot stand for such research into uncertainty.) Something else must be happening. (I would not know what. A speculation is in Section 9.5.)

This Chapter thus contains my reports about papers by Den Butter and Verbruggen. Their papers appear to structurally misrepresent the Tinbergen & Hueting approach. Apparently Den Butter and Verbruggen did not submit their drafts to Hueting for potential clarification, which would have been logical to do, given the importance to be clear on this subject.³⁰⁸ They apparently published in journals without informing Hueting, which comes across to me as "behind his back" (making it less easier for him to know that a reply is needed), even though such journals are public (behind a paywall, so that you must pay to see how your work is misrepresented). The Tinbergen & Hueting approach, and especially Hueting et al. (1992d) (the Methodology M44), thus were misrepresented by them in the national and international literature in 1994, and Den Butter and Verbruggen never published a retraction even though their later statements (like quoted above) would warrant this.

This Chapter is not pleasant reading. With such an *ad hominem* email, the deconstruction of the Den Butter and Verbruggen papers about the Tinbergen & Hueting approach turns out to be rather an exercise in *exposing disingenuity*.

The disclaimer is that I myself have been a victim of unethical behaviour by Den Butter since 1991. This is documented (in Dutch)³⁰⁹ and of no direct relevance here, though indirectly it may mean that Den Butter may not communicate properly with me, while I warn the world to take great distance from him until the 1991 issue is resolved in proper scientific manner. I regard Den Butter as a mediocre econometrician, perhaps with some technical skill but actually not too intelligent, with inadequate self-criticism, who by the peculiarities of Dutch society (like its small size and pillarisation) has received more social standing than has been good for his self-perception. This is not *ad hominem* but a statement on competence and a warning to be alert for disingenuity. (Den Butter might make a statement about my competence but then check whether he has read and discussed my work, and retracted his earlier misconduct.) Obviously I had hoped that another researcher would deconstruct these papers by Den Butter and Verbruggen, but since this doesn't happen, apparently, the burden seems to fall on me (with the additional risk that someone might say that the victim of bias is the perpetrator).

Before we look at the various papers, let us start with a curious phenomenon.

³⁰⁸ Hueting was indisposed for a half year in 1992/93 but this should not have been a drawback for such contact, which could have sustained a delay of a half year.

³⁰⁹ <http://thomascool.eu/Thomas/Nederlands/TPnCPB/DenButter/HeelErgEng.html>

39.2 Calculating NI and eΔ separately but not eSNI = NI – eΔ

The distance to environmental sustainability is given as $e\Delta = NI - eSNI$. Den Butter & Verbruggen (1994ab) (BVa English, BVb Dutch) expressed their support for the calculation of both $e\Delta$ and NI, but rejected calculating $eSNI = NI - e\Delta$. This is a strange position to hold, especially for econometricians.

(i) For the calculation of $e\Delta$, check this statement, BVa:205:

“In spite of our criticism on GNP-corrections made by official statisticians we advocate that national accounting should proceed along both lines indicated above: construction of satellite accounts (and derivation of environmental indicators) and *an estimation of the money value of environmental degradation (or upgrading)* [my italics] in relationship with national production. The official statisticians should try, as much as possible, to harmonise both methods as they are partly complementary. Moreover, it is of great importance that the environmental economists speak with one voice: environmental decay has become too serious a problem to allow that vital policy recommendations made to improve the state of the environment are enervated by public dispute between specialists.”

(ii) This advocacy by BVa:205 for the calculation of NI and $e\Delta$ separately is in contradiction to the Abstract of that article that rejects calculating $eSNI = NI - e\Delta$:

“However, official statisticians should refrain from correcting GNP or NNP for environmental change, as this correction implicitly contains a political judgement and cannot be based on mere technical knowledge.”

BV might be confused that “*correcting*” would also mean “*replacing*”. However, BV also show themselves to be aware of this distinction. BVa:188 state:

“Two alternative methods are proposed for the statistical registration of the trade-off between economic growth and the state of the environment. The first method is to correct, in one way or another, GNP for environmental change and arrive at a so-called environmentally adjusted GNP: ‘green’ GNP or eco-GNP. The other method is to calculate one or more physical indicators for the state of, or the pressure on, the environment and to relate these indicators to GNP growth.” (...) “calculation of a green GNP implicitly³¹⁰ defines an overall indicator for the state of the environment, namely the difference [here $e\Delta$] between the traditional GNP and the corrected figure for GNP. Most proponents of a green GNP will not advocate publishing the corrected data for GNP *instead* of the traditional GNP, but will advocate publishing both data series, so that such implicitly defined indicator [here $e\Delta$] can always be computed from the published data.”

³¹⁰ It is rather a put-down to say that $e\Delta = GNP - eGNP$ would be “implicit”. Hueting (1974a, 1980) already proposed to calculate the distance $A = NI - NI-A$, and to have the figures alongside each other (for otherwise you cannot calculate the distance).

Thus there is a conundrum: the Abstract of BV (no eSNI) is in conflict with the body of BV (calculate $e\Delta$ so that we also find $eSNI = NI - e\Delta$), while the article also shows that BV are aware of the notions involved.

Options to explain this conundrum are: (i) B wrote some lines and V some other lines and they did not fully discuss the joint outcome, (ii) they both are confused, (iii) they deliberately try to confuse the world, so that they can quote selectively to who wants to hear a particular conclusion.

The conundrum is repeated in the Dutch version of the paper, Den Butter & Verbruggen (1994b) (BVb) (my translations and italics):

“Because this knowledge is not yet available and because national accounting cannot be based on a hypothetical situation,³¹¹ we do not consider a green or eco-GNP useful in the policy analysis, especially since such a number has an implicit political valuation about the trade-off between economic growth and environmental quality.”³¹²

“But a monetary valuation in the form of a correction on national income blurs the political trade-off between environmental quality and other welfare objectives. *Even when the corrected income is used in policy analysis alongside the uncorrected national income. This does not invalidate that the calculation of repair costs in itself is a useful exercise as part of the environmental assessment.* For political consideration, on the other hand, the use of one or a small number of composite physical environmental indicators is preferable to a seeming correction of national income.”³¹³

Thus BV are rather confused (on this issue) and send out conflicting messages.

A discussion of their papers appears to be a tough exercise because this is not the only case of confusion. A constant factor is that they misrepresent and put down the Tinbergen & Huetting approach.

39.3 Background and competence on standards for sustainability

Alongside presenting the Alleingang scenario, Den Butter and Verbruggen emphasize the uncertainty about the standards for environmental sustainability that are used for calculating eSNI. This uncertainty can be acknowledged but the actual issue is the validity of the analysis, see Section 5.5. The name “standards for environmental sustainability” is used for application in an economic model. We

³¹¹ My comment: It actually can, and this is the key innovation by Huetting, see Chapter 19.

³¹² Dutch: “Omdat die kennis er vooralsnog niet is en omdat de nationale boekhouding bovendien niet op een hypothetische situatie gebaseerd kan zijn, achten wij het gebruik van een groen of eco-BNP in de beleidsanalyse niet zinvol, temeer daar zo'n getal een impliciete politieke waardering in zich bergt in de afweging tussen economische groei en milieukwaliteit.”

³¹³ Dutch: “Maar een geldelijke waardering in de vorm van een correctie op het nationaal inkomen vertroebelt de politieke afweging tussen milieukwaliteit en andere welvaartsdoelstellingen. Ook al wordt naast het gecorrigeerde nationaal inkomen het ongecorrigeerde inkomen in de beleidsanalyse gehanteerd. Dit neemt niet weg dat de berekening van de herstelkosten op zich een nuttige exercitie als onderdeel van de milieuwaardering is. Voor de politieke afweging valt daarentegen het gebruik van één of een klein aantal samengestelde fysieke milieu-indicatoren te prefereren boven een schijncorrectie van het nationale inkomen.”

see a similar expertise by Johan Rockström on “planetary boundaries”, but these need not necessarily be used in an economic model. It is not clear to me how these “boundaries” relate to those used by Hueting & De Boer. The derivation of such standards from the scientific literature requires expertise, such as environmental engineer Bart de Boer has developed.³¹⁴ Who wants to argue that such standards are “too uncertain” or not derived from the scientific literature then should look up those sources in science or show that those sources are not there. Instead, economists like Den Butter and Verbruggen or economic-statisticians who criticise eSNI take the easier route to say, out of thin air, that such standards are “disputable” (Henk van Tuinen, Chapter 25) or “political” (Steven Keuning, Frank den Butter and Harmen Verbruggen). One way to respond to such abuse of thin air is to check upon the background of such critics, and verify that they do not have the competence (while De Boer or Rockström do) to propound such judgements. This is not *ad hominem* but about competence.

Harmen Verbruggen (born 1950)³¹⁵ first went to college in business administration 1971, then entered university and graduated as economist in 1977 with majors in international economic relations and development, and a PhD in economics in 1985. He first was assistant professor in agriculture & development and in 1989 became deputy director of IVM alongside director Hans Opschoor, succeeding him in 2001. Though finally professor in “international environmental economics”, there is no indication that Verbruggen developed the competence to judge about the bio-chemical and ecological quality of the environmental sustainability standards used in eSNI.

Frank den Butter (born 1948)³¹⁶ is a professor in econometrics with a 1986 thesis on modeling of monetary transmission and policy. Potentially Den Butter is one of the exceptions, but there is something about money that selecting it as your first topic of research also doesn't train for common sense and open-mindedness (quite similar as, in the history of economic thought, mathematicians who embark upon economics without an eye for empirics can wreak havoc). His first papers that show an additional interest in the environment are Den Butter (1990) in Dutch and (1992) in English: *“The mirror of cleanliness: on the construction and use of an environmental index”*. Both the 1990 Dutch and 1992 papers refer indirectly to the Tinbergen & Hueting approach of an income measure for environmental sustainability, but in both papers Den Butter manages not to refer to the work by Hueting directly. It is possible that he invents himself what this method would be and then rejects it, like a straw man.³¹⁷ Obviously we do not know what is the case here, and the reader is invited to join in a deconstruction.

39.4 Nijkamp & Verbruggen (ed) 1990 and Den Butter 1997-2003

There is the Dutch “(Koninklijke) Vereniging voor de Staathuishoudkunde” (KVS) or the (Royal) *Association for Political Economy* that traces its roots to 1849. It

³¹⁴ <http://www.sni-hueting.info/#Norms>

³¹⁵ https://sbe.vu.nl/en/Images/Verbruggen-cv_long_11_sept_2014_tcm258-771998.pdf

³¹⁶ <https://web.archive.org/web/20151023074210/https://personal.vu.nl/f.a.g.den.butter/default.htm>

³¹⁷ Reading Den Butter (1990:199) in 2019, with his reference to the CPB Athena model, has a special touch for me, as I was one of the econometricians who helped make that model.

annually publishes a collection of “preadviezen” (pre-advice). Originally the annual meeting would vote on the preadviezen and then arrive at a joint advice, but rather early in history this vote was abolished as somewhat nonsensical. The original 1936 Tinbergen model of the Dutch economy had been presented in such a pre-advice. See Chapter 33 for a longer deconstruction for KVS’s role in this issue. For the current chapter we highlight these points:

(i) Nijkamp & Verbruggen (ed) (1990) is about the Dutch environment in the European space. See Chapter 33 for a longer discussion.

(ii) In 1997-2003, Den Butter was chairman of both KVS and the steering committee for calculating eSNI, and might have encouraged attention for its report Verbruggen (ed) (2000). Calling attention to a subject is not the same as instructing people what to write about it, and thus there would have been no conflict of interest in calling attention to it. However, it might also be that Den Butter was not impressed by eSNI and advised against the idea to make a pre-advice on it. Whatever that be, we only observe the absence of a pre-advice.

39.5 Den Butter 1990 & 1992

In 1987 there had been the Brundtland report, and the Dutch Science Council for Government Policy had its own report WRR (1987), “*Room for growth*” (and this growth was explicitly “sustainable growth”). Den Butter (1990) (Dutch) and (1992) (English) thus arrives late at the scene. In 1990, Den Butter was 42 years of age and had become director of the Tinbergen Institute, the graduate school for economists in Holland. One can imagine that an econometrician in his position wants to see whether he or she can provide the world with a relevant contribution from the field of econometrics. Unfortunately, Den Butter does not refer to the work by Hueting (1986b) or Tinbergen & Hueting (1991). He refers to other authors like Heertje (UvA) (this book Chapter 34) and Opschoor (VU) (this book Chapter 38), but they might not have alerted him to Tinbergen and Hueting. Den Butter however refers to Pen (1990) who refers to Hueting:

“Hueting insisted a long time ago on analyzing the functions of the environment. (...) A boundary condition can be written down for each of these functions, and when exceeded then the Brundtland-norm will be violated.”

Such a quote about Hueting’s method should merit that Den Butter (1990)(1992) studies his work, yet he doesn’t refer to it. He basically tries to re-invent the wheel and actually comes remarkably close. For his data, Den Butter (1992) (VU) refers to Opschoor (VU) who refers to CBS, where Hueting has been collecting these data. The advantage of referring to Opschoor is that Den Butter doesn’t have to refer to Hueting, because if you refer to Hueting for the data then perhaps you also must refer to him for his other work on eSNI ?

“Opschoor (1990, page 32) presents a qualitative survey of the state of the environment using time series data collected by the CBS for 26 indicators, which are associated with environmental pollution. However, these indicators cover only some aspects of the environment.”

Den Butter (1990:199) (Dutch) and (1992) (English) formulated an alternative approach, namely an “*environmental mirror*”, using techniques of principal components, averages and an aggregator function like the Constant Elasticity of Substitution (CES) function. He compares his proposal with eSNI though without referring to Hueting on eSNI:

“The choice of the starting point is determined by the normative value of the environmental mirror (index) that the policy focuses on. This is a political choice, which is veiled in a correction of national income as implemented by technocrats.”³¹⁸

Comment: (i) there is nothing *veiled* when NI and eSNI are alongside each other, and when both measurements are documented, as scientists are common to do, (ii) there is nothing *political* about the definition of environmental sustainability as a technical concept and with empirical implementation by science.

We may decompose $e\Delta = NI - eSNI$ in vectors of volumes and market or shadow prices: $e\Delta = y p_y - y_e p_e$. Basically $e\Delta$ are costs or a difference in income. Though it is less economically useful, we might also link the levels of income to the environmental variables (like emissions): $NI = u p_u$ for the current unsustainable use, and $eSNI = s p_s$ for the sustainable use, for which we can assume that the standards are also binding. Then $e\Delta = u p_u - s p_s$.

The Tinbergen & Hueting approach presumes that the experts calculate such components of $e\Delta = NI - eSNI$ and then submit these findings, including their substantiation, to the policy makers, who decide upon next years budget and its allocations. The policy makers are in no way forced to select $e\Delta$ as their target. Only if they make election campaign promises that they want environmental sustainability, then the experts provide for a sound definition of what this entails.

Den Butter suggests that the derivation of s and the calculation of its shadow prices p_s (or another calculation within $e\Delta = NI - eSNI$) would be a veiled political choice. He neglects that all information is made available to the political body, so that nothing is veiled. He does not properly account for the division of labour between experts and policy makers. He suggests that politicians have expert knowledge (can derive s from the scientific literature) and that experts make (veiled) political choices (furthering some agenda).

An example will help. When there is a medical test whether you have a disease X, this test need not be perfect, and can generate true positives, false positives, true negatives and false negatives. The designers of the test can experiment with levels of discrimination and derive a standard, and must balance the cost of the test, the impact of treatment on false positives, the impact of non-treatment on false negatives (who might be non-treated anyway), e.g. measured in quality adjusted lifeyears. Hopefully there is a golden standard (with 100% true positives and true negatives), that e.g. allows measuring the performance of cheaper tests. Normally all such research is left to professionals, and parliament only steps in for

³¹⁸ Dutch: “De keuze van het startpunt wordt bepaald door de normwaarde van de milieuspiegel waar het beleid zich op richt. Dit is een politieke keuze, die bij een (door technocraten uitgevoerde) inkomenscorrectie versluierd blijft.”

discussions of costs and cost-effectiveness and comparison of the health care for the various diseases, accidents and health and life events. Over time there are protocols about what are judgements by parliament (called “political”) and what are judgements by the professionals (called “expertise”). Den Butter turns this into a soup by suggesting that policy makers may pick the standards for environmental sustainability (potentially neglect the scientific literature, even when the ecology implodes) or that the experts commit politics (even when they derive standards that conflict with their political views). Den Butter’s view is dogmatically driven by the mathematical labeling of the model (“if something is called a standard then it must be normative”) and recognises neither an alternative view (“the definition of environmental sustainability requires empirical implementation”) nor the reality and complexity of society, and blocks the development of practical procedures.

Thus, it is not impossible that Den Butter from 1990 onwards had this stated bias against eSNI and never entertained the open mind to properly read what Hueting was actually stating. However, whatever bias, the confusion that we observed for 1994 remains a confusion. Though Den Butter could have properly read Hueting’s work already in 1990, the later views by Den Butter in 2001 have been affected by a discussion with Hueting, but Den Butter & Dietz (2004) (DB) and Den Butter, Kocsis and Tieben (2014:20) (BKT) (a SEO report to the Ministry Infrastructure and Environment) return to earlier bias, and reach a dismally low point in misrepresentation.

39.6 Den Butter 1992

The 1992 paper shows that a professor in econometrics in 1992 could produce what nowadays at best would be an undergraduate paper on aggregating some time series. In terms of science, it is deficient for lack of referring to Hueting, a known expert in the field, whom he may not have consulted. In terms of economics, the paper is deficient by not properly restating the link between the SWF and the tangent plane called “income”. In terms of political economy, the paper misjudges the role of experts, including his own role. Let us look at these points by deconstructing the paper.

39.6.1 *Its summary*

“The economic debate on the environmental policy needs a clear measure of pollution or “mirror of cleanliness”. This environmental index, which summarizes all available data on the state of pollution and environmental damage, is to indicate to what extent the country has been polluted. Such index may be very helpful to the proponents of environmental policy, as it makes the environment a rival of other economic policy problems, such as unemployment, the government deficit, inflation, or disposable income, all of which are summarized in appealing indices or numbers. Moreover, when similar indices are constructed for a number of neighbouring countries, the resulting trade balance of pollution may be instrumental in coordinating environmental policy. The latter is particularly important in the case of small open economies, where pollution is imported to a large extent. This paper discusses the scope for the construction of an appropriate environmental

index for the Netherlands and illustrates how it can be used in policy analysis. Some environmental indicators for which time series already are available for the Netherlands are combined to a prototype of a mirror of cleanliness. However, the main lesson from this combination exercise is that we need much better data and more sophisticated combination techniques in order to arrive at an index of practical relevance

39.6.2 *Reference to national income and growth*

“Yet the impossibility of designing a perfect environmental index should not prevent us from constructing one which is less than perfect. In fact the same argument applies to calculating the national income, which has obtained general acceptance as a useful summary statistic for economic analysis.”

Comment: Indeed, one should consider the reasons why the figure of national income has received such wide acceptance. The standard NI still is misleading w.r.t. the environment, an issue that Den Butter doesn't discuss.

“In this context sustainable economic growth can be defined as equilibrium growth at a constant value of the environmental index. Obviously for this definition of sustainability no monetisation of the environmental capital is needed. Therefore there is no necessity to calculate a green GNP, which is the actual GNP from the National Accounts corrected for the users cost of the environmental capital which that growth involves.”

Comment: (a) There is no necessity but it is easier to work with, with proper foundation in theory. (b) There is no need to value “natural capital” indeed but the argument about the link between this and the “user cost” is weak. (c) Den Butter's definition of sustainability only conforms to Hueting's definition if also the latter holds, and Hueting's definition better captures the notion of environmental sustainability.

“Of course calculation of both the actual GNP and green GNP implicitly defines an environmental index. However, this monetized index will only be equal to the 'true' index in case the (implicit or explicit) price determination of the environment has been fully correct. In practice such price formation which fully reflects environmental damage seems impossible.”

Already quoted and commented on. Additional comment: (a) For his own index Den Butter rejects the need for “perfection” but for a monetary measure he requires it. This is unbalanced. (b) Why no reference to Hueting's *practical* solution approach ? The “seems impossible” only comes from not-looking.

“Now the vital question is whether we can leave this price determination process to the market, as classical welfare theory would prescribe, or whether the price of the environment should be determined in a more autocratic way.”

Comment: This reminds of the two types of assumptions that Hueting makes for NI and eSNI respectively. It merely reflects the comparison of the current situation with some measure on sustainability. However, Hueting's approach is more involved than Den Butter's binary prong here.

"When full information were available on the remaining stock of the environment and on its self-regenerating power, and when the interests of the future generations would be fully taken into an account, no much objection can be made to let in the price of the environment be determined by the market. Obviously these conditions do not hold, as our knowledge on the environment and the altruism towards future generations is rather limited. The impression is that at this moment the market price of the environment is much too low. Still a large gap exists between the actual utilisation price of the environment and its social or welfare costs. Therefore, from the welfare point of view, the use of the environment is far from optimal. For that reason it does not seem wise to let the market determine the price of the environment at this moment."

Comment: Hueting expresses the same skepticism. The figure of NI gives misleading information about the what people would want to be seen done w.r.t. the environment. National statistical offices should stop publishing only misleading information. This, however, is not an inference made by Den Butter.

39.6.3 *Experts and policy makers*

"Therefore I see no other possibility than to let the price of the environment be determined by experts. This price determination can, as we shall see, proceed along the same lines as the construction of an environmental index, which is based on expert opinions. It should be noted that this form of interventionist price formation does not exclude the role of the market when the prices are to be paid. On the contrary, it seems desirable that once the price of the environment has been determined, the goals of the environmental policy should be reached by the use of market conforming instruments, such as taxes or transferable pollution rights, and not by quota or prohibition orders."

Comment: Who will choose the experts ? How will they execute their expertise ? At that time, Hueting et al. (1992d) suggested that statistical rules might suffice (instead of using a model). Nevertheless, a good solution approach is: when those experts use environmental standards and impose those upon an economic model, then the model generates such prices. Thus Den Butter (1992) would implicitly support Hueting's approach, but Den Butter (1990) and (1994ab), see below, denounces it, saying that it would be *politics* (and see their deconstruction).

"Usually environmental specialists consider a more restricted definition of sustainable development. Their definition often includes explicit norms for a reduction of pollution."

Comment: Here he recognises that experts develop standards for environmental sustainability – which is something else than politics. (It is politics to *respect or not to respect* such standards.) (See the discussion above on a test on disease X.)

"When the environmental experts have established the various trade-offs between the component parts of the index, politicians should determine the trade-offs between the pollution of the environment and the other policy goals in the macroeconomic welfare function. (...) Once these policy choices have been made explicit, economists are able to calculate the shadow price of the environment."

Comment: There are different categories of shadow prices.

- For eSNI, there are shadow prices at environmental sustainability.
- Instead, Den Butter specifies a situation that politicians say that they aspire environmental sustainability but *in practice* deviate from it by making other choices. Den Butter then calculates such shadow prices on actual policy that are malinformative on sustainability but that are informative about what policy makers are really aspiring. (If an expert does not agree with those new prices then, according to Den Butter, the expert is doing *politics*, while the politician performs the task of the *expert* in establishing the prices for the malinformation.)

Den Butter (1992) observes that experts need not have consensus, and perhaps might be tempted to play political games instead of safeguarding their professional expertise. This awareness of Public Choice is recommendable. However, he decides to rely upon the "tricks" in "econometrics" (and Verbruggen would hold that he is more qualified to propose tricks than Hueting):

"However, such perfect quantification is still an utopia. At present there is an enormous lack of appropriate time series data on all specific aspects of pollution and there is no consensus amongst experts on the trade-offs between these aspects. Therefore we will dispense with the idea of constructing an ideal index and concentrate on some scarce time series information on pollution which is readily available."

Comment: While perfection is required for the Tinbergen & Hueting approach, this is not required for what Den Butter proposes to do, which is unbalanced.

39.6.4 *Principal components, averages and CES*

Den Butter (1992) considers principal components in various time series of environmental indicators, but also: "As an alternative for the principal component analysis we have combined the indicators by calculating simple index values." He uses arithmetic and geometric means. In addition, he also considers a Constant Elasticity of Substitution (CES) function.

"When similar indices are constructed for several neighbouring countries, regression and/or causality analysis may reveal how much domestic pollution can be attributed to pollution abroad, and to what extent a reduction of the level of pollution can be induced by domestic environmental policy measures. In this way, the pollution indices and the resulting environmental "trade balances" may constitute a basis for international negotiations on worldwide policy measures to deflect pollution."

Comment: The latter statement of awareness about the importance of an environmental index may also be the expression by a monetary economist discovering global environmental issues in the wake of the Brundtland report. The new kid on the block starts explaining the situation to the seasoned experts.

Den Butter's method seems dubious from the start, without a reasoned intuition why it would work for what purpose, and the exercise at least had the benefit that the paper shows that is a dead end street indeed.

39.6.5 *Main conclusion*

"Yet we see that the majority of the indices constructed by us, still show an apparent correlation with national product. It does not imply that deflecting economic growth is a necessary condition for our environment to become less polluted, but it does imply that stringent policy measures are needed to refrain pollution from running parallel to economic growth (see also Pen, 1990). The main conclusion of this paper is, however, that much more time series data and experts' opinions on trade-offs are needed for the construction of a mirror of cleanliness, in order to grant it just some practical relevance."

As a comment on the latter conclusion, and the deconstruction of this paper in general, we can conclude that Den Butter (1992) – and its Dutch companion Den Butter (1990) – are substandard compared to Hueting et al. (1992d) and that it is awkward that Den Butter doesn't refer to such work, including Tinbergen & Hueting (1991), to measure up to what he himself is doing. If we didn't know better then we would regard this behaviour as autistic but it is unscientific anyway.

39.7 *Den Butter & Verbruggen 1994a April*

39.7.1 *Article and abstract*

Den Butter & Verbruggen (1994a), "*Measuring the Trade-Off Between Economic Growth and a Clean Environment*" (BVa) has Dutch companions, see Den Butter & Verbruggen (1994b) (BVb) and Den Butter, Hofkes, Verbruggen (1994) (BHV) discussed below. The BVa abstract reads:

"This article surveys various aspects of the measurement of environmental quality from the view point of national accounting and welfare economics. It focuses on the question whether GNP or NNP should be corrected for environmental change ('green' or 'eco'-GNP) or whether physical accounts provide sufficient information for an assessment of the trade-off mentioned above. We conclude that valuation of (services from) environmental capital cannot be avoided for such assessment, but can only be made using a model based approach. Statistical agencies should continue to collect data on environmental quality and to *value changes in environmental capital in the context of national resource accounting*. However, official statisticians should refrain from correcting GNP or NNP for environmental change, as this correction implicitly contains a political judgement and cannot be based on mere technical knowledge." (my italics)

39.7.2 Overview assessment

The last statement in this Abstract apparently is their main worry, and likely also their cause to write the paper. The Abstract suggests that the article gives reasons why eSNI is politics but the article effectively shows no such reasons but only a value judgement that eSNI would be politics. The article propounds at the start that the choice of environmental standards would be political. The conclusion repeats this, as if there has been reasoning about it in the body of the paper, quod non. It is only with some effort that we can reconstruct why the authors might have come to their value judgement that there would be politics. They do not clearly develop the argument, and thus this reconstruction of ours is only tentative.

Den Butter and Verbruggen (1994a) (BVa) claim to present a survey but effectively concentrate upon the Tinbergen & Hueting approach in welfare economics and national accounting, with a focus on Hueting et al. (1992d), the methodology M44. The latter appears to be their only reference.

BVa actually copy the structure of their article from the Tinbergen & Hueting approach. It would have been more forthcoming when (i) BV had clearly stated their focus on the Tinbergen & Hueting approach, (ii) had given a fair representation, and (iii) then given their comments. The article is a put-down by misrepresentation, and this put-down is sold as a survey as if the put-down is not the very objective of the paper. The article suggests that other econometricians would not be able to see what they are doing here, though perhaps non-econometricians might fall for it.

39.7.3 Eye-openers

BVa:202:

“The main objection against this method is that the costs of repair are not necessarily equal to the welfare losses associated with that environmental damage.”

Comment: Costs are in money and welfare losses are in utility. The Tinbergen & Hueting approach clearly focuses on income.

BVa:202:

“Moreover, we may consider the more principal question why we should correct national income anyhow. The present calculation of national income, following the national accounting guidelines, is based on (the value of) market transactions: if we would like to include externalities due to market failures into our definition of income, national income should be corrected for all (positive and negative) externalities and not solely for environmental change.

Comment: (i) It is up to other authors to take up other externalities. (ii) The Tinbergen & Hueting approach concentrates on $e\Delta = NI - eSNI$ because of the environment, and, within this, in particular ecological survival. Their contribution should be appreciated for what it is, and it is not relevant that one can point to golden pots at the end of the rainbow for other issues. (iii) BVa do not mention the criticism that the notion of NI is a misleading concept w.r.t. the environment, and

that Hueting (1974a, 1980) has established that *the environment also falls under economics*, and thus also economic accounting.

BVa:202 combine these two earlier points:

“The argument that a correction for environmental change improves national income as a measure of welfare is ambiguous as well. There are many other quantifiable aspects of economic welfare: why correct national income for environmental quality but not for a skew income distribution or high illiteracy? Incidentally, human development indicators or quality of life indicators provide such composite measures of national welfare.”

Comment: The Tinbergen & Hueting approach is about income and not welfare. It is about environmental sustainability and not about other issues.

A major point is BVa:200:

“In Hueting's reasoning, the official pursuit of sustainable development by governments can be conceived as a societal expression of preference for the sustainable use of the environment.”

Comment: Hueting employs *assumptions* and not policy statements. Hueting et al. (1992d:6) clearly state:

“For this the standard for a sustainable use of the environment has presented itself. [fnt to “In accordance with the recommendations of the Brundtland committee the concept of sustainable development has been adopted in Dutch government policy.”] (...) The calculation is therefor based on the *assumption* that the perpendicular in Figure 1 reflects the intensity of the individual preferences for environmental functions.”

There is a clear difference between what happens in an economy and policy statements by government. (For the statement above: “adopting a concept” is something else than accepting a policy target.) The crucial contribution by Hueting concerns the recognition that measurement of “national income” is conditional to assumptions on preferences. Hueting's reference to the official government goals only enhances the legitimacy of this conditional approach, but should not be confused with Hueting's contribution itself. On occasion Hueting may have contributed to such confusion by not always emphasising this distinction, but if BV had read Hueting et al. (1992d) properly, and read and referred wider about Hueting's work, then they would not have made the mistake of attributing to Hueting the simplemindedness that only the official government policy matters.

One might call it a minor point that BVa:199 are confused about stocks and flows. However, such confusion basically shows that BV did not really study M44 at a deep level.

“The *environmental* degradation is valued at the yearly costs which are necessary to enhance the availability of environmental functions – Hueting's terminology for services from environmental capital – to their standards for sustainable use.”

Comment: The latter is wrong. Environmental functions are “possible uses” and thus a stock (or “environmental capital”), and services are “uses” and thus a flow. See Section 7.10.

39.7.4 A “survey” that is no survey

Some elements are curiously missing in what is presented as a “survey”:

- BVa refer to Den Butter (1992) in the volume by Krabbe & Heijman 1992, but not to the article by Hueting in that same volume. It would have been more forthcoming, also to the referees, to alert readers to that publication as well.
- BVa refer to the volume by Kuik & Verbruggen 1991 *“In Search of Indicators of Sustainable Development”* but not to the contribution by Hueting in that volume. It would have been more forthcoming, also to the referees, to alert readers to that publication as well.
- The 1994 paper does not refer to Tinbergen & Hueting (1991), and thus this “survey” does not alert its readership to the support given by Tinbergen.
- BVa refer to other CBS work, by Frits Bos 1992 about the history of national accounting and by Steven Keuning 1992 on the NAMEA, but do not protect Hueting from misrepresentation by Keuning. The incompleteness by Bos can only be shown by us for a later paper, but for a “survey” it might have been an option for BV in 1993 to ask Bos how the Tinbergen & Hueting 1991 paper fitted in his description of the history. What is missing is that the NAMEA and SEEA systems are very much based upon earlier work by Hueting and Canadian statisticians to create these environmental statistics in the first place. Keuning’s contribution is to formalise the link with the national accounts, which his precursors at the NA department were not open to, but he should have included Hueting in the list of authors.
- In addition to the referees, the authors thank seven authors for useful comments, including Keuning (eSNI is politics) and Opschoor (claim of a new notion of ecospace, but of 1 point). Hueting is not mentioned. Either they didn’t ask Hueting for comments, or he did not reply, or his comments didn’t merit thanks. The article suffers from needless drawbacks that might have been prevented by comments by Hueting. It is neither clear whether the authors alerted Hueting to this paper in the journal *Environmental and Resource Economics*, with thus the option to write a rejoinder. It is not clear whether the referees asked for Hueting’s comments, and if not, why not. (Some referees apparently allow that an author is misrepresented without giving the option to comment at the draft stage. An editor-in-chief might object that this option then should be given to all references, but a practical approach is that it would at least be considered for a (“special attention”) author who receives a negative conclusion.)
- The authors present a section with a “survey of the literature” with also some history, but do not refer to the thesis Hueting (1974a, 1980) that already provides such survey and history, albeit obviously not after 1980, and who establishes *that the environment falls within the subject matter of economics and thus also national accounting*. Everyone has the freedom to rework surveys and histories from earlier books, but it is not okay to leave scope for doubt whether the Tinbergen & Hueting approach would not have been

developed with such awareness of the literature and history. What is missing is a statement like: “This survey and history is also known by Hueting and likely other writers about this subject, so we only repeat it for novices.”

- BV (1994a) uses the term “economic growth” for production growth and thus show themselves unsensitive to Hueting’s analysis on the misleading character of the term. They do not mention the issue at all, leaving out a key element in the reasoning to regard the figure of NI as misleading.

39.7.5 A “survey” that invents put-downs

BVa:188 state:

“Two alternative methods are proposed for the statistical registration of the trade-off between economic growth and the state of the environment. The first method is to correct, in one way or another, GNP for environmental change and arrive at a so-called environmentally adjusted GNP: ‘green’ GNP or eco-GNP. The other method is to calculate one or more physical indicators for the state of, or the pressure on, the environment and to relate these indicators to GNP growth.” (...) “calculation of a green GNP implicitly defines an overall indicator for the state of the environment, namely the difference between the traditional GNP and the corrected figure for GNP. Most proponents of a green GNP will not advocate publishing the corrected data for GNP *instead* of the traditional GNP, but will advocate publishing both data series, so that such implicitly defined indicator can always be computed from the published data.”

It is a put-down to say that $e\Delta = \text{GNP} - \text{eGNP}$ would be “implicit”. Hueting (1974a, 1980) already proposed to calculate this distance, and to have the figures alongside each other.

It is incorrect to suggest as if these would be two methods. The calculation of eSNI obviously requires “more physical indicators”. Tinbergen & Hueting also require these, and do not suggest to suppress them and only publish $e\Delta$. At issue is only that $e\Delta$ is published alongside the other indicators, as another physical indicator of the state of the environment. This way of presentation is like presenting the choice “your money or you life” to make it seem as if you get a good deal by keeping your life while in reality you are robbed from your money.

The physical aspect of $e\Delta$ is a minor point, but it goes to show that BV have not properly studied Hueting’s work and haven’t noticed some aspects that open to see and not hidden in his work. Namely, they miss that Hueting insists that $e\Delta$ is a physical indicator as well. When nominal figures are deflated to volumes, then the price index concerns a physical basket of goods and services, and the underlying prices concern physical units like “dollar per liter milk” or “dollar per doctor time”.

BVa:188 state about “correcting national income”:

“It affects the definition of national income and requires an amendment of the theory of national accounting.”

Comment: (i) The term “correcting” is not the same as “replacing”. (ii) The SNA contains various notions of “national income”, like GNP and GDP. It is curious to

suggest that the notion of *income* doesn't allow more aspects. (iii) The theory of national accounting *has already been adapted*, namely by Hueting et al. (1992d). BV curiously suggest that there is some authority that provides a stamp "belongs to theory of national accounting". (It is true that Den Butter became involved in co-authoring a textbook (with Compaijen) that included discussion of national accounting, and perhaps he saw himself as in a position of authority, but it goes too far now to check here whether he abused his position by misrepresenting eSNI there too.)

BVa:192:

"Up till now, this survey of the literature focuses on national accounting and on the measurement of environmental change and sustainability within the field of descriptive statistics. On the other hand, the theory of economic growth provides the proper framework for a model based analysis of the trade-off between economic activity and environmental change."

Comment: (i) Why is it not explicitly stated that the latter can be used for inferential statistics ? (ii) Why is it not clarified that Hueting looks at statistics and not policy making ?

BV then present an "archetypical" ("corn") model with a distinction between "physical capital" with depreciation and "environmental capital" with extraction and regeneration, and a parameter value for a "fully regenerated environment". There is consumption but no population. The optimand is the discounted flow of continuous utility (social welfare) based upon consumption and (for sustainability) the stock of environmental capital. Whether consumption depletes the environment depends upon the functions for production and utility. There is no role for a population. From this archetypical model they switch to their ideas how an empirical model might work. It is a valid scheme in econometrics to switch from a small model to an empirical model, but the validity is based upon the quality of the argument, and it is not valid to just do it without proper argumentation.

"Hence, a full assessment of the trade-off between these policy targets is only possible within the framework of an empirical model of the economy."

This employs the language of future policy making, while Hueting targetted for statistics of the past. Originally Hueting allowed for rules rather than a model. The discussion with Keuning, and perhaps also BV, and the notion that it is no bottleneck to find an economic model, caused him to accept the use of a model. From this discussion by BV it cannot be concluded that there could not be a useful estimate of eSNI without the use of a model. The small model that BV show here only serves illustrative purposes and it does not some crucial aspect that has been overlooked by Tinbergen & Hueting or others.

BVa:196 refer to Mäler 1991 and summarize their take of his conclusions. They claim that NNP need not be amended for asymmetric bookkeeping. At this point it must be mentioned indeed that econometrics allows for the conceptual shift between "archetypical" and full scale empirical modeling, in which SWF

optimisation is replaced by demand functions and government policy targeting. For the latter setting, the Tinbergen & Hueting approach to asymmetric bookkeeping remains relevant.

Notwithstanding their reference to (their ideas about) an empirical model, BVa:197 however stick to the world of the archetypical model:

“Although most certainly the economy will in fact deviate from its optimal trajectory, in the context of a growth model valuation at optimal prices seems the natural way of valuation.” fnt: “our model is merely to illustrate the distinction between the technical and the judgemental aspects of the problem.”

Thus they agree that their ideal cannot be attained (like perhaps also the archetypical model that might be unsolvable), but they still use its ideal properties to criticise researchers (like Tinbergen & Hueting) who want to become practical ... By analogy, this is like rejecting that a car has wheels because such wheels cannot be perfectly circular.

It took quite an effort to deconstruct this article, to trace what it might have to say. The present deconstruction suggests that their problem resides here, in the tension between archetypical ideal and empirical reality, and which tension gives them the “argument” that experts can usurp political judgement. For them it is:

- *The optimal path is chosen by politicians. When experts adopt this optimum then they are merely following politics and not doing politics themselves.*
- *When experts guess at optimality but fail to hit true optimality then they actually make political choices in deviation of optimality.*
- *Empirical models cannot create ideal optimality and thus experts using models can be expected to always make political choices. Only descriptive statistics would still be non-political.*

Their view comes from thin air, does not form a substantive argument, and thus doesn't warrant a place in their section of conclusions as if they have proven something. Merely posing your opinion is not what a scientific article is about. BV refer to an ideal-typical world such that in empirical reality “everything is politics”, except when statisticians hide behind “descriptive statistics”. They forget that the real world has a distinction between politicians in parliament and experts at the national research institutes. This is a distribution of labour with professional standards. Economic research is not some discussion about unattainable ideals.

Subsequently, the statement about descriptive statistics requires deconstruction, which BV fail to do.

BVa:197-199 discuss research on shadow prices, namely dose-response methods, implications from market behaviour (people can foresee disasters but still suffer them) and contingent valuation. A key reference for them is Hoevenagel, also at VU. It is not clear to what extent Hoevenagel is aware of Hueting's objections to these various valuation methods, that caused Hueting to develop eSNI. However, BV agree:

“Moreover, valuation problems in national accounting are of a different order of magnitude than the actual measurement of the costs of

environmental damage reported above which relates mainly to the micro level.”

Up to here, BV haven't reported anything that wasn't known *grosso modo* to researchers in this field. They only insert their perspective from idealism. Now they reach their target, namely their “assessment of Hueting's method”. BVa:199:

“The major innovation of Hueting's methodology is that he 'solves' the valuation problem by using technical standards *for sustainable use of the environment* as a yardstick instead of the stretchy concept of sustainable development.”

Comment: Why the quotes for “solve” ? Even with such quotes, this interpretation might only be illuminating for who focused on sustainable development (i.e. thinking about the solution path of the “archetypical” model, assuming that it would be solvable; otherwise likely without a clear definition what such a path would be). For readers who have been educated about the Tinbergen & Hueting approach there is no need to focus on sustainable development (with such caveat), for it suffices to develop standards for environmental sustainability.

In the BVa:193-196 discussion of their archetypical model, there is little attention for sustainability. Now, in the context of “assessing” Hueting's work, BVa:200-201 consider how a notion of sustainability can be formulated.

“Our first concern is with the concept of sustainable use which constitutes the key to Hueting's calculation of the costs associated with stocks and flows of environmental degradation. One could define sustainable use in a narrow sense, (...)”

Comment: This is awkward. Hueting did not formulate their archetypical model, and obviously Hueting refers to a population which is missing in their model. Thus, BV should have discussed their notions of archetypical model separately, and not mix it with a discussion about Hueting, and also have given a fair representation of what Tinbergen & Hueting are doing.

BVa:201:

“It is unclear how this time horizon and the appropriate discounting is determined in Hueting's method.”

Comment: Why would this be unclear when Hueting has always clarified that the adaptation is assumed to be instantaneous. If it is unclear, ask him, with provision of a reference that can be included in the list of references.

BVa:201-202 have the construction that (i) environmental economists disagree about a definition of “sustainable development” (for the future), (ii) Hueting provides a definition of “sustainable use” (for statistical purposes), (iii) Hueting doesn't solve the first whence something would be amiss with his approach.

BVa:202:

“Although Hueting's method assumes that for each aspect of the environment technicians are able to indicate sustainability standards and to calculate the costs associated with complying with these standards, we

still face the problem of determining the desired state of the environment. [Yes, politicians still must make decisions about policy.] This problem is obviously related to the definition of sustainable economic development, in spite of the distinction made by Hueting between sustainable use and sustainable development. However, after the concept of sustainable economic development has been introduced in environmental economics, a large number of alternative operational definitions for this concept have been given. These definitions yield an equal number of different sustainability standards for the state of the environment. For example (,,,) Hence, there is no unanimity amongst economists about a proper definition of sustainable economic growth and hence about the state of the environment, which is desired from that perspective; neither will there be with environmentalists or technicians about sustainable use of the environment. Therefore, we still face the problem of the valuation of environmental change.”

Comment: A non-sequitur. When a car is presented for driving on a road, why criticise that it cannot fly ?

39.7.6 *More artificial objections created by misrepresentation*

BVa:202:

“Moreover, sustainable economic development (or sustainable use) relates to a hypothetical reference scenario in which production prices may deviate substantially from actual production prices. The conventional measure of national income in the reference scenario cannot be, for that reason, equal to that of actual income. It implies that a measure of sustainable national income does not only differ from the conventional figure of national income of the national accounts because it includes a correction for environmental damage, but also because national income itself has changed in this hypothetical situation.”

Comment: A national income of 1990 can be compared to a national income in 2015 by means of deflating to constant prices. The Tinbergen & Hueting approach uses standard techniques to compare levels of income. One of its strengths is that it employs such standard techniques. (Den Butter’s experiment with principal components, averages and CES also uses rather common techniques but less transparent than the notion of national income.)

BVa:202

“Another major problem with Hueting’s correction method in particular, and calculation of a green GNP or eco-GNP in general, concerns the use of income as a measure of welfare.”

Comment: The Tinbergen & Hueting approach explicitly distinguishes income and welfare, and warns about using income as a measure of welfare. Clearly BV have not properly read the work they are “surveying”.

Instead of studying the work, BVa:203 try to guess what the Tinbergen & Hueting approach is, in terms of some options:

“Hueting’s proposal seems to accord with goal 3” and “For instance, when actions to prevent damages are cheaper than actions to repair damages the corrections with respect to goals 2 and 3 will differ.”

Comment: There is no need to guess, because they could have quoted what it does. The Tinbergen & Hueting approach orders measures according to their cost-effectiveness in abatement curves. BV falsely suggest that there is unclarity about this.

“Yet, Nyborg convincingly demonstrates that the methodology for calculating the correction may vary with the purpose of the correction.”

Nyberg’s comment does not preclude that the Tinbergen & Hueting approach has particular purpose, clearly stated, and useful for the policy making cycle.

39.7.7 BVa’s evaluation

BVa:203 is packed with distortive statements, and we can only deal with this by putting comments within brackets:

“This article surveys [Does not survey] problems associated with the measurement of environmental change in national accounting. It considers two [“your money or your life”] different procedures for statistical registration of data which are designed to reveal the mutual relationship between economic and environmental factors. [With a confusion by BV of statistics and planning.] The first procedure is a direct correction of GNP (or NNP) for environmental change which yields an ‘environmentally adjusted’ GNP (NNP). We amply discussed the method proposed by Hueting in this respect. [No, BV discussed their misrepresentation.] The second procedure purports the construction of satellite accounts containing information on environmental factors. [This however is not national accounting but the presentation of environmental statistics.] This information in satellite accounts relates to physical indicators, which can be juxtaposed to the conventional welfare indicators in a social welfare function. [The issue is national accounting that uses money and not welfare maximisation with some SWF.] In that case, shadow prices for environmental capital can be deducted from welfare optimization (...) so that the monetising of environmental change is left to the users [Tinbergen & Hueting do not hinder this use, and Hueting has developed such statistics] of the satellite accounts. [But, doesn’t policy making benefit from some consensus, at least about the terms in the discussion ?] On the other hand, calculation of an adjusted GNP implies an immediate [BV said that they allow use of the indicators, and now they disallow this use ?] monetising of environmental change, based on an implicit model. [Why would this be implicit ? Why would the Tinbergen & Hueting approach not publish details in a transparent way ?]”

Creating satellite accounts is *not* the same as “measurement of environmental change in national accounting.” At the CBS dept. of environmental statistics, Hueting already developed such statistics. Hueting never stated that these statistics were no longer needed and that only eSNI needs to be published. The

NAMEA and UN SEEA only reorder Hueting's statistics for an updated order of the national accounts. Re-arranging is not national accounting. When you put tubes of colour paint into some order you do not have a painting yet.

Recall the decomposition on p475 with $e\Delta = y p_y - y_e p_e$ and $e\Delta = u p_u - s p_s$. In above quote BV forget about the distinction between use and standards. They implicitly suggest that everyone can derive their own standards with shadow prices perhaps like $e\Delta = u p_\Delta$. Well, perhaps, but the relevance of the Tinbergen & Hueting approach is its foundation in economic analysis, practice in economic statistics and the environment, and target at providing information for policy making. National statistical offices are advised to employ the best experts and resources that they can find. Let the process be open so that other users can see what they can do. But do not suggest that such openness precludes the responsibility by statisticians to stop publishing only the misleading figure of NI.

BVa:204:

"Two major problems are connected with the construction of economic data on the environment: -- the kind of analysis for which the data are used; -- the valuation of environmental change."

Comment: Why is the word "problem" used for the first category? The Tinbergen & Hueting approach is very clear about the purpose and kind of analysis.

BVa:204:

"The valuation problem has a technical and a judgemental dimension. Within the theoretical framework of a model of macroeconomic growth these dimensions are readily separable."

Comment: So what is the problem ?

BVa:204:

"However, practice does not allow such clear separation of the technical and the judgemental dimensions of the valuation problem. This is our main criticism of Hueting's argument that his definition of sustainable use would solve the valuation problem by making it a sheer technical one. We believe that his method, and for that reason each calculation method of an environmentally adjusted GNP, still implicitly contains judgemental choices which are political and not technical choices."

Comment: (i) This is the argument that a car better has no wheels since those can never be perfectly round. (ii) If you think that something goes wrong in practice then explain this.

BVa:204 again requires the method of commenting withing brackets:

"The judgemental problem relates to the specification of the utility function (weights attached to environmental quality in relation to other macroeconomic policy goals), [Commonly the empirical demand functions concern consumer goods and there is no explicit preference on the environment since such (contingent) valuation is elusive] the choice of the discount rate (measure of time preference and altruism with respect to future generations) [Tinbergen and Hueting have a zero rate] and the selection of the sustainable or 'desired' level of environmental

capital. [The latter are derived from the scientific literature] The latter is implicitly determined by optimal growth [Perhaps in the archetypical model for future planning, but in the Tinbergen & Hueting approach to statistics, environmental sustainability follows from standards derived from the scientific literature], when the specification of all required functions and all data have been established. In that case, calculation of shadow prices of optimal growth solves the valuation problem.”

Comment: All this circumstantial deliberation would not have been needed if BV had simply explained what the Tinbergen & Hueting approach was, and then had given their criticism. Still, what is wrong with their method ? We are still no further than the insight that an empirical model with restrictions (eSNI) generates another solution than an empirical model without restrictions (NI).

BVa:204-205:

“We realize that the aggregation of environmental indicators to one or a limited number of general indicators on environmental quality [like Den Butter with principal components, averages and CES] also involves an element of judgement in case these various aspects of environmental quality enter into the utility function separately. [A model may use empirical demand functions and no SWF.] However, in case of separability in the utility function it becomes a two step problem. [Open door, the definition of separability is that you can do this, so what ?] In the first step the various aspects of environmental quality are valued amongst each other, and in the second step the value of environmental quality is judged against the other aspects of economic welfare. [ftnt] This judgemental valuation of the second step should not be made by statistical agencies without an extensive sensitivity analysis.”

Comment: The Tinbergen & Hueting approach concerns income and not welfare. If the argument is that the economic model cannot be trusted, then say so explicitly instead of creating a confusion of income and welfare. Everyone advises to sensitivity analyses. Argueing for sensitivity analyses is something else than a conclusion (in the Abstract) that “official statisticians should refrain from correcting GNP or NNP for environmental change”.

BVa:205:Table I: This is again the “your money or your life” misrepresentation of the “two” methods. In the Tinbergen & Hueting approach the physical indicators obviously remain available. BV create a scare-mongering dilemma as if there would be a choice between either one or the other. They adorn the GNP-correction (alongside GNP) with misrepresentations: (i) a “implicit judgement” while everything is documented, (ii) as if monetising might be bad in itself, (iii) as if there is another purpose than calculating $e\Delta = NI - eSNI$, (iv) as if only “optimal economic growth” would be acceptable, while it is unknown and only depends upon *assumptions* whether the current economy is on its optimal path or not, (v) an ex cathedra statement from thin air as if $eSNI = NI - e\Delta$ cannot use abatement curves that also include the costs of repair.

BVa:205:

"In spite of our criticism on GNP-corrections made by official statisticians we advocate that national accounting should proceed along both lines indicated above: construction of satellite accounts (and derivation of environmental indicators) and *an estimation of the money value of environmental degradation (or upgrading)* [my emphasis] in relationship with national production. The official statisticians should try, as much as possible, to harmonise both methods as they are partly complementary. Moreover, it is of great importance that the environmental economists speak with one voice: environmental decay has become too serious a problem to allow that vital policy recommendations made to improve the state of the environment are enervated by public dispute between specialists."

Comment: They accept the calculation of $e\Delta$ but not the calculation of $eSNI = NI - e\Delta$. This advocacy is in contradiction to the Abstract: "However, official statisticians should refrain from *correcting* GNP or NNP for environmental change, as this correction implicitly contains a political judgement and cannot be based on mere technical knowledge." (my italics) Perhaps the Abstract means to say *replace* GNP by eGNP ?

(If Hueting had been doing politics, he might have said in 1994 "Okay, let us calculate $e\Delta$ and forget about the subtraction $eSNI = NI - e\Delta$." However, Hueting clearly has a full theory that includes eSNI and it is science to present the full analysis.)

BVa:206 again mix truisms with misrepresentations, which again requires comments within brackets.

"Against this background we emphasize the valuation problem: economists should not provide a policy diagnose with an implicit political valuation. [Indeed, this is proper science] For that reason [a false suggestion as if there would be implicit valuation], when environmental adjustments of GNP or NNP are made public, the valuation should be made explicit in a sensitivity analysis of the major assumptions of the adjustment method. [Proper science] Moreover, statistical data should not contain an implicit assessment of the trade-off between a clean environment and economic growth; [Proper science distinguishes between statistics and planning, and uses "production growth" instead of the inconsistent terms "economic growth". The "trade-off" should not be seen as a fixed parameter but represents only the notion that the increase of one tends to come with a decrease of the other] only a model based approach enables such assessment. [Proper science might also allow for transparant rules] This article indicates that in that case the trade-off depends on the specification and the parameter values of the (growth) model. [A model and its trade-offs indeed depend upon its specification and parameter values]"

39.8 Den Butter and Verbruggen 1994b

Den Butter and Verbruggen (1994b) (BVb in Dutch) is a companion to Den Butter and Verbruggen (1994a) (BVa in English). The papers are much alike but

no direct translation of each other. BVb again refer to Hueting et al. (1992b) only (or its 1991 Dutch precursor). The BVb article is in the Dutch journal "Milieu", for environmental sciences or studies, and not targeted at economists. It may be doubted that Hueting was consulted on a draft, see above on BVa. It is not clear whether Hueting was informed about this publication and whether he was given the opportunity to respond in its columns. It again supports the calculation of $e\Delta$ but rejects the calculation of $eSNI = NI - e\Delta$ while the latter is a direct implication. Its Abstract is:

Most economists nowadays agree that the environment is priced too low. However, it is subject of controversy how this phenomenon must be treated in economic statistics. Must we calculate, in the context of national accounting, a figure of national income adjusted for environmental degradation, a so-called 'green' or 'eco' GNP, or does it suffice to have a small number of physical indicators of environmental quality to provide for sufficient information for adequate environmental policy? In this article we argue that we need to know the price of the environment if we want to arrive at a good valuation of the environment in the national accounting. In a previous article we have indicated that the correct price of the environment can only be calculated within the hypothetical framework of a growth model. This requires complete knowledge about the technical relationship between the environment and economic development and about political preferences. Because this knowledge is not yet available and because national accounting cannot be based on a hypothetical situation, we do not consider a green or eco-GNP useful in policy analysis, especially since such a number has an implicit political valuation about the trade-off between economic growth and environmental quality."³¹⁹

The latter lines reject $eSNI$, while the following lines accept the calculation of $e\Delta$, and implicitly also $eSNI = NI - e\Delta$.

"But a monetary valuation in the form of a correction on national income blurs the political trade-off between environmental quality and other welfare objectives. *Even when the corrected income is used in policy analysis alongside the uncorrected national income. This does not, however, invalidate that the calculation of repair costs in itself is a useful exercise as part of the environmental assessment.* For political consideration, on the other hand, the use of one or a small number of composite physical environmental indicators is preferable to a seeming correction of national income."³²⁰ (my italics)

³¹⁹ The last lines in Dutch: "Omdat die kennis er vooralsnog niet is en omdat de nationale boekhouding bovendien niet op een hypothetische situatie gebaseerd kan zijn, achten wij het gebruik van een groen of eco-BNP in de beleidsanalyse niet zinvol, temeer daar zo'n getal een impliciete politieke waardering in zich bergt in de afweging tussen economische groei en milieukwaliteit."

³²⁰ Dutch: "Maar een geldelijke waardering in de vorm van een correctie op het nationaal inkomen vertroebelt de politieke afweging tussen milieukwaliteit en andere welvaartsdoelstellingen. Ook al wordt naast het gecorrigeerde nationaal inkomen het

The article confusingly uses the term “value” for *both money and welfare* (utility), while welfare economics and national accounting tend to use “value” for money terms and “welfare” for utility. E.g. one of their confusing statement is:

“Traditional national accounting therefore restricts itself to an factual valuation of welfare and its components in the past (...)”³²¹

The BVb article wants to find the “money value of the environmental stock and its usage” while the Tinbergen & Hueting approach avoids this valuation, namely by focusing on $e\Delta$ for unsustainable use only. Again BVb do not clearly state that the relevant policy concerns environmental sustainability (which the Dutch government namely has stated in its objectives), so that it is legitimate to focus on sustainability, so that it appears that calculation of $e\Delta$ suffices. They don’t really clarify why all their additional information is required that they refer to (which is hard to get anyway). BVb refer to an earlier article that apparently has presented a growth model, but, since they don’t say that $e\Delta$ suffices, this earlier article likely has neither explained that such growth model is not required for the Tinbergen & Hueting approach.

BVb repeat the misrepresentations discussed for BVa.

My editorial problems are: (a) A deconstruction might require a translation back from Dutch into English to show that the misrepresentations in BVa and BVb are basically the same. Obviously there are subtleties in both languages, and translation might be an issue. (b) The BVb article, directed at non-economists in Dutch, may contain expressions and formulations that may sound seductively reasonable while being economically unreasonable. We might make a comparison in Dutch of BVb and below BHV, that was published in the economic-statistical bulletin ESB. (c) Most readers will grow tired from the rehash of misrepresentations, but some readers might want to see a deconstruction of BVb in particular anyway. My solution for these editorial problems is to cut the knot. Here we focus on the papers for economists, namely BVa above and BHV below, and we will not discuss BVb in detail since it is so much alike these other two papers anyway.

39.9 Den Butter, Hofkes and Verbruggen 1994 July

Den Butter, Hofkes and Verbruggen (1994) (BHV) (in Dutch) was published in the economic-statistical bulletin ESB. The list of references does not contain any direct reference to Hueting or Tinbergen & Hueting (1991). Den Butter (1992) did not have any such reference, and was joined by Verbruggen in 1994. While Den Butter did not stage himself as an environmental economist in 1992, Verbruggen did so, namely as deputy director of VU IVM since 1989. While both should have referred to Hueting for his work in welfare economics and national accounting,

ongecorrigeerde inkomen in de beleidsanalyse gehanteerd. Dit neemt niet weg dat de berekening van de herstellkosten op zich een nuttige exercitie als onderdeel van de milieuaardering is. Voor de politieke afweging valt daarentegen het gebruik van één of een klein aantal samengestelde fysieke milieu-indicatoren te prefereren boven een schijncorrectie van het nationale inkomen.”

³²¹ Dutch: “De traditionele nationale boekhouding beperkt zich dus tot een feitelijke waardering van de welvaart en de onderdelen daarvan in het verleden (...)”

Verbruggen should have done so for Hueting's work in environmental economics. BVab had 1 reference, but BHV again no longer. Hofkes steps in with a master in econometrics 1987 and a thesis in mathematical economics 1991.³²² The BHV article refers indirectly to the Tinbergen & Hueting approach, and their references are to authors who misrepresent the approach, like Van Tuinen and Keuning. It is remarkable that the ESB editor (Leo van der Geest) allowed this manner of (non-) referring.

A possibility is that Hueting's work so much belongs to the "home furniture" that researchers no longer feel that reference is needed. For example, BHV in such manner employ the term "environmental function" (p640). However, it remains odd to not-refer. We cannot avoid the inference that there must have been deliberate intentions at VU to burk reference to Hueting and / or Tinbergen & Hueting (1991). It is unclear what such deliberation was (except for the Verbruggen quotes of 2001 and 2019: that he does not regard Hueting as a relevant person to speak with).

BHV (1994):

"Sustainability indicators are normative for two reasons. Firstly, because they indicate a distance that must be transferred between the current and reference values. Secondly, because the reference values are always the result of a political negotiation process and therefore reflect the social preference for a certain environmental quality and amount of environmental capital. Scientific knowledge serves this negotiation process, but cannot replace it."

Comment: (i) This is stated *ex cathedra* and without discussion of alternative considerations. (ii) Standards can also be technical. For example, a circle has a circumference at a fixed distance from a center. Standards can mean the same as a definition. For empirical research, a definition must be implemented in reality, and then empirical considerations are relevant. The latter do not involve a political negotiation process. (iii) This BHV statement is in direct conflict with Den Butter (1992): "Usually environmental specialists consider a more restricted definition of sustainable development. Their definition often includes explicit norms for a reduction of pollution." (iv) Those norms are derived from the scientific literature and not from discussion in national parliament. BHV are no experts in ecology and biochemistry, and still propound upon the competences of such experts.

Subsequently BHV discuss how the system of national accounts and national income can be adapted for inclusion of environmental sustainability. Since they haven't referred to Hueting, they can present such considerations as if such ideas are originally their own. Without a reference, BHV are not forced to specify what Hueting suggested and what their innovation would be. A lack of reference technically means plagiarism. They took the information from elsewhere, since from BVa we know that BV know about the Tinbergen & Hueting approach. It is unlikely that BHV intended plagiarism. Instead, BHV are burking this approach.

³²² <https://web.archive.org/web/20190830095207/https://research.vu.nl/en/persons/mw-hofkes>

It may be noted that BHV speak about “environmental capital”, by which they extend the notion of capital in SNA, see the discussion in Section 7.10 about terminology.

“It seems obvious to treat environmental capital in national accounting in the same way as physical capital.”

BHV might think that Hueting with his environmental functions has no notion of “environmental capital”, and thus needs no reference. However, Hueting has been a pioneer in this issue, should be referred to, and BHV then should have explained, if they really thought so, that Hueting would have no notion of “environmental capital”. They should have checked with Hueting (Dutch mail tends to function) whether they understood him correctly. Subsequently, the issue of terminology as discussed in Section 7.10 could have contributed to clarity in ESB 1994.

BHV repeat the confusion that NI is replaced by eSNI, while Hueting (1974a, 1980) and elsewhere, as in Tinbergen & Hueting (1991) clarifies that NI and eSNI are alongside each other, which is also required to find $e\Delta = NI - eSNI$.

BHV refer to Weitzman, Hartwick, Mäler, then to the subsequent issue of shadow prices, and then propound that eSNI cannot be defined and calculated because of the valuation problem. Again their reference is to abstract modeling with lack of appreciation of the empirical Tinbergen & Hueting approach.

- This basically is in conflict with the Verbruggen (ed) (2000) report on the actual calculation. (The Alleingaing scenario apparently is abused to create a case as if there would be uncertainty.)
- The BHV 1994 rejection of eSNI is also in conflict with Den Butter (2001), already quoted above. He explicitly states that he prefers the formulation with a Social Welfare Function (SWF) and that Hueting prefers the direct imposition of standards, and then states: “Both views do not have to exclude each other. After all, when the environmental quality below a certain limit value in the welfare function receives an infinitely large negative weight, this lower limit automatically becomes a precondition.”

BHV are not proven wrong by the results in 2000 but by their devious way of reasoning. The basic information was already available in 1994. Comparing these statements of 1994 and 2000-2001 only shows that BHV 1994 was premature, and basically derived from an unwillingness by these authors to engage with the work by Hueting. Without apparently studying his work, even though BVab refer to it, they already so much disliked it, that they did not consider it relevant enough to properly read and discuss and refer. They basically employ the simplism “*a standard means that it is normative and thus politics*”, after which everything is judged and rejected from this falsehood. It is like when NASA has put a man on the Moon (Hueting et al. (1992d), methodology M44) and then you tell a story like Jules Verne about a self-invented rocket, as if NASA had made such a rocket, and then you advise against rocketry because your Jules Verne image of a rocket doesn’t work. In 1994 there were no results as in 2000, so that it was easier in 1994 to suggest that the rocket was deficient, but the point here is that their 1994 structure of the argument is deficient.

BHV in 1994 advise the use of “indicators” and suggest that the Den Butter (1992) exercise with principal components, averages or CES function would be more practical. However, they do not prove that principal components, averages and CES are better ways to make an index. Den Butter (1992) is experimental and rather shows that it doesn’t work. He too runs into the problem that he must specify what would be the critical levels for CO₂ and such. There is no indication that IVM VU further developed his approach in the last 30 years (with relevant advice for environmental policy making). A key point remains that BHV are incompetent to judge about standards for environmental sustainability anyway. (Given their rejection of the Tinbergen & Hueting approach, IVM VU might embrace the prospect to further develop the Den Butter (1992) approach, and find some biochemists and ecologists who are willing to say that the Hueting & De Boer (2019b) standards of environmental sustainability are inadequate.)

Remarkably, BHV no longer mention that they support the calculation of $e\Delta$. This omission is too important to neglect. (i) It might be that they still support it but merely do not mention it. In this case we have a deficient article because they have left out key important information about support for $e\Delta$ and inconsistency w.r.t. $eSNi = NI - e\Delta$. (ii) It might also be that they do no longer support it, but then this is such an important retraction that they should have mentioned it explicitly. In this case we have authors who burke what they do not like to admit.

39.10 *Verbruggen (ed) (2000)*

Verbruggen (ed) (2000)³²³ is the final report on the calculation of $eSNi$ for the year of observation 1990. Remarkably this report has not been published at a major publishing firm in 2000 and it remained available only as a report on paper and not as pdf in the VU-Dare system. It came available online in October 2019 after request. Later publications by the IVM team do not contain all details that can be found here. For our present deconstruction, these points may be noted:

- (a) Page v gives the composition of the steering committee, with chairman Den Butter, members Henk van Tuinen (Chapter 25) (without mention that De Boer had been appointed by Van Tuinen to stand in for him in absentia; the steering committee treated De Boer always as member of the Hueting team and not when appropriate as the official view by CBS, notably on the Alleingang scenario), Carl Koopmans (then CPB and now in 2019 at SEO management with involvement with Bert Tieben, see Section 39.17), Eric Bartelsman (then the Ministry of Economic Affairs and now in 2019 at VU and co-editor of the KVS preadviezen, see Section 39.4), and Kees Vijverberg (Ministry of the environment, see Section 43.12).
- (b) Only Chapter 3 by Hueting and De Boer refer to Tinbergen & Hueting (1991) but none of the other chapters by the IVM team.
- (c) Chapter 2 by Onno Kuik is an excellent overview and assessment of approaches in accounting for the environment, except for the lack of reference to the support by Tinbergen for $eSNi$. Page 15: “ SNi assesses the distance between the present and the sustainable level of production and consumption, given to-day’s technology.” With this statement it is

³²³ <http://www.sni-hueting.info/EN/Others/2000-Verbruggen-ed-O00-10.pdf>

remarkable that the IVM team then and later never calculated, graphed and discussed this distance $e\Delta = NI - eSNI$ but only put NI and eSNI alongside. In his retirement lecture, Verbruggen (2018) stated (my italics): “But policymakers and politicians could do nothing with it. Too hypothetical, too far from reality. *Nobody can imagine a sustainable development at a halved income.*” However, the IVM team here bodged in communication and own understanding of the purpose of eSNI, see Section 39.18.

- (d) Chapter 3 by Hueting and De Boer was written before the IVM team scenario's became available and does not contain a protest against the Alleingang scenario. The steering committee and the editor should have allowed the inclusion of the protest that existed when finalising the study. Remarkably, later reports by the IVM team do not refer to that protest either.
- (e) Chapter 4 by De Boer on the standards for environmental sustainability is an important early source in 2000 for deriving such standards for economic modeling. In 2019 there is wide recognition of the relevance of the “planetary boundaries” by Johan Rockström, quite similar to the “limits to growth” of 1972, yet it is remarkable that the IVM team in 2000 did not widely publish their final report in recognition of the important application for an economic model.

Observe that Chapters 3 and 4 use the term “setting standards”, which has the connotation as if CBS would perform the political function of imposing standards upon the world and policy making, while the actual intention is “deriving standards from the scientific literature in order to specify the conditional assumptions”. See also the issue of uncertainty, Sections 7.4 and 5.5. This issue in terminology has been resolved by Hueting & De Boer (2019b). While Hueting (and Tinbergen) had been very clear about this intention, but apparently used words in 1991 and 2000 that might be misconstrued, the IVM team did not aid Hueting and De Boer in clarifying the terminology for avoiding such misunderstanding and misconstruction. Potentially the IVM team did not really study the analysis and took the words at face value and joined in the misconstruction. Obviously there is a case to argue that “if Hueting says that he sets standards and corrects national income, then who are we to argue that he means something different, namely derive standards and calculate conditional $e\Delta = NI - eSNI$ ”, but arguing in this manner is too simple since it is based upon selective reading. By 1991 there had been ample discussion to clarify what the Tinbergen & Hueting (1991) approach is.

39.11 Den Butter 2001

Den Butter (2001) discusses the first VU IVM calculation of eSNI (Verbruggen (ed) (2000)) and concludes, and I label the statements: “(i) All in all, it is clear that this calculation of eSNI cannot be regarded as a simple statistical-technical correction in the system of national accounts. (ii) Hence [false inference] it is good that this model-based calculation, with a number of far-reaching assumptions, was carried out outside of the CBS.”

Comment: (a) It is false that (i) implies (ii), as if CBS can only handle simple things. (b) It is a value judgement to qualify the assumptions as “far-reaching”. (c)

The methodology for eSNI falls under inferential statistics. The notion of environmental sustainability requires a *definition*, if we want to be able to discuss it for statistical estimation and policy making. (d) With this methodology eSNI falls under the scientific mission of economic statistics to calculate and publish eSNI, since calculating only NI is misleading.

The points (a) – (d) have been explained to Den Butter. He does not respond. Was Den Butter chartered by the Dutch Ministry of Economic Affairs to politically contain eSNI with such misrepresentation, illogic and value judgement disguised as science ? Not necessarily, because Den Butter may well have been a willing executioner, for whatever motivates him to behave like this. Perhaps it is only: the illusions of mathematical modeling and “not invented here” ? It may also be that his misrepresentations inspired the Ministry to be hesitant about eSNI instead of support it.

39.12 Den Butter and Dietz 2004

Den Butter and Dietz (2004) (here BD) discuss welfare and sustainability, and manage to do so without reference to Hueting who is a major author on this topic.

They argue that “sustainability” in 2004 has become an catch-all phrase and no longer differs from general welfare (the notion in welfare economics).

“The pursuit of sustainable development is therefore nothing but the pursuit of the highest possible welfare: old wine in new bags.”

For environmental sustainability they refer to WRR 2002 and not Hueting.

They neglect that sustainability, in the period around the Brundtland report in 1987, actually meant environmental sustainability. By this neglect and lack of historical perspective, they put the earlier literature and policy discussion about environmental sustainability into the dustbin of the new catch-all phrase “welfare”. This is a rewriting of history and the scientific literature on a grand scale. It is remarkable that Dietz works at the PBL Netherlands Environmental Assessment Agency.

In a Public Choice perspective, we can observe that the popularity of the notion of sustainability since Brundtland 1987 also was an invitation to the world to join the bandwagon, and to sell one’s own ideas by means of the label of “sustainability”. Also government agencies did so. This opportunistic behaviour and pollution of the notion of sustainability now is accepted by BD, without any memory about the original intentions. Cynically, BD refer to Public Choice but do not employ its critical method.

BD suggest that the societal worry about climate change only arose *after* scientists started issuing warnings. Their argument is badly defined and likely not true. The true story likely is one of interactivity in an increasingly complex society. The worry about the environment started in the 1960s with congestion, pollution and smog, which affect lives directly. This created a social interest in such topics, so that more complex scientific messages about ozone and greenhouse effect could be understood. Much of this information met with skepticism but changing weather patterns are affecting lives directly again.

BD conclude:

“The collection of sustainability indicators can be limited to those which quantitatively measure the relevant trade-offs.”

$e\Delta = NI - eSNI$ clearly measures the relevant trade-off between environmental sustainability and national income (and its production growth), and thus we would expect a support of this. However 5 years later in 2009, see Section 21.11.1, Dietz at PBL apparently participated in blocking the calculation of eSNI with the argument that it would be “too aggregative”, which it is not. Colignatus (2019c) quotes a reply by Dietz at PBL that he still rejects eSNI in 2019 as a “welfare indicator” that is “too aggregative”. The latter is mistaken since eSNI is income and no welfare, and income is not “too aggregative” for the purposes of national income accounting. We can infer that Dietz at PBL has been blocking eSNI for quite mistaken reasons, potentially encouraged by misinformation by Den Butter (and apparently also without real interest to properly study the work by Hueting).

39.13 Den Butter, Chapter 8 in Boumans (ed) 2007

Den Butter (2007) “*National accounts and indicators*” is Chapter 8 of Boumans (ed) “*Measurement in Economics: a Handbook*”. We mentioned it in Section 5.5. Boumans (1992) is his thesis on Tinbergen’s move from physics to economics, and throws some light upon Boumans’s interest in measurement.

Since Den Butter writes a chapter for a *Handbook*, we meet with the whole area that we have been discussing already. A summary is that Den Butter gives the same misrepresentation as we have already seen by him above. We might leave it at that, but for completeness the following can be mentioned.

In this chapter 8 Den Butter explicitly states that Verbruggen “chaired” the IVM team, while he doesn’t mention that he himself was the actual chairman of the steering committee (see the Preface page v of Verbruggen (ed) (2000)). At best, Den Butter should have reported to editor Boumans that he had been involved himself, and was not in a position for this *Handbook* to write an unbiased report (given the criticism that had been received).

De Butter’s manner of referencing:

- Den Butter’s chapter 8 has no reference to Tinbergen & Hueting (1991).
- The reference to Hueting is restricted to the 1992 “methodology” M44.
- There is ample reference to misrepresenting Keuning (1993), Den Butter & Verbruggen (1994), Gerlagh et al. (2002) and Van den Bergh (2005).
- There is also reference to the Bos (2003) thesis about “past, present and future” which however doesn’t refer to Hueting, see Section 7.9. Den Butter thanks Bos for comments and doesn’t thank Hueting for comments (he may not have asked, even though he indicates that there has been “fierce debate” so that readers would want to see an unbiased evaluation).

Here, we identify the Tinbergen & Hueting approach as a revolution caused by Hueting and initiated and supported by Tinbergen, such that the environment and this sustainability fall within the subject matter of economics which also requires a change in national accounting. When the situation is presented in this manner then it makes sense to create a single book or chapter on “*national accounts and environmentally sustainable national income*”.

If Den Butter had understood the Tinbergen & Hueting approach then he would have adopted the same structure of presentation, or, if he did not agree with such structure, then he might have suggested to the editor of the *Handbook* to assign a separate chapter to Tinbergen & Hueting approach. Their approach is directed at measuring the distance $e\Delta = NI - eSNI$ concerning ecological survival, which is not quite the same as “*national accounting including something about the environment in satellite accounts*”. However, Den Butter apparently did not understand the approach and apparently disagreed with it in such manner, that he arrived at the current setup of his chapter 8, namely by subsuming only Hueting (no Tinbergen) under the general heading of “*national accounting (in conventional manner, without Hueting)*” (no quote). Thus we see a distraction w.r.t. $e\Delta$ by a discussion of all kinds of other issues of national accounting. This is like classifying a hangover and chemo-therapy under the common heading of “effects of substances”, or like dividing medicine in “effects of pills” versus “other”.

39.13.1 Role of this chapter 8 within the Boumans (ed) book

Boumans (ed) (2007) is about *measurement in economics*. Boumans's introduction to his book clarifies the distinction between accuracy (centered around the *bull's eye*) and precision (nearness of results). Section 5.5 above uses the distinction between validity and uncertainty. The figure of standard NI might be more precise and less uncertain for tax purposes but it is invalid and highly inaccurate for the issue of the environment and ecological survival. The uncertainty about $eSNI$ cannot be used to reject its validity. Hueting (since 1986) has made a key contribution to the theory of *measurement in economics*, see Chapter 19 above. He has the revolutionary insight that measurement of national income cannot be done properly without conditional assumptions about preferences on environmental sustainability. Den Butter was chairman of a project to calculate Hueting's $eSNI$. Thus, when Den Butter writes his chapter 8 about national accounting, then Den Butter could have been a perfect intermediary to report Hueting's revolutionary insight. Unfortunately, Den Butter apparently has always failed to appreciate that Hueting has made a key contribution to the theory of measurement in economics, the very subject of the Boumans (ed) book.

Since the Tinbergen & Hueting approach is a no-brainer for econometricians, professor of econometrics Den Butter likely never properly studied Hueting's analysis, entertained some bias from the start (e.g. that the conditional assumptions would be politics), joined in the Alleingang misrepresentation (suggesting that $eSNI$ would not be clearly defined) and he puts all this bias in his chapter 8, but in such manner that readers do not see what is happening.

Den Butter's chapter 8 thus is deficient since it does not give the available information about *measurement in economics*, the purpose of the book.

Apparently, Den Butter did not inform editor Boumans about Hueting's contribution to the *measurement in economics*, with his revolutionary approach. This deficiency is not itself a reason to request a retraction of this chapter 8. If Den Butter doesn't see something then he only properly reports what he sees.

However, Den Butter also gives a misrepresentation so that a request of retraction is in order. If Den Butter had properly presented the Tinbergen & Hueting approach as its authors had presented it themselves, then readers of this

chapter 8 would have been able to observe themselves that Hueting had made a key contribution to the theory of *measurement in economics*, and readers (like editor Boumans) would have wondered why Den Butter did not say so directly.

See Section 7.9 for our distinction between tradition and convention. We mentioned the history writing by Frits Bos, who neglects the tradition in national accounting, and who gives a conventional view that basically neglects Hueting's contribution in the tradition of national accounting as presented by Tinbergen. Den Butter joins with Bos. The distinction however is that Den Butter was chairman of the steering committee of the final report Verbruggen (ed) (2000), which contains a chapter by Hueting & De Boer that refers to Tinbergen & Hueting (1991). In this case there is evidence that Den Butter must have known about Tinbergen's support in line of tradition, while Bos might claim that he never knew.

39.13.2 Subsumed under conventional measurement

Den Butter (2007) states about his section 8.8:

"This section also gives examples where the conceptual problem of measurement and use has been subject of fierce debate, such as the use of NA statistics as welfare indicators and the correction of national income for environmental degradation."

Comments: (a) This reduces a revolution to "examples". (b) It downgrades to "fierce debate" what Tinbergen, Hueting and De Boer have been presenting in modest scientific manner, and while we can observe *factually* that other researchers have been listening badly, misrepresenting, neglecting and burking the analysis, and an *ad hominem*. (c) The statement by Den Butter is self-serving.

39.13.3 Subsumed under national accounting in conventional manner

The abstract of Den Butter (2007) is:

"National accounts generate a variety of indicators used in economics for determining the value of goods and services. This chapter highlights two problems in the measurement of such indicators, namely the construction of the data at the macro level using individual observations from different sources, and the interpretation of the data when economic relationship are empirically investigated using these data at the macro level. The chapter pays ample attention to the institutional set-up of national accounting, and to the use of indicators derived from the national accounts in policy analysis in various industrialised countries. Major difficulties in interpretation arise when the indicators are used in the assessment of (social) welfare and in separating developments in prices and volumes."

Den Butter (2007) apparently regards the environment as separate from economics and national accounting, and thus takes the point of view as if there is no Hueting (1974a, 1980), which thesis has shown that the new scarcity causes that the environment is an essential part of the subject of economics and national accounting. Remarkably though, Den Butter's chapter still subsumes the environment under the heading of national accounting, but apparently only with

the intention to show that eSNI turns accounting into *politics* so that it must remain outside of a Bureau of National Statistics.

39.13.4 *The use of NA Indicators in welfare and policy analysis*

In welfare theory, there is a clear distinction between welfare and income. Income is additive (somewhat assuming the *law of one price*) but the treatment of welfare depends upon assumptions. The strong assumption of a Bergson welfare function would still allow only that income and welfare under constant prices would move in the same direction, but the “amounts” of change would still be incommensurable.

For a *Handbook*, Den Butter is obliged to mention some special cases when “real NNP growth indicates welfare improvement” and to point to “a substantial correlation with (...) indicators of non material welfare, such as child mortality, (...)”. He then proceeds to the “however” part, with lack of data, index numbers, measurement of quality, keeping track of your telephone service plan, advertising, handling of risk, transfer pricing for multinational companies.

Subsequently, for the environment, his English text refers to Van den Bergh (2005) in Dutch – instead of precursoring Hueting (1974a, 1980), Tinbergen & Hueting (1991) and Hueting & De Boer (2001b) – and he does not mention that Van den Bergh (2005) misrepresents Hueting. At some point (perhaps here) this chapter for a *Handbook* stops being a chapter for a *Handbook* and is exposed as the vehicle for Den Butter’s misconceptions.

39.13.5 *National accounts and the environment*

Den Butter does not distinguish between ecological survival and plain use of the environment. Also, he mentions the distance $e\Delta = NI - eSNI$ to environmental sustainability, but calls it “implicit” and presents it as some after-thought that might be made explicit, instead of as the very purpose of the exercise.³²⁴

Let me use footnotes for comments.

“In the assessment of the relationship between national accounting and welfare much attention has been paid to environmental issues (see e.g. Mäler, 1991).³²⁵ A major criticism on national income as welfare indicator³²⁶ is that it does not take environmental degradation, or the use of the

³²⁴ This purpose w.r.t. $e\Delta = NI - eSNI$ was known by the IVM team in 2000 but less expressed, tabulated or graphed. Verbruggen (ed) (2000) contains a theory chapter by Kuik who clearly states on p15: “Given the lack of knowledge of subjective preferences, SNI shows the correct measure of national income only if one *assumes* that society’s preferences for the sustainable use of the environment are absolute, i.e. independent of their costs. (...) SNI assesses the distance between the present and the sustainable level of production and consumption, given today’s technology. When the calculation of SNI is repeated in later years it can be assessed whether technological improvement has indeed reduced this distance.”

³²⁵ This *Handbook* chapter fails in providing relevant references. Why not refer also to Hueting (1974a, 1980) (criticism but no solution) and Hueting (1989b) (criticism and solution approach) or the more recent Hueting & De Boer (2001b) ? Mäler (1991) only refers to Ahmad et al. (1989) that contains the crucial Hueting (1989b) paper. Den Butter might personally prefer Mäler because it contains the calculus of variations, but Mäler also would seem to neglect the boundary conditions for ecological survival.

³²⁶ In 2007, NI is taken as indicator for welfare only by people who do not know welfare theory.

environment in production, into account.³²⁷ In principle two solutions have been proposed for this problem³²⁸ (see also Den Butter and Verbruggen, 1994).³²⁹ ”

“The first solution is to consider environmental quality as a separate variable (or policy target) in the social welfare function. In that case the argument is on the trade-off between environmental quality and material welfare – as indicated by national income –, given the other variables in the welfare function. The problem in this case is how to determine the composite indicator of environmental quality which reflects this respect of social welfare. The second solution is to correct,³³⁰ in one way or another, GNP for environmental change and arrive at a so called environmentally adjusted GNP: ‘green’ GNP, eco-GNP or (environmentally) sustainable GNP. Now the problem³³¹ is how to make this correction which gives an implicit³³² weight to the trade-off³³³ between environmental quality and income in the welfare function.³³⁴ Such correction was, by the way, already alluded to by, Clark, (1937, p.9) who indicated a possible ‘deduction for any demonstrable exhaustion of natural resources’.”

The issue is not as binary as presented. One can include an aspect of the environment within the SWF (e.g. consumer appreciation of nature) as well as include the environment in the boundary conditions.

“Both methods obviously represent opponent strategies, which stem from different schools of economic thought.³³⁵ A correction of GNP implies a monetising of environmental degradation (or upgrading) by the statistical agency that publishes these data. It affects the definition of national income and requires an amendment of the theory of national accounting.³³⁶ On the other hand, the calculation of physical indicators leaves the final valuation of the trade-off between economic growth and a clean

³²⁷ What about the distinction between ecological survival and mere use ?

³²⁸ There is no problem. Den Butter misrepresents welfare theory and creates his own problem. This is not didactics (“there is a problem”) but incompetence in welfare theory.

³²⁹ Given his exchanges with Hueting around 1997-2001, Den Butter should have retracted this 1994 paper. In 2007, he apparently returns to his old misrepresentation.

³³⁰ Den Butter should know that the discussion is not about “correction” per se, but targeted at finding the distance to environmental sustainability.

³³¹ It is no longer a problem if you state immediately what the solution is. Den Butter’s approach does not follow from didactics but from his disagreement with Hueting’s approach.

³³² $e\Delta = NI - eSNI$ is only implicit if you burke it and do not calculate it.

³³³ The boundary conditions on the vital environmental functions indeed cause shadow prices (how much one would be willing to sacrifice in order to relax the boundary), but it is dubious to call this a trade-off, since the boundary conditions cannot be traded about.

³³⁴ This formulation is crooked as if we have SWF(environment, income).

³³⁵ Non schools. Only two different ways of how Den Butter grapples with the issue.

³³⁶ Yes, Hueting has provided a seminal contribution to the theory of national accounting, see the paradigm shift in Section 7.5, but it must be stated that the calculation of NI according to the original definition remains necessary, for you cannot find the distance $e\Delta = NI - eSNI$ without having NI.

environment to the users of the data.³³⁷ Then, it may³³⁸ become a political rather than an economic valuation. [See the discussion below about “politics”.]

“However, both strategies are not opponent in every respect. For the construction of composite indicators of the state of the environment some valuation cannot be avoided as various aspects of pollution are to be added up, whereas calculation of a green or sustainable GNP implicitly³³⁹ defines an overall indicator for the state of the environment, namely the difference between the traditional GNP and the corrected figure for GNP.”

So, Den Butter admits that the so-called “two” approaches are no “two” at all. Thus why does he still create the Christmas tree as if there really would be “two” ? The only reason can be that Den Butter had always thought that there would be two approaches, and only realised thanks to Hueting that there is $e\Delta = NI - eSNI$. Yet he still does not want to acknowledge that $e\Delta = NI - eSNI$ can be the very target of the exercise. He simply sticks to his old storyline, quite happy that readers will be so bewildered (“two are not opponent in every respect”) so that they will never understand what the Tinbergen & Hueting approach actually is. Apparently his purpose with his chapter is to make everyone as confused as he himself has been since 1990, when he looked into this subject without asking Hueting for counsel.

“Physical indicators for the state of the environment can be constructed within the framework of national accounts, namely by adding, by way of satellite account, an environmental module to the system (see the description of the modular approach above).³⁴⁰ In the Netherlands the design for an environmental module to the NA, which yields such satellite account, was made by De Boo et al.(1991).³⁴¹ Indicators for the state of the environment can be derived from the physical accounts of this environmental module (see e.g. Keuning, 1993, De Haan and Keuning, 1996). A related method is to combine various aspects of environmental quality by using theme indicators. In their environmental indicators for respectively the UK and the Netherlands, Hope et al. (1992) and Den Butter and Van der Eyden (1998) have aggregated such theme indicators of environmental policy (such as greenhouse emissions, acidification, eutrophication etc.) to one overall index. For the aggregation weights of these indices evidence from public opinion polls on the concern for

³³⁷ If a National statistical office does not calculate eSNI then it is misleading w.r.t. the stated goal of calculating “national income”. Den Butter doesn’t follow scientific objectivity here.

³³⁸ Yes it may, but a scientific bureau would use scientific standards. This “may” is a bit weaker than the 1994 position that advisers would take the position of decision makers. Likely the “may” is only intended as an understatement.

³³⁹ This is only implicit if you don’t state that it is explicitly the purpose to calculate it.

³⁴⁰ This is *only* within the framework *when a national product or income is calculated*. If such isn’t done, then it is only *said* that “it is the framework”, in the same way as a sticker on a cucumber would claim that it is a banana.

³⁴¹ This publication apparently did not make clear enough that the data actually had been constructed by Hueting’s department of environmental statistics, and mainly were given a different format of presentation.

environmental problems is used.³⁴² In this way preferences with respect to trade-offs between various aspects of the environment are taken into account in the overall indicator.³⁴³ ”

Den Butter (2007) explicitly refers to Hueting only in the following passage.

“The second way to incorporate the environment in national accounting is, as mentioned before, to correct GNP for environmental damage. A strong proponent of this methodology is one of the pioneers in environmental economics, Hueting.³⁴⁴ In many publications he has proposed a practical methodology for the calculation of an environmental correction, which is based on sustainability norms (e.g. see Hueting, Bos and De Boer, 1992).³⁴⁵ Hueting’s proposals for the correction of GNP for environmental loss has been made operational³⁴⁶ for the Netherlands by a research team at the Institute for Environmental Studies (IvM) of the Vrije Universiteit chaired by Verbruggen³⁴⁷ (see Gerlagh et al., 2002).³⁴⁸ They use a computable general equilibrium model calibrated to a benchmark year. The equilibrium obtained with an unrestricted version of the model is compared with the equilibrium obtained when the sustainability standards are included as constraints in the model. GNP in this new equilibrium, which appears to be (much) lower than the original equilibrium because all standards are binding, is labelled “the sustainable national income according to Hueting” for the benchmark year.³⁴⁹ Clearly this calculation of the sustainable NI cannot be taken as a simple statistic-technical correction in the system of the national accounts.³⁵⁰ That is why, in Tinbergen’s set-up of separated responsibilities in economic policy preparation,³⁵¹ this model based calculation should not be conducted by the NSO (CBS in this case) but by outsiders (in this case the IvM). [See the discussion below]”

The latter sentence has hidden presumptions. Den Butter means to say that he regards eSNI as “politics”. If eSNI is “political” then it should not be calculated by a

³⁴² Hueting (1974a, 1980) has shown that such “opinion polls” are unreliable.

³⁴³ No, they are not. Den Butter only claims this, contrary to scientific evidence.

³⁴⁴ Den Butter fails to mention Tinbergen. In 1969 Tinbergen advised CBS to appoint Hueting to correct the figure of national income for environmental damage.

³⁴⁵ Writing this in 2007, it is disingenuous by Den Butter to refer to 1992. This key document indeed must be mentioned but for a *Handbook* a reference to a more recent and more accessible paper like the contribution to the Van Ierland et al. (2001) book would have been necessary.

³⁴⁶ It ought to be explained why Hueting himself wasn’t given the funds to do so, and hire his own team, without having to deal with researchers who could not control their urge to misrepresent and undermine his analysis.

³⁴⁷ Den Butter fails to mention that he himself was chairman of the steering committee, and that he allowed the misrepresentation by the Alleingang scenario.

³⁴⁸ Den Butter (2007) and Gerlagh et al., (2002) do not mention Hueting’s protest against that misrepresentation by the Alleingang scenario.

³⁴⁹ The focus is on the distance. See the earlier footnotes about the distance measure.

³⁵⁰ This is convoluted. What is “a simple statistic-technical correction”? eSNI uses valid methods of statistics. It requires understanding at the PhD level so may not be “simple” like $1+1=2$. But the fact that it is not simple does not mean that the method would not be valid statistics.

³⁵¹ Tinbergen separated the role of advisers (technique) and decision makers (politics).

National Statistical Office (NSO). Presumably readers are to agree that “not simple” means “political”. Presumably, readers are to see that the earlier “may become” actually means “becomes”.

For a *Handbook*, this discussion is not transparent. It contains too many hidden assumptions. Though Den Butter presents the general outline, the upshot still is “ex cathedra”. If Den Butter would have developed the argument precisely – but he doesn’t want to provide that service – then readers would have seen the errors in the reasoning, and would understand why the calculation of eSNI by scientists is *not* political but part of the task of scientific advisers, and why Tinbergen & Hueting have proposed that CBS calculates it, see Chapter 15. (Tinbergen advised that CBS appointed Hueting in 1969 to correct standard NI for damage to the environment, and Tinbergen supported Hueting on his thesis in 1974 and on content in 1991, also requisiting support from environmental economists for an UNEP award,³⁵² and there need not be a specific letter by Tinbergen to advise CBS to start calculating eSNI. If there are intelligent people at CBS then they ought to be able to make the proper inference without Tinbergen explicitly stating so. Check Chapter 25 about what e.g. went wrong in reasoning at CBS.)

39.13.6 About the chapter as a whole

(1) Den Butter (2007) does not discuss Hicks’s definition of income, and thus remains at a superficial level without adequate theory. When he states: “Particularly those aspects of the economic activities are described which are directly or indirectly related to the formation, distribution, spending and financing of the domestic product or national income”, then he presents “income” as something that is obvious (with differences between domestic and national, gross and net), but the Tinbergen & Hueting approach clarifies that there are two notions of income NI and eSNI that differ importantly w.r.t. the environment.

(2) Den Butter (2007) seems to join in Van Tuinen’s inconsistency on disputes, Chapter 25, and adds another confusion: that people outside of the building should not hear or care about dispute within the building: “However, the fact that national account data should be undisputed when used in policy practice, does not exclude that there can be much dispute between experts on proper definitions.” Den Butter’s confusion would seem to be on legal arrangements versus scientific discourse. And can’t experts demand dispute in the public realm ?

(3) Den Butter (2007) contains 4 A4-pages about the history of national accounting. Subsequently there are 2,5 A4-pages about the history of statistics and economic analysis in the Netherlands. Den Butter is no historian, and it would have sufficed to refer to such historians. Perhaps Den Butter must be forgiven his excursion, as he has been chairman of the Dutch Royal Association for Political Economy (“Koninklijke Vereniging voor de Staathuishoudkunde”, wrongly translated by Den Butter as “Royal Netherlands Economic Association”). But still, if he thought it relevant for inclusion in the *Handbook* he might have alerted editor Boumans to invite such historian(s).

(4) Den Butter (2007) contains 3 A4-pages about Jan Tinbergen and the institutional setup of the Dutch Central Planning Bureau. The same comment

³⁵² <http://www.sni-hueting.info/EN/Others/2019-05-02-Tinbergen-1990-UNEP-Sasakawa-Hueting.pdf>

about history writing can be made. Den Butter has been much involved in matters of policy and this might disqualify him as a historian even more so. Den Butter's history writing has some bias and distortion.

(i) Wrong is: "Nowadays the bureau calls itself CPB Netherlands Bureau for Economic Policy Analysis, because there is no true "planning" involved in the activities of the bureau." (a) There still is "indicative planning", (b) The CPB-directorate wanted to get rid of the "central planning" that reminds some people of Soviet times. (c) The notion that various indicative plans from various ministries are co-ordinated economically at CPB however still is very valid and useful.

(ii) Den Butter refers to a disagreement between Tinbergen and Van Cleeff, as reported in the thesis by Van den Boogaard (1999). "The crucial question in this controversy was about the way economic policy advice would be the most successful in the pillarised economy." I wonder whether this dispute really happened as interpreted here. Den Butter suggests that Van Cleeff confused advice and policy making (science and norms), and that Tinbergen wanted to keep them separate. This portrayal is very suitable to Den Butter, who erroneously suggests that eSNI would be *politics* too. However, in my reading, Tinbergen and Van Cleeff both distinguished advice and policy making ("Tinbergen's dream"), see also Van den Boogaard (2000). As has been clarified in Section 9.2 above, Tinbergen still aspired at more planning (likely more than Den Butter (2007) suggests). The difference with Van Cleeff may mainly have concerned what was feasible at the time about how to plan with what kind of information about preferences in society. This difference in degrees is turned by Den Butter into a dogma "the balancing of different points of view is done by the government in dialogue with unions, employer organisations and other associations of organised interest", while it may well be questioned whether this current practice is the most fruitful way to collect information about preferences and to arrive at proper co-ordination. See mass unemployment since 1970 and the notion of an Economic Supreme Court, Colignatus (2000a, 2011), and see in this book now also the issue of eSNI and ecological survival.

Thus eSNI is not politics, and the situation of Tinbergen & Van Cleeff is not similar, and Den Butter writes a biased report, partly because he has been too much involved, see also Colignatus (2013).

(5) Subsequently there are 7.5 A4-pages about the institutional structure in various countries for the construction of national accounts and policy preparation. With so many pages about history and institutions, Den Butter perhaps feels excused to rush off a discussion about eSNI and quickly dismiss it as politics ?

(6) Then there are 4 A4-pages about "National Accounts today". This basically returns to the earlier chapter 2 about the NA today, after the historical excursion. As Den Butter has a research agenda on "transaction costs", he also finds a place here to mention those. "Such common economic framework, whereall "speak the same language", greatly contributes to the efficiency in the policy discussions." The latter however does not quite seem to square with the phenomenon that the Tinbergen & Hueting approach is so often misrepresented, also by Den Butter.

39.14 Verbruggen in Opschoor (compilation) et al. (2009)

See Section 21.11.1 and Chapter 40 for a deconstruction of Opschoor (compilation) et al. (2009).

39.15 Cost benefit analysis 2012

There is the discussion in Dutch focused on CBA by Hofkes & Verbruggen (2012) with response from Hueting & De Boer (2014a) and the bundle of articles and letters Hueting & De Boer (ed) (2014b). See Chapter 44 and Section 21.11.2 also in the context of the more general discussion in Section 5.6.

39.16 Lecture at KVS by Verbruggen 2015

On June 11 2015 the Royal Association for Political Economy (KVS) had its annual meeting and Harmen Verbruggen was invited to present a lecture titled “*Environmental economics and green growth*”. KVS chairman at the time was Bas Jacobs of Erasmus University, and lecture and discussion would be moderated by Sandra Phlippen, at that time chief editor of *Economisch Statistische Berichten* (ESB), who had actually started there by publishing an article by Hueting about asymmetric bookkeeping. In a run-up to that lecture Roeland Bosch in an email of May 27 alerted the moderator that he had organised a colloquium about a closely related theme in 2013,³⁵³ and he asked whether it wouldn’t be elegant to invite Hueting and/or De Boer as “co-referees”, since the model by Verbruggen and Hofkes had been based upon Hueting’s analysis. I myself alerted the moderator and those involved about some issues around eSNI, though it was obvious that Verbruggen’s lecture was about more than just eSNI.

The actual lecture seemed to be okay and I said so in the discussion and confirmed this in an email of June 13 to those concerned. Looking back for the purpose of this present book, I must diagnose that the lecture seemed okay because Verbruggen did not highlight the points that would have caused more discussion, also about the way how the issue was (mis-) presented. In particular, the Alleingang scenario was shown on a slide but not discussed and explained to the audience. My question to Verbruggen was whether he could highlight the conditionality, since the audience might not have understood the approach itself, and whether he could say more about the reactions in Dutch Parliament. There was no immediate problem with what Verbruggen replied to this. This seems as much as what one can achieve with a question from the audience. In retrospect, a question about the Alleingang scenario would have been better to expose the problem of misrepresentation. Likely though, if the audience did not understand the issue of conditionality, then it might not understand the problem with the Alleingang scenario. Obviously, the situation would have been quite different if there had been more people at KVS who had understood the analysis and could have joined in critical questioning.

The Appendix to this Chapter reproduces my emails about this event.

³⁵³ <http://www.sni-hueting.info/NL/Documentatie/2013-11-02-EZ-Monetaire-meetbaarheid-duurzaamheid.pdf>

39.16.1 *Appendix to this Chapter: My emails about this event*

My email of May 29 2015, my translation:

"With regard to the KVS on green growth, I would like to draw your attention as moderator, and also of our chairman Bas Jacobs, to the following short articles in ESB about the work of Roefie Hueting and eSNI. It is a subject that you must understand 100%. Everyone may understand 99%, but each time another 1% is missing, and this causes endless discussions. These short ESB articles can refresh understanding: [Cool ESB 2001, Colignatus EBS 2007, Hueting ESB 2011, no 96 (4610), pages 310-313]. Some more information that doesn't meet the "short in ESB" criterion can be found in the appendix to this message.

Fieke van der Lecq, your predecessor at ESB, was interested in Hueting and eSNI. Now involved with pensions she has the problem that pension investments change the climate so that there is little to enjoy the pension. I haven't yet come across an environmental economist who has studied Hueting's work sufficiently – e.g. there is lack of knowledge about the National Accounts. Frits Bos, former CBS, now CPB, has that knowledge in abundance but then again has too little knowledge of the environment and ecology. Remarkable is how the misunderstanding at CBS, CPB and PBL thus has come about. (...)

Harmen Verbruggen has done research about eSNI but only partially understands it. Verbruggen wants to provide policy advice, but Hueting looks at economic statistics, and those are different perspectives.

One can only hope that economists in the Netherlands will take a good look at Hueting's work. You can't ignore that work either. Ignoring gives inadequate arguments about the economy and the environment. It would be nice if you and Verbruggen avoided such incorrect arguments. (...)

[signature]

Appendix: Some more information

(a) Link to what is now Chapter 6 of this book

(b) Link to a draft of this book [MPRA 63904]

(c) Link to Hueting & De Boer about the notable misconceptions of Verbruggen regarding eSNI ³⁵⁴

(d) Hueting & De Boer correctly state that it is inevitable for statistics to work from two hypotheses: (a) the optimality for the normal national income (NI), (b) the optimality of sustainability for eSNI.

You can also look at policy preparation, such as Verbruggen. My suggestion from 2000 is that at least two regimes are conceivable here, with a meta-SWF choosing from regimes (link to Chapter 8 of this book)"

My email of June 5, my translation

"To supplement the earlier short texts:

³⁵⁴ [http://www.sni-hueting.info/NL/Others/2012-TvOF-Hofkes-Verbruggen-2014-Hueting-DeBoer-plus-brief Exchange.pdf](http://www.sni-hueting.info/NL/Others/2012-TvOF-Hofkes-Verbruggen-2014-Hueting-DeBoer-plus-brief%20Exchange.pdf)

(1) There is also this brief explanation of how statistical measurements of welfare and national income can deal with uncertainty [link to what is included here partly as Section 4.5]

(2) These are my 200 words for the 2025 Science Agenda: that scientific economists fail because of their mistreatment of the eSNI.³⁵⁵

It is up to Verbruggen to give his lecture, but I assume that he mentions eSNI, with his criticism, and the response from Hueting and De Boer. This can be done in five minutes, and gives a base for the discussion. If he does not mention eSNI, a discussion about green growth would quickly become scientifically irresponsible, and would fall under the category I mentioned for the Science Agenda.

Below is a brief explanation of the welfare theoretical landscape.

[signature]

Appendix – continuing above numbering:

(3) It is useful to recall this welfare-theoretical relationship: Jan Tinbergen, Hans van den Doel, Jos de Beus and Roefie Hueting.

Hans van den Doel made this drawing of his heroes, drawing himself, De Beus and Hueting as water carriers. Van den Doel apparently understood the welfare-theoretical framework for Hueting.^{356 357} It is then important that: (3a) Jos de Beus was known for his open mind. He was kind enough to talk to me sometimes. (3b) Arjo Klamer and Harmen Verbruggen organized the impressive memorial service of De Beus. Apparently they are jogging together.³⁵⁸ (3c) Arjo Klamer and Harmen Verbruggen, however, don't take the open mind of Jos de Beus as their example. Klamer does not want to talk to me, Verbruggen apparently does not want to talk to Hueting. What is this ? Scientists must keep talking to each other, let at least someone in society do this. Thus the suggestion for the KVS meeting to promote this openness of mind. (3d) For the sake of completeness: De Beus's thesis shows that he did not understand Arrow's Theorem about social welfare. Van den Doel also drew Amartya Sen as a hero. But Sen has some serious misconceptions about welfare theory, see my book "Voting theory for Democracy".³⁵⁹ The Nobel Prize for Sen is a mistake. Sen is involved in the Stiglitz-Sen-Fitoussi initiative on a green NI. I only looked diagonally at that, but what I see is that the mDNI is really better."

In the weekend before the lecture of June 11, NRC-Handelsblad published an article³⁶⁰ (shorter version³⁶¹) by journalist Hester van Santen about a project to "value nature" for the Dutch Limburg Mookerhei. This project was by Wageningen

³⁵⁵ <https://vragen.wetenschapsagenda.nl/vraag/hoe-kunnen-ecologie-milieu-en-of-klimaatwetenschappers-gaan-inzien-dat-wetenschappelijke>

³⁵⁶ <http://www.sni-hueting.info/NL/index.html>

³⁵⁷ <http://www.sni-hueting.info/NL/Other/SchilderijHansVanDenDoel.jpg>

³⁵⁸ http://www.wbs.nl/system/files/arjo_klamer__harmen_verbruggen_-_in_memorian_jos_de_beus.pdf

³⁵⁹ <http://thomascool.eu/Papers/VTFD/Index.html>

³⁶⁰ <https://www.nrc.nl/nieuws/2015/06/06/voor-de-heide-1501579-a1213017>

³⁶¹ <https://www.nrc.nl/nieuws/2015/06/07/wat-moet-dat-kosten-die-natuur-a1496206>

biologist Dolf de Groot, engineer Lars Hein, systems analyst Rik Leemans and environmentalist PhD student Roy Remme (also at RIVM Atlas Natural Capital, CBS 2016, PhD 2016 in unspecified area about this topic “*Accounting for ecosystem services and biodiversity in Limburg province, the Netherlands*”,³⁶² now in 2019 at The Natural Capital Project, Stanford). The 2015 newspaper article also referred to Costanza et al. (1997) while economists Hueting,³⁶³ Pearce and El Serafy had argued that those methods were economically unsound, and while Hueting had argued that such methods were superfluous too since environmental sustainability concerned $e\Delta = NI - eSNI$ without the need to “value natural capital”, see Sections 7.10 and 21.9.10.

De Boer sent a letter³⁶⁴ to the journalist but it did not cause a revised newspaper report or investigation into the differences of views between economists and natural / technical scientists. Sadly, while De Groot as co-author of Costanza et al. (1997) must know and have known about the criticism, the thesis by Remme (defended a half year later) does not contain any reference to it nor to the work by Hueting or even Tinbergen & Hueting (1991). At CBS, physicist Edens participated though in personal capacity. In this very year 2015 Hueting met with misrepresentation by Edens at CBS, see this book Sections 21.11.13 and 21.11.14. In 2019, Edens is project manager “natural capital” at UNSD.³⁶⁵

My email to the moderator cs of June 9 2015, my translation:

“Last weekend the NRC Science Section reported on the valuation of the environment, with the Mookerhei as an example.³⁶⁶ A short reaction on this can help for the KVS discussion about green growth. NRC / Hein / CBS Ebens [Edens] refer to an article by Costanza et al. (1997) in Nature. Costanza et al. come from an approach in thermodynamics, and have no insight into welfare economics as used by Tinbergen, Hennipman and Hueting. The idea by Costanza et al. is ‘if nature is expensive, we are rich’ while Hueting calculates ‘when nature becomes expensive then we become poorer’. In welfare economics you need supply and demand curves for valuation. Costanza doesn't mind. He thinks he can find rules for appreciation, with the philosophy ‘I will come up with something, because I need a result’.

Next, the problem lies with standards for environmental sustainability, that's what it should be about. NRC / Hein / CBS [Edens] are going to “measure” everything (that's what they call it), but the core conclusion is that you *can't* measure some crucial things. You only find a result by making an assumption. For national income (NI), the assumption is that the economy is optimal. For eSNI, the assumption is that sustainability is pursued. The adjustment follows from the validated model.

³⁶² Accounting for ecosystem services and biodiversity in Limburg province, the Netherlands

³⁶³ <http://www.sni-hueting.info/EN/Publications/1998-The-concept-of-env-function.pdf>

³⁶⁴ <http://www.sni-hueting.info/NL/Documentatie/2015-06-08-BartDeBoer-aan-HesterVanSanten-NRC-Mookerhei.pdf>

³⁶⁵ <https://www.youtube.com/watch?v=YokJrEMSfow> (Statistics South Africa)

³⁶⁶ <http://www.nrcq.nl/2015/06/07/wat-moet-dat-kosten-die-natuur>

Here is the letter ³⁶⁷ by Bart de Boer to Hester van Santen of the NRC about her limited and one-sided reporting. Van Santen is only a journalist. The problem lies with scientists such as Prof. Hein and his PhD student Remme, as well as [Edens] at CBS, who apparently no longer know what welfare theory is, and who do not mention Hueting's analysis. People are so blinded by "a publication in Nature" that the correct analysis by Hueting is discarded without considering the argument. Statisticians also seem to have a fear of making assumptions, and feel more comfortable when they can "measure", even though they lack the economic-scientific framework. So here is that letter by De Boer.

I wrote earlier that this is a topic for which you need all 100 pieces of the puzzle, perhaps everyone has 99 pieces but always with another missing piece. Van Santen's article is another example. You can only get out of this confusion by sticking to the norms of science, in Tinbergen's tradition. [signature]"

After the event, my email to the moderator cs of June 13 2015 is, my translation:

(1) For the record it is useful to report, as I have also said to Sandra, Bas and Harmen, that Harmen's explanation of the mDNI was good and insightful, also via the place with regard to other indicators and policy.

I was also pleasantly touched by Harmen's comment that the NRC article on "What is worth the mookerhei" was lacking in ecologists' lack of economic knowledge: whatever my comment was in the previous email.

It is fitting to note that one of the 100 pieces of the puzzle can still be lacking. In the graph with the time path of NI and eSNI, Harmen places two variants: a scenario with an eSNI in all countries, and a scenario in which only the Netherlands has eSNI with competition by other countries. [In the lecture this was not discussed by Verbruggen but his slide shows it.] This second [Alleingang] scenario is alien to the concept of eSNI. eSNI makes it possible to measure the distance to environmental sustainability. eSNI is not relevant for measuring competitiveness. It is a mystery to me why Harmen includes this second scenario. It is clear to me that he considers this genuinely relevant, but then he is probably thinking about the policy discussion, while this is no relevant issue for the economic theory of measuring environmental sustainability in national income.

My suggestion is to collect and discuss such misunderstandings. Essentially another article in Nature is conceivable, so why not ?

(2) Harmen made a remark about the "double dividend" use of revenues from environmental taxes to reduce labor taxes. There is the analysis by Bovenberg, De Mooij and Van der Ploeg that this sword has at least one dull edge. My criticism of that analysis has long been that B, DM & VdP do not reckon with my analysis of the relationship between taxes and unemployment. Hueting & De Boer rightly state that a policy for a better environment is not detrimental to employment. However, it is always a

³⁶⁷ <http://www.sni-hueting.info/NL/Documentatie/2015-06-08-BartDeBoer-aan-HesterVanSanten-NRC-Mookerhei.pdf>

question whether the relationships in the models are sound. As long as B, DM & VdP ignore my analysis, they can apparently continue to create confusion. Maybe others want to wake them up. See DRGTPE, topics 'tax void' (for the lowest incomes) and 'dynamic marginal tax rate' (for others). Links to: DRGTPE and "double dividend" [MPRA 13899].

This may also have consequences for Wouter Keller's model and the outcomes for eSNI, but I have always found it a bit odd in Roefie's analysis to allow NI to come about with unemployment, and that possibly eSNI can lead to disappearance of unemployment through economic optimization in the correct model of the economy. In this case you would also like to impose the precondition for equal unemployment. But these are questions about measurement.

I consider that "double dividend" as part of more normal economic analysis and policy advice.

[signature]

39.17 Den Butter, Kocsis and Tieben 2014

Den Butter, Kocsis and Tieben (2014:20) (here BKT) (a SEO report to the Ministry Infrastructure and Environment) state:

"In short, there are so many judgmental difficulties for the calculation of a green national income, that it would be incorrect when a statistical agency (in this case CBS) would publish such a figure."

Comment: In itself it is correct that BKT state some of the assumptions of eSNI. However, they do not clarify the methodology. Hence they give a misrepresentation. Their report to the Ministry is no scientific evaluation but a value judgement in which misrepresentation is used to give it the seeming appearance of science.

On page 17, these authors present a social welfare function (SWF) $W = w(Y, E)$, with Y purportedly standing for "material welfare" and E for "environmental quality". They state, and let me label the statements:

"(a) the weight of these two components in the welfare function is a matter of political consideration. (b) This means that when an attempt is made to summarize green growth in one indicator – a sustainable or green national income – the political consideration is implicit. (c) This is an important objection to the calculation of a national income corrected for environmental deterioration."

Subsequently, on p20:

"(d) Hueting's "solution" to avoid the implicit valuation of the environment is to assume functions of the components of the environment that are at play in the creation of the national income. (...) if the environmental quality in all these different aspects falls below the minimum, production is no longer sustainable."

Comment: While (a) is correct, it is false that (a) implies (b). The assumption made for eSNI is explicit and not implicit, namely environmental sustainability. The

authors thus falsely suggest here that Hueting hides an implicit assumption on preferences. Thus (c) is a false objection and accusation. In (d), Hueting's solution approach is disqualified by the quotes for the term "solution". It is falsely suggested that Hueting would want to avoid an "implicit valuation" (which supposedly is hidden in his method). Hueting explicitly derives standards for environmental sustainability from the literature.

In fact, Den Butter (2001) explicitly states that he prefers the formulation with a Social Welfare Function (SWF) and Hueting prefers the direct imposition of standards. Den Butter then states:

"Both views do not have to exclude each other. After all, when the environmental quality below a certain limit value in the welfare function receives an infinitely large negative weight, this lower limit automatically becomes a precondition."

While the latter is clear, the BKT (2014) statement is a distortion.

Who wants to argue that such standards are not derived from the scientific literature then should look up those sources and show that those are not there. BKT (2014:20) only *suggest* that these derived standards are "criticised", but they do not provide evidence. BKT do not try to clarify that they have the competence to judge on those standards. Kocsis³⁶⁸ (first SEO³⁶⁹ now at CPB) is an economist with a PhD in networks and competition. Tieben is an economist with a PhD in the history of economics.³⁷⁰ An interest in history must be welcomed but not at the cost of incompetent judgements about environmental standards. As said, Den Butter is a professor in econometrics with a 1986 thesis on modeling of monetary transmission and policy.³⁷¹ These authors are not competent to judge about such standards in biochemistry, ecology and other.

It is true that one would want to see more researchers involved with those standards, apart from the Hueting et al. (199d) and subsequent publications, like also Hueting & De Boer (2019b), but that is another argument. National statistical offices that calculate and publish eSNI would want to enhance the quality of the figures, and there would arise a network of experts around the globe.

Subsequently, BKT (2014) refer to thermodynamicist Costanza et al. (1997) but not to the criticism w.r.t. this report expressed by economists El Serafy, Pearce and Hueting. This is unbalanced. See Section 21.9.10.

PM. TPE-Digitaal is a journal with Tieben in the board of editors. Its issue 5/1 2011 is a special issue about Cost-Benefit Analysis (CBA) with guest editor Dietz, that also discusses CBA for environmental sustainability. It refers to Den Butter and Dietz (2004) but not to the Tinbergen and Hueting approach, which belongs to CBA. This is burking.

³⁶⁸ <https://www.linkedin.com/in/viktoria-kocsis-76769194/>

³⁶⁹ <https://ideas.repec.org/f/pko279.html>

³⁷⁰ <https://www.auc.nl/shared-content/news/news/faculty/ssc/tieben-bert.html>

³⁷¹ <https://personal.vu.nl/f.a.g.den.butter/default.htm>

39.18 Verbruggen's retirement speech 2017

Remarkably, in 2017 the IVM project leader Verbruggen contradicts his earlier explanation from 2000 about the Alleingang scenario. In his retirement speech of June 7 2017, Verbruggen (2018:89) discusses eSNI (my translation, italics and footnotes):

"I myself have also made a bold attempt with Gerlagh, Dellink and Hofkes to calculate a sustainable national income for the Netherlands, using an applied general equilibrium model. The concept came from Hueting and the Ministry of Economic Affairs was the principal. The planning agencies didn't dare to burn their fingers on such a calculation,³⁷² but members of the House of Representatives kept asking for it. Our calculations showed that one-third to one-quarter of standard national income must be sacrificed *if the Netherlands would become sustainable by itself alone*,³⁷³ and roughly half if the rest of the world were to produce sustainably too (Gerlagh et al. 2002; Dellink and Hofkes 2008). The sustainable national Income has been calculated for 1990, 1995, 2000 and 2005. A slight trend was visible that the regular and sustainable national income converged, mainly as result of environmental technology developments. Our calculations have resulted into interesting scientific publications.³⁷⁴ But policymakers and politicians could do nothing with it. Too hypothetical, too far from reality. *Nobody can imagine a sustainable development at a halved income.*"³⁷⁵

In 2000 the IVM team had stated that both "variants" imposed sustainability standards so that both variants had world sustainability: the only distinction would be with respect to prices. In 2018 Verbruggen acknowledges that in one variant:

"the Netherlands would become sustainable *by itself alone*".

³⁷² This is an inaccurate statement. It is true that CBS, CPB and PBL apparently did not want to do so, but their argumentation requires deconstruction and then appears to be wanting. Verbruggen took the job himself but might have provided a better academic service in showing the misconceptions at the agencies, though, one might say, actually giving a *proof of concept* is perhaps the best way to highlight the misconceptions by the agencies.

³⁷³ This contradicts the 2000 claim that both Holland and the World would be sustainable.

³⁷⁴ But Verbruggen and IVM in practice do not refer to it themselves.

³⁷⁵ Dutch: "Zelf heb ik met Gerlagh, Dellink en Hofkes ook een manmoedige poging ondernomen om een duurzaam nationaal inkomen voor Nederland te berekenen, gebruik makend van een toegepast algemeen evenwichtsmodel. Het concept stamde van Hueting en het ministerie van Economische Zaken was de opdrachtgever. De planbureaus durfden aan een dergelijke berekening hun vingers niet te branden, maar leden van de Tweede Kamer bleven erom vragen. Onze berekeningen toonden aan dat van het gewone nationaal inkomen een derde tot een kwart moet worden opgeofferd, als Nederland alleen duurzaam wordt, en ruwweg de helft als de rest van de wereld ook duurzaam zou gaan produceren (Gerlagh et al. 2002; Dellink en Hofkes 2008). Het duurzaam nationaal inkomen is berekend voor 1990, 1995, 2000 en 2005. Er was een lichte trend zichtbaar dat het gewone en duurzame nationaal inkomen naar elkaar toegroeiden, voornamelijk als gevolg van milieutechnologische ontwikkelingen. Onze berekeningen hebben tot interessante wetenschappelijke publicaties geleid. Maar beleidsmakers en politici konden er niets mee. Te hypothetisch, te ver af van de werkelijkheid. Niemand kan zich een duurzame ontwikkeling voorstellen bij een gehalveerd inkomen"

The latter statement in 2017 contradicts the first statement of 2000.

Unfortunately, this remains a pure contradiction only. When queried about this contradiction in 2019 for the purpose of Hueting & De Boer (2019b), Verbruggen and none of the IVM team retracted the “variant” that contains the misconception. Thus they continue mispresenting eSNI as inaccurately defined and more uncertain than it is.

Verbruggen (2018:89) also does not acknowledge that he and the IVM team have been presenting Hueting’s analysis in a didactically destructive manner. The analysis concerns $e\Delta = NI - eSNI$. It cannot be said that the IVM-team was not aware about the focus on $e\Delta = NI - eSNI$, see IVM-team member Kuik (2000:15) in his discussion of the theory:

“Given the lack of knowledge of subjective preferences, SNI shows the correct measure of national income only if one *assumes* that society’s preferences for the sustainable use of the environment are absolute, i.e. independent of their costs. (...) SNI assesses the distance between the present and the sustainable level of production and consumption, given today’s technology. When the calculation of SNI is repeated in later years it can be assessed whether technological improvement has indeed reduced this distance.”

Given above quote, Verbruggen himself states (and apparently can imagine) how this distance to environmental sustainability evolves (in a later year with more observations). Thus, when the analysis is about $e\Delta$ then the IVM-team should have presented tables and graphs about the development of $e\Delta$. They didn’t, leaving policy makers to wonder what to think about “half NI” indeed.

39.19 Questions for Den Butter in 2019

The deconstruction not only in this chapter generates these questions for Den Butter, who in recent retirement would generally still be able to answer them.

(i) When did he first hear about the Tinbergen & Hueting (1991) article ? Only in Verbruggen (ed) (2000) or earlier ?

(ii) Why does he not refer to it ? What was his first reaction and what is it now ? While the article evidently expresses Tinbergen’s support for the analysis of Hueting, does Den Butter think that Tinbergen was mistaken, and that it is better to be silent about this mistake ? Why not mention such criticism explicitly ?

(ii-a) In particular, Tinbergen apparently would not have seen what Den Butter himself thinks, namely that the environmental sustainability standards are “political” ? However, this Chapter has shown that Den Butter’s reasoning that the standards are “political” is inadequate, because he ignores Hueting’s innovation of conditional assumptions. Tinbergen & Hueting (1991) clearly refer to assumptions, that turn the issue into conditional reasoning. In 1986 Hueting followed the preference of the Indonesian government with regard to the vertical demand curve (as an adviser allows policy makers to make decisions), but he quickly changed this to conditionality, see the article in Ahmad et al. (1989), World Bank / UNEP. When reading the latter article, an econometrician should be able to understand this, but perhaps Den Butter can indicate where things went wrong with him ? But perhaps he understands it now ?

(ii-b) Or is there a new explanation why something would be wrong with the Tinbergen & Hueting approach ? Let Den Butter explain what is wrong.

(iii) What does Den Butter think about the Alleingang scenario, its criticism, and the *ad hominem* and self-contradiction by his co-author Verbruggen, see Section 39.18 ?

(iv) Den Butter was chairman of the Dutch Royal Association of Political Economy (KVS) in 1997-2003. We discussed some conjectures in Section 39.4. What were his considerations back then ? Did he block attention by KVS because of his misconceptions on both “politics” and the Alleingang scenario ?

(v) Will Den Butter retract his 2007 article in the Boumans volume ?

(vi) What does Den Butter think about the deconstruction w.r.t. other authors, especially in Holland, as discussed here in Part 4 of this book ? Does he want them to correct, or does he just let the omissions or misrepresentations happen ?

40. Opschoor, Verbruggen and Van Egmond on the monitor MDN 2009

Section 21.11.1 discussed the CBS et al. (2009a) *Monitor Duurzaam Nederland 2009* (MDN 2009). eSNI already belonged to the official Dutch government's strategy for sustainability, in the wake of Johannesburg, see Ministry of VROM (2002). The Ministries also provided funds for calculating eSNI in five-year intervals.³⁷⁶ eSNI however got removed from the MDN 2009. Scientists would wonder why. Hueting protested against the removal of eSNI, and was given inadequate reply.³⁷⁷ Subsequently, there was a conference to evaluate the monitor. My solid impression is that Hueting wasn't informed. See Chapter 26 for the responsible head of the department of national accounting at CBS at that time.

Said Section already contains a comment on a quote from an "evaluation from science" by Opschoor (compiler), Van Doorne-Huiskes (professor in sociology), Van Egmond, Verbruggen (2009). There are more aspects to observe, skipping sociology and only considering the three "experts" who claim to know about economics and the environment. The "evaluation by science" came at a crucial moment in time. Again, it is unlikely that Hueting was informed, because if he had, we would see a reply by him.

The "evaluating scientists" are not entirely independent from the makers of the MDN, and this book shows that they share some bias and misrepresentation. The CBS project leaders Hoekstra (Chapter 27) and Smits (Chapter 28) have a background at VU and Opschoor (Chapter 38) and Verbruggen were at the VU where Hoekstra wrote his PhD thesis. Verbruggen (Chapter 39) was project leader of the calculation of eSNI, see Verbruggen (ed) (2000). Van Egmond (Section 21.11.7) was director environment at RIVM 1988-2004 and director of MNP 2004-2008, who apparently developed a negative opinion about eSNI without explicitly stating why (see the Chapters and Sections referred to).

Further comments on Opschoor (compiler) et al. (2009) are:

- (1) (p10) The three "experts" agree with the adoption of the "capital approach" but do not explain that this is merely an issue of terminology compared to the Tinbergen & Hueting approach, see Section 7.10. They also use the term "environmental use space" which notion Opschoor has taken from Hueting's framework of conditional analysis but given his own name, see Section 38.2. The general idea is that when you introduce new names for known insights then you can claim new insights.
- (2) (p10) The three "experts" observe that there is no "true SWF" for the past but do not draw the inferences as explained in Section 9.2. A sober economist would observe that putting all these indicators in one single report is rather useless when each indicator is not discussed in relation to policy making. The truly relevant issue is to counterbalance the information about the growth of production with the distance to environmental sustainability $e\Delta = NI - eSNI$,

³⁷⁶ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

³⁷⁷ <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CBS.pdf>

³⁷⁸ <http://www.sni-hueting.info/NL/Documentatie/2009-04-02-Monitor-Planbureaus-CPB.pdf>

but this effort has been removed from the MDN. This MDN 2009 is a Christmas tree to keep everybody busy so that the truly relevant issue is not discussed.

- (3) (p10) The three “experts” advise “per capita” measures while the ecological challenge concerns the absolute levels. They refer to the *Conference of European Statisticians* report, for which the *Task Force* consisted of the same Hoekstra and Smits.
- (4) (p11) The three “experts” observe that there are no longer targets: “Without objectives, judgments become difficult to make as to whether, and to what extent, the Netherlands is on the road to more sustainability.”³⁷⁹ Indeed, it is precisely a key element in the Tinbergen & Hueting approach that there are standards for environmental sustainability. It would have been more logical for these “experts” to argue that eSNI should not have been removed, but that there should be a discussion about the derivation of the standards (targets).
- (5) (p12) The three “experts” mention the notions of scarcity and weak and strong sustainability, and the issue of “critical natural capital” that Hueting calls “vital environmental functions”. They advise: “A more systematic reflection seems important of what would be “critical assets” in and for the Netherlands (see also UNECE et al. 2009)”³⁸⁰ However, Verbruggen (ed) (2000) contains this systematic reflection, and these standards have actually been used in the calculation. So why did Opschoor, Verbruggen and Egmond and the creators of the MDN not discuss these in 2000-2009, or at least mention them?
- (6) (p12) The three “experts” state: “The MDN is not sufficiently clear about the connections between the individual indicators, which can lead to problems in the sphere of trade-off analysis.”³⁸¹ Thus they want to see an economic model that contains the relationships between the indicators, while they actually agree with the removal of eSNI that uses such a model. (Indeed on page 17 they use the word “model” but within quotation marks, perhaps because the acceptance of the notion of modeling indeed leads to acceptance of eSNI.) Subsequently they also want benchmarks (standards) and a smaller set of indicators, which eSNI helps to achieve too, but they agree to remove eSNI.
- (7) (p13) The three “experts” want to see more data over more years, and want to see an evaluation of environmental policy since 1971. However, they do not point out that the studies for eSNI have generated data for 1990, 1995, 2000 and 2005 (with the latest report in 2008), and that the MDN 2009 fails to make a proper evaluation of what insights these outcomes have generated (at the cost of only about EUR 0.5 million per year of observation, see Section 20.6). This ease of criticism w.r.t. the MDN 2009 and lack of criticism w.r.t. the removal of eSNI can only be explained by a gross bias against eSNI. The three “experts” may each have their own reason to reject eSNI but they do not take the effort to correct each other where they may have different reasons.

³⁷⁹ Dutch: “Zonder doelstellingen worden oordelen over de vraag of, en in welke mate, Nederland op de weg is naar meer duurzaamheid, moeilijk.”

³⁸⁰ Dutch: “Een systematische doordenking van wat in en voor Nederland ‘critical assets’ zouden zijn, lijkt van belang (zie ook UNECE et al. 2009).”

³⁸¹ Dutch: “De MDN maakt niet voldoende zichtbaar wat de samenhangen zijn tussen de afzonderlijke indicatoren, wat in de sfeer van de afreik-analyse tot problemen kan leiden.”

Verbruggen apparently did not ask Opschoor or Van Egmond to put their evaluation in writing, about his report Verbruggen (ed) (2000) and the subsequent reports by IVM paid by RIVM.

- (8) (p13) The three “experts” discuss (and the lofty Dutch is less easy to translate into English): ³⁸² “We live in a global environmental use space. Attention is rightly given to the Dutch influence on options for sustainable welfare elsewhere. (...) By the way, the role of the Netherlands is played down rather too often as a small country in the context of a potentially unsustainable rest of the world.” The Tinbergen & Hueting (1991) paper indicated that eSNI was around 50% of NI. ³⁸³ The situation in 1990 in the world will be like in Holland. ³⁸⁴ This means that the world is in an *unsustainable* condition. Thus: it is quite bizarre to say repeatedly that there is an “environmental use space” when such use space is only hypothetical. This kind of talk shows the absurdity of Opschoor’s “environmental use space”. It is only the fancy use of words to act as if he has something to say. See Section 38.2 for the deconstruction. Policy makers will likely see the analysis by Tinbergen & Hueting as more dangerous for policy making, and when Opschoor is willing to criticise eSNI and to provide fallacies to remove it, then the Ministries will gladly make him feel important by inviting him to come over and talk the talk. By flattering the ego of an environmentalist one can make him or her forget about the environment.
- (9) (p14) For the environmental issue, the three “experts” follow the MDN in the suggestion that one must choose between 1 indicator or a set of indicators, as if paper allows only one option to print and then all letters have been used. Thus they neglect the option use all: ³⁸⁵ “Here too, there are measures under discussion such as the “ecological footprint”, that want to summarize in one number how environmental use is in relation to the available space, but the MDN opts for a differentiated system of subdomains and indicators.” For eSNI it has never been claimed that the figure of eSNI itself would be enough. It is only used to calculate $e\Delta = NI - eSNI$ to counterbalance the information about production growth. Subsequently the calculations give details at sectoral level and indicators for the environment. It is a fallacy that one must “choose”.
- (10)(p15-16) We may skip this part of this “State of the Union”.
- (11)(p17) The three “experts” judge that a new cabinet that has started new policy cannot be informed whether their policies improve sustainability. They hold that this can only be judged when there are outcomes, which apparently must be in a distant future, given their notion of “sustainability”. For these “experts” policy makers can be left in the dark and everybody likely will be dead before the outcomes can be measured. Instead, alternatively, these “experts” judge

³⁸² Dutch: “We leven in een mondiale milieugebruiksruimte. Met recht wordt aandacht geschonken aan de Nederlandse invloed op mogelijkheden voor duurzame welvaart elders. (...) Overigens wordt de rol van Nederland wel erg vaak gebagatelliseerd als klein land in de context van een mogelijk onduurzame rest van de wereld.”

³⁸³ They used Net National Income. For GDP the ratio is different because of depreciation.

³⁸⁴ CPB modeling has Holland, big countries, regions, and a “rest of the world” (ROW). These three “experts” have only Holland and ROW. Holland is so small that their ROW is the World.

³⁸⁵ Dutch : “Ook hier geldt, dat er maten in discussie zijn als de ‘ecologische voetafdruk’, die het milieugebruik ten opzichte van de ruimte daarvoor in één getal willen vatten, maar de MDN kiest voor een gedifferentieerd stelsel van subdomeinen en indicatoren.”

the conservation strategy relevant, which method also has been adopted by the Tinbergen & Hueting approach and eSNI, that they however agree to remove:³⁸⁶ ""Does the government's effort actually lead to more sustainability?" To answer the last question, it is still too early, given the [young] age of the KADO strategy. The other question is addressed in the MDN. In terms of the MDN thinking model: "Are the sources of welfare passed onwards over time in a *non-falling* whole [my italics], or are they degraded?" If the reader starts feeling getting lost, then this is not because of my reporting, but by the incomprehensible "logic" by these "experts". Subsequently the "experts" do not check whether the sources are *non-falling*. Though the MDN claims to be an empirical report, the three "experts" are happy that the notion of the "MDN thinking model" remains theory only. The three "experts" again regret that there are no standards or benchmarks to judge the outcomes.

- (12)(p17) The three "experts" state: "Therefor a really clear diagnosis is actually not attained. In our opinion, less features of the capital / indicator approach have been used than would be possible."³⁸⁷ This again shows the muddleheaded focus on phraseology. The true conclusion is that the capital approach *has not been employed*. MDN only claims to do so, but MDN didn't. They only adopted the terminology of the capital approach, see Section 7.10, since for some reasons they did not like the terminology of the Tinbergen & Hueting approach, very likely because they did not study it. The other true conclusion is that if both MDN and "experts" had studied the Tinbergen & Hueting approach, then they would see that there is only an issue of *terminology*, and that the proper employment of econometrics would regard the Tinbergen & Hueting approach as a no-brainer. Most remarkable is that even Verbruggen, who calculated eSNI, and who would have noted the treatment of stocks and flows, and how *actual use* is compared to the *standards of use*, did not see that the "capital approach" is only an issue of terminology.
- (13)(p18) The conclusions repeat the confusions that we observed above. The three "experts" want to see tradeoffs but do not clarify how more free time and fun today can be traded for the flooding of Holland over some centuries. They hold:³⁸⁸ "Moreover, the panel believes that a more systematic and explicit confrontation of factual developments with goals, preconditions, etc. is possible and desirable." But the latter leads to eSNI and they agree with its removal.
- (14)(p18) Subsequently the three "experts" hint at a closer link to policy making but neglect that the project leadership has landed at CBS and not the planning agencies. Unfortunately they do not report about the remarkable historical

³⁸⁶ Dutch: "Leidt de inspanning van het kabinet inderdaad tot meer duurzaamheid?' Voor het beantwoorden van de laatste vraag is het – gezien de leeftijd van de KADO-strategie – nu nog te vroeg. De andere vraag is aan de orde in de MDN. In termen van het MDN-denkmodel: Wordt een niet-dalend geheel aan welvaartsbronnen doorgegeven door de tijd heen, of wordt er ingeteerd?"

³⁸⁷ Dutch: "Een echte heldere diagnose blijft dus eigenlijk achterwege. Ons inziens wordt zo toch minder uit de kapitaal/indicatoren-benadering gehaald dan er in zit."

³⁸⁸ Dutch: "Bovendien meent het panel dat een meer systematische en explicietere confrontatie van feitelijke ontwikkelingen aan doelen, randvoorwaarden etcetera mogelijk en wenselijk is."

sequence in Section 9.2. The three “experts” should have concluded that they had landed in a madhouse, but since they apparently were no real experts, and anyway apparently were united in dislike of eSNI, they enjoyed the limelight of being treated as “experts” in the madhouse.

41. Aart de Zeeuw at UvT and Beijer Institute

Aart de Zeeuw ³⁸⁹ graduated in mathematics in Groningen 1978. According to this page ³⁹⁰ he graduated in mathematics only, but this page ³⁹¹ claims a graduation in both mathematics and economics, and this cv ³⁹² states “applied mathematics”. This denomination matters because an economist benefits from an early training in economics, while mathematicians turning to economics may have a different mindset. My interpretation of these data is that De Zeeuw is a *mathematician turned to economics*. This fits my personal observation as an econometrics student in Groningen when I encountered De Zeeuw there as another student but at the mathematics subfaculty – but I have no evidence on his take on economics back then.

De Zeeuw was assistant professor in mathematics in Tilburg in 1980-1985. His 1984 thesis has the title “*Differential Games and Economic Policy*”, ³⁹³ which De Zeeuw (at the Beijer page) claims to be in economics but his thesis supervisor was Jan Camiel Willems, an engineer in systems and control, ³⁹⁴ and perhaps Willems gave De Zeeuw the false impression that this would be economics.

41.1 The mathematics of topics that claim to be about the environment

De Zeeuw then became a lecturer in mathematical economics, then professor in quantitative economics, and in 1993-2017 professor of environmental economics, including 1998-2000 president of the *European Association of Environmental and Resource Economics* (EAERE) and 2007-2009 co-director of the *Beijer Institute of Ecological Economics*, Stockholm, Sweden.

The Beijer Institute webpage states: “The Beijer Institute is an international research institute under the auspices of the Royal Swedish Academy of Sciences. The Institute was established in 1977 and was reorganized in 1991 with a focus on ecological economics.” ³⁹⁵ See Section 21.9.10 for a discussion that “ecological economics” need not be economics. Remarkably, non-economist De Zeeuw (217) basically agrees:

“In the long term, environmental economy must become superfluous, because economics cannot be separated from the natural environment, ³⁹⁶ but there was still a long way to go. I was confronted directly with a difficult contrast. There was a world of “ecological economists” and a world of “environmental economists”. The first had de facto renounced

³⁸⁹ <https://web.archive.org/web/20190826123130/https://research.tilburguniversity.edu/en/persons/aart-de-zeeuw>

³⁹⁰ <https://web.archive.org/web/20190826143339/https://www.duurzaam-ondernemen.nl/prof-aart-de-zeeuw-wint-de-eaere-european-lifetime-achievement-award-in-environmental-economics/>

³⁹¹ https://web.archive.org/web/20171209020046/http://www.beijer.kva.se/staff_under.php?id=2

³⁹² http://www.beijer.kva.se/PDF/73882330_CV.pdf

³⁹³ <https://genealogy.math.ndsu.nodak.edu/id.php?id=75885>

³⁹⁴ Wikipedia is a portal and no source: https://en.wikipedia.org/wiki/Jan_Camiel_Willems

³⁹⁵ <http://www.beijer.kva.se/sida.php?id=1>

³⁹⁶ Actually the Huetting (1974, 1980) thesis.

economics because of disappointment that economics had ignored environmental issues for so long. The second wanted to preserve economics but revise it and explicitly integrate the environment into the analyses. The contrast is now less sharp. Ecological economics is more interdisciplinary and focused on social change, environmental economics is part of economics but focused on changing it. ”” 397 398

De Zeeuw became co-editor with John List of *“Recent Advances in Environmental Economics”*, Edward Elgar 2002, ³⁹⁹ of which the table of contents does not indicate that it contains attention for the approach by Tinbergen & Hueting, even though in 2002 there was the *then recent* 1999 Hueting Symposium and the Verbruggen (ed) (2000) report on the calculation of eSNI.

De Zeeuw (2017) refers to CBA and the valuation of “goods, services and welfare provided by the environment” but does not refer to Hueting’s thesis that is critical of CBA and the Tinbergen & Hueting approach (in CBA) that results into the vertical demand curve and eSNI.

One might say that De Zeeuw (2017) is a retirement speech that only reviews issues in environmental economics. However, it is strange to present long existing issues as if they are only newly discovered. De Zeeuw (2017):

“My own work is now strongly influenced by my directorship at the Beijer Institute in Stockholm. By working together with ecologists I came across the importance of tipping points.”

However, ecologists already knew about tipping points in the 1950s and Hueting (1974a, 1980) already refers to their work, and the calculation of eSNI requires standards to avoid such tipping points. Subsequently De Zeeuw (2017):

“An example is the recent discussion about the discount rate. Theory shows that nature and the environment must be treated differently due to changing relative prices.”

However, this regards 1930 as recent. It is strange to refer to “changing relative prices” when the true criterion is ecological survival. De Zeeuw appears to be not only a mathematician turned to economics but also one who assumes authority in environmental economics without properly studying it. At fault is the UvT department that appointed him without requiring a sound basis in empirics.

³⁹⁷ Dutch “Op de lange termijn moet milieueconomie overbodig worden, omdat economie niet los te denken is van de natuurlijke omgeving, maar er was nog een lange weg te gaan. Meteen werd ik geconfronteerd met een lastige tegenstelling. Er bestond een wereld van “ecological economists” en een wereld van “environmental economists”. De eerste had de facto economie afgezworen uit teleurstelling dat economie zo lang de milieu problematiek genegeerd had. De tweede wilde economie behouden maar herzien en milieu expliciet in de analyses integreren. De tegenstelling is nu minder scherp. Ecological economics is meer interdisciplinair en op maatschappelijke verandering gericht, environmental economics is onderdeel van economie maar gericht op verandering daarvan.”

³⁹⁸

https://web.archive.org/web/20190915151005/https://www.nieuwsbriefmilieueconomie.nl/index.php?option=com_content&view=article&id=527:vijftig-jaar-milieueconomie-het-begin-van-een-transitie&catid=43:opinie-en-debat&Itemid=131

³⁹⁹ <https://www.e-elgar.com/shop/recent-advances-in-environmental-economics>

41.2 About Tinbergen

De Zeeuw (2018)(2019) "*Jan Tinbergen, from Mathematics to Poverty and Environment*" has already a title that misrepresents the situation: Tinbergen departed from physics and not mathematics. Tinbergen did not leave mathematics behind but kept using it but for a different field. The body of the paper is similarly flawed. The publication must be retracted and the working paper at the Beijer Institute must be revised to see whether it might be published in revised form.

The stated objective of the paper is: "(...) in order to characterize the importance of his thinking and his contributions". However, De Zeeuw only refers to two Dutch publications by Tinbergen of 1970 and 1987, neglects what Tinbergen wrote about the topics in English, and creates the impression as if Tinbergen & Hueting (1991) would not exist (and would be no contribution). De Zeeuw doesn't mention that Tinbergen gave support to Hueting's notion of eSNI, which would be something of key importance to report about. If De Zeeuw's paper really had the stated objective above, then the paper (i) would indicate what Tinbergen already published himself in English, (ii) would clarify that English readers have missed nothing of essence since Tinbergen already took care of this reporting himself, (iii) so that the discussion of the Dutch texts only has some use to show that Tinbergen did not forget about communication with his home Dutch audience. Since the paper does nothing of this, we can doubt the stated objective.

Most likely, De Zeeuw did not know about the Tinbergen & Hueting (1991) paper and only knew about these Dutch books, and he really thinks that he has something new to report that will be news for readers of English. Corroborating evidence to think so is:

(a) De Zeeuw does not report about Tinbergen & Hueting (1991) in a 2015 encyclopedia publication too, see Chapter 42 below.

(b) De Zeeuw translates the Dutch word "contraproductie" as English "contraproduct" apparently unaware that Tinbergen (1985) used "counterproduction" in his book on the Optimal Order. NB. Hueting nowadays calls this "asymmetric bookkeeping", and it would have been important for De Zeeuw to mention this, namely to allow his readership to link up to the modern literature.

(c) De Zeeuw refers to the "planetary boundaries" by Johan Rockström 2009 and the tipping points, but neglects to mention that Hueting in 1974 already referred to ecologists in the 1950s about irreversible processes, that this was already a key component of the "World Conservation Strategy" in 1980, and that Tinbergen already supported Hueting's notion of standards for environmental sustainability, and he doesn't mention that it would be proper for Rockström to look at the Tinbergen & Hueting approach, and to compare his boundaries with the standards by Hueting, Bosch en De Boer, see Hueting & De Boer (2019b).

(d) A google does not generate information whether De Zeeuw as chair of EAERE called attention to the approach by Tinbergen & Hueting (1991). This needs further checking if one would want to go to the bottom of this, but it is indicative that nothing pops up as such. There is an "EAERE European Lifetime Achievement Award in Environmental Economics" and De Zeeuw is listed as a laureate in 2018 and apparently did not refuse to be honoured before Hueting.

(e) With respect to *Limits to Growth* of 1972, De Zeeuw states that Tinbergen was "*ahead of his time*", but doesn't mention that Jan must have spoken with his

brother Niko Tinbergen, and De Zeeuw obfuscates that *everyone is way behind time now*. De Zeeuw about Tinbergen 1987: “However, Jan Tinbergen explicitly added sustainability to growth. This is still not standard, 30 years later!” We discussed this history of policy goals briefly in Section 7.14 above. Holland adopted a similar official goal in 1992. UK Prime Minister Margaret Thatcher in a 1988 in lecture for the Royal Society: “The government espouses the concept of sustainable economic development. Stable prosperity can be achieved throughout the world provided the environment is nurtured and safeguarded.” (Pearce et al. (1989:183)). Undoubtedly Tinbergen was a leading figure in such changes and undoubtedly he must be “ahead of his time” as a figure of speech, but he wasn’t a voice calling in the desert and the real point of interest is why the flock doesn’t follow. A key insight is that academics like De Zeeuw sabotage the discussion.

A paper about Tinbergen, poverty and the environment should require knowledge about Tinbergen, poverty and the environment, and De Zeeuw apparently has none in sufficient amount. As professor of environmental economics he has looked at mathematical models about what these models call the environment, but there would be no link-up to the Tinbergen & Hueting approach, and there would rather be a negative influence, namely by its neglect. The readers of De Zeeuw (2019) get the impression that only the Dutch books are relevant and when they hear about the Tinbergen & Hueting (1991) paper then they are induced to infer that it would not be relevant enough to mention.

De Zeeuw in his conclusion:

“[Tinbergen] is highly respected for his scientific contributions and for his commitment to solve the major problems humanity is facing: poverty, war and environment.”

De Zeeuw does not provide quotes to prove this respect by authors referring to Tinbergen on the environment. De Zeeuw only invents this respect in order to put more shine on his own article. Within the community of environmental economics, Tinbergen is basically a non-entity. For example, De Zeeuw might have referred to his own work where he referred to Tinbergen before, but it is dubious that there is such a text, even from the period when De Zeeuw was director of the Tinbergen Institute, or in the book that he edited with John List. For example, the Atkinson & Fankhauser (2019) “*Sustainability Economics*” collection of articles does not contain the Tinbergen & Hueting (1991) paper, which is very curious given its relevance, but see Chapter 43 on the role by David Pearce, while Frankhauser collaborated with Pearce on methods of WTP / WTA that Hueting has diagnosed as inadequate. Apparently De Zeeuw is growing aware that he has been overlooking the work by Tinbergen and his article of 2018 / 2019 is intended to wash his hands, but De Zeeuw still presents only one aspect of Tinbergen’s work, and he buries the Tinbergen & Hueting (1991) paper and connection.

There is the awkward issue of the blindness by mathematicians for empirical matters. This is best discussed at the end of this Chapter since it is a more structural issue. This discussion pertains less to individual papers which are merely the result of this more general issue. If a whole wheat field is barren then it makes less sense to focus on each and every particular square cm why it is barren in particular. This aspect of De Zeeuw’s paper is best discussed under the

general umbrella of the deficiency of mathematicians embarking on issues of empirics and policy making. Another example is how mathematicians deal with the empirics of education in mathematics and its research, see Colignatus (2009c, 2015a). On the other hand, we now look at this particular paper, and some comments may be required. The first paragraph of the paper is:

“When I started working, early 2007, as co-director of the Beijer Institute of Ecological Economics at the Royal Swedish Academy of Sciences in Stockholm, I thought of Jan Tinbergen. In 1969, the Academy awarded him, together with Ragnar Frisch, the first Prize in Economics in honor of Alfred Nobel, and the Beijer Institute represents one of the strong drives Jan Tinbergen developed during his life. The natural environment was one of his big concerns, and he consistently called out to the world to get together and take care of the issue. The Prize was awarded to him for his work in econometrics and macroeconomic modelling, but [why “but” ? / TC] the fact that he moved from theoretical physics to economics was already a sign that his main interest was the society and mankind. He loved mathematics, but he wanted to serve humanity. Economics was a logical choice, especially in the times of crisis and post-war reconstruction.”

Tinbergen must have loved mathematics (or must have loved torturing himself with it but the latter is less likely). However, mathematician De Zeeuw overstates the love for mathematics, namely by singling it out. Econometricians love all three pillars of economics, mathematics and statistics. De Zeeuw thus misrepresents the situation. His title is misleading.

In his master's thesis Buitenhuis (2016) presents Tinbergen at age 22 discussing the relationship of mathematics to reality. In digesting this history, a mathematician perhaps only sees and remembers mathematics, but the two components are both relevant, and it is a misrepresentation to single out mathematics.

Mathematicians tend to distinguish pure mathematics and applied mathematics. Tinbergen did not study (pure) mathematics. By categorising (theoretical) physics as applied mathematics, De Zeeuw might justify his title, but then we would get “*Jan Tinbergen, from Applied Mathematics to Applied Mathematics*”, which is uninformative, and De Zeeuw's article then becomes an exercise in psychology of mathematicians, and no longer a historical review, in which Tinbergen departs from physics.

Might we be able to construct a storyline that the love for mathematics resulted in studying theoretical physics instead of experimental physics as done by engineers ? Even then, Tinbergen still did not choose to study mathematics, and De Zeeuw overstates his love for mathematics as a single issue. Tinbergen was also interested in reality and at first opted for physics.

PM. I am no physicist, and I would not know whether physicists in 1925 already made the distinction between theory done at universities and practical experiments done by engineers, though I am inclined to think so. Tinbergen (1929)'s thesis about minimum problems mentions cases that seem more close to practical issues rather than high theory, but because there apparently are no

statistics then they might be called theory nevertheless, and it remains a thesis only and his thesis supervisor might not have wanted to see economic statistics in it. Perhaps physicists can inform us whether theoretical physics can be equated to mathematics. I doubt this. By analogy, mathematical economics still is directed at economics and not at mathematics. (We might make a Venn diagram with mathematical economics as the intersection of economics and mathematics, and then it would be both, but this would indicate that the Venn diagram is not the right representation. There is a distinction between doing and the result. When we do mathematical economics then the focus is on economics, but a mathematician might take the result and look at it only from the angle of mathematics.)

Overall, the paper De Zeeuw (2019) must be retracted from the scientific record because it forms a misrepresentation, in particular since it might induce readers to think that the Tinbergen & Hueting (1991) paper need not be read and is irrelevant for understanding Tinbergen's scientific results in environmental economics. De Zeeuw appears to be lacking in knowledge about the subject that he has chosen with this paper. He can be advised to use the present criticism, with proper reference, to update his working paper De Zeeuw (2018) at the Beijer Institute, so that this working paper in its current version can neither become a source for misunderstanding (there). Whether some journal would be interested in publishing the history that Tinbergen also communicated in Dutch with his fellow Dutch remains to be seen. No doubt De Zeeuw is creative enough to invent some new storyline but he is advised neither to tempt himself nor to entice peer reviewers with claims that they apparently are also incompetent about. A relevant storyline would be however how De Zeeuw and his community of mathematically inclined researchers managed to neglect the Tinbergen & Hueting (1991) paper and subsequent developments in the Tinbergen & Hueting approach, or to abuse it as we have seen in Chapter 39. More information about this would be enlightening, naturally also for the purpose of repairing and further preventing damage.

42. *Environmental economics in a Dutch Canon of Economics* 2015

Phlippen & Werner (eds) (2015) present a “*Canon of economics*” (in Dutch) (“*250 short insights that economic science has to offer the world*”),⁴⁰⁰ at the occasion of 100 years of the Dutch economic-statistical bulletin (“*Economisch-Statistische Berichten*”, ESB). Environmental economics is covered as part 12, by Van Soest, De Zeeuw and Van den Bergh (2015), henceforth SZB. Van den Bergh is mentioned as co-author on page 511 but erroneously not on the title page 214.

The work by Jeroen van den Bergh (at VU IVM) is discussed in Chapter 35. The background of Aart de Zeeuw is discussed in Chapter 41. Daan van Soest⁴⁰¹ got his training and PhD in economics in Groningen 1997 and moved to Tilburg and into environmental economics at least since 2009, also for a while at VU IVM Amsterdam. With these backgrounds, it may very well have been the case that Van Soest and De Zeeuw in 2015 had no idea about the misrepresentation by Van den Bergh of the Tinbergen & Hueting approach. Given the work by John List on contingent or non-market valuation it would have been relevant when De Zeeuw could have informed List about the Tinbergen & Hueting approach, and it is likely that this channel of communication was blocked by Van den Bergh’s misrepresentation.

The Canon discussion of environmental economics contains mostly topics that were already known around 1980, see Hueting (1974, 1980). The new development of eSNI by Hueting (1986b) and Hueting et al. (1992d) is treated summarily, which is unbalanced.

(a) SZB:220 give a positive discussion of emissions trading, while a Public Choice approach would treat it as a political manoeuvre to prevent a really effective carbon tax. By comparison, a 1997 “Economists’ Statement on Climate Change”⁴⁰² curiously still mentions “carbon taxes or the auction of emissions permits”, but a 2019 statement focuses correctly on carbon tax: “A carbon tax offers the most cost-effective lever to reduce carbon emissions at the scale and speed that is necessary.”⁴⁰³ The latter was obvious already in 1997 and 2015.

(b) SZB:221 suggest: “a shift of taxes from labour to the environment can have a double dividend”, while referring to Bovenberg & De Mooij (1994), which conflicts with their actual finding “that environmental taxes typically exacerbate, rather than alleviate, preexisting tax distortions”. Also, the latter authors overlook an essential aspect of taxation, see DRGTPE.

(c) SZB:226 refer to Van den Bergh 2006 and Mishan 1967 for the distinction between income and welfare (utility). This distinction is so elementary in welfare economics that such referral is curious. Instead, for the environment, it is Hueting

⁴⁰⁰ <https://web.archive.org/web/20170301192716/https://webshop.eur.nl/nl/canon>

⁴⁰¹ <https://www.linkedin.com/in/daan-van-soest-7747316/?originalSubdomain=nl>

⁴⁰² https://en.wikipedia.org/wiki/Economists%27_Statement_on_Climate_Change

⁴⁰³ <https://www.clcouncil.org/economists-statement/>

(1974 / 1980) who made progress here. Van Soest and De Zeeuw overlook that Van den Bergh has a background in operations research (OR), has no advanced training in welfare economics, and basically misrepresents Hueting's work, see Chapter 35 of this book.

(d) (d) SZB:228 section 7 discuss eSNI by Hueting, with a reference to Gerlagh et al. (2002). Unfortunately the latter authors misrepresent eSNI, see the discussion about the Alleingang scenario in Section 21.9.12 above. SZB provide neither a reference to an original statement by Hueting nor his protest against the misrepresentation by VU IVM, nor the comment on this issue by CBS vice-DG Henk van Tuinen.

(e) SZB:230 discuss international trade, free-riding and beggar-thy-neighbour policies by countries. They overlook the argument, which has been stated explicitly in this book, but which is available implicitly in the Tinbergen & Hueting approach, that the statistical offices of all countries calculate their national eSNI, such that there is monitoring of policy making not only nationally but also internationally, with the rise of a system of co-ordination. It is remarkable that SZB have not grasped this themselves, given the awareness that key environmental issues are of an international nature, and thus must be regarded from the global level.

(f) SZB:232 section 9, on international treaties on climate, point to game theory for sovereign nations. They do not mention Tinbergen's analysis on the optimal social order, nor the approach under (e) (as also clarified in this book). Neither are they aware that political scientists apparently are still locked in the humanities and thus no proper scientists, see Colignatus (2018). (Not available in 2015: Rick van der Ploeg, now at Oxford, mentioned in point (b), might bear witness on Brexit.)

(g) SZB:233 discuss tipping points, with references to rather late publications in 2000, 2009 and De Zeeuw himself 2014. However: Hueting (1974, 1980) already referred to ecological tipping points (Kapp, Odum). They refer to "planetary boundaries" but forget to mention that eSNI has been based upon similar standards for environmental sustainability (formulated for use in an economic model).

Overall, the SZB discussion fails on crucial points of knowledge and analysis, is unbalanced and shows an academic bias against work done at a national statistical office.

Van Soest replied to this criticism, explicitly stating that he wrote only for himself and not for the others, and in some hurry.

- 2019-04-18: "The Canon is intended to provide rough insights into a subject - encyclopedic, therefore - but there is not enough room to cover all subjects, nor to discuss each subject in detail. (...) I hope you understand that the Canon has only an informative character about the state of thinking on many topics, including environmental economics, and not an in-depth scientific review of everything that has ever been written about each of the

environmental economic topics that are in the bundle - let alone the topics that are not in it." *However, my points were on misrepresentation and inaccuracy.*

- 2019-05-08: "I hereby commit myself that if I write an article or give a presentation about measuring sustainable development, I will submit that presentation or that article to you, to ensure that Hueting is not being subjected to even more misrepresentation than is currently the case." *However, my request was to correct the misrepresentation and inaccuracy in the present Canon.*

43. David W. Pearce (1941-2005)

The work by David W. Pearce (1941-2005) has already been referred to at other places in this book, notably at the end of Section 7.10 on terminology.

Hueting and Pearce are both neoclassical economists, and much of what Turner (2005) describes about Pearce also holds for Hueting.⁴⁰⁴ Where Pearce et al. (2001) state that Pearce differs from Hueting on government competence and benevolence, Pearce actually has misunderstood Hueting, and he did not see the conditionality. On the other hand there are some natural canyons between Hueting and Pearce: age (born 1929 versus 1941), country, language, academia versus statistical offices, policy for the future versus statistics of the past, manner of using mathematics. If the two economists had been able to bridge the chasms then much could have been achieved, but alas. One might say that the younger economist might be advised to pay attention to the older economist but such other canyons might offer excuses to let it pass. My suggestion is that such excuses are a luxury that humanity cannot afford. Let the younger generations try again.

I had expected to see a reference to Hueting's work by Pearce, Markandya⁴⁰⁵ & Barbier⁴⁰⁶ (1989) "*Blueprint for a green economy*" but it wasn't there, even while Hueting (1986b) was presented at the 5th UNEP / World Bank workshop in 1986 (see Ahmad et al. (1989:95)) and while the *Blueprint* refers to those workshops, and while the very objective of the *Blueprint* was to *review the state of the art*. The *Blueprint* originated by a research contract issued by the UK Department of the Environment, with a Term of Reference §4 stated by Pearce et al. (1989:27):

"review the state of the art on the relationship between the sustainable development concept, national accounting, resource accounting, satellite accounting, and project appraisal procedures (T.O.R. para. 4)."

Pearce et al. (1989:6) *Blueprint* show a diagram of demand and supply, with an downward sloping demand curve and a fixed supply Q^* of "*quantity of environmental services*". They explicitly state:

"The supply is generally fixed, however. This is shown by the vertical supply curve, S."

Remarkably, the authors allow a consumption of $Q_0 > Q^*$ at zero price, which contradicts the statement that only Q^* is available. Conversely, Hueting (1986b) has the vertical demand curve of *purity*. In his model, supply is upward sloping and demand is fixed at the assumption of preferences for environmental sustainability. One would expect the *Blueprint* to discuss the difference of "use" $S = Q^*$ versus "purity" $D = Q^*$, as part of *the state of the art*, but such isn't there.

I did not see a paper by Pearce that refers to Tinbergen & Hueting (1991). There are some later publications where Pearce refers to Hueting's work, notably Pearce (1994), Hamilton, Pearce et al. (1994), Pearce et al. (1996) (1998). These

⁴⁰⁴ Turner refers to Hueting but does not compare the two economists and/or approaches.

⁴⁰⁵ <http://web.archive.org/web/20190918112944/http://icre8.eu/professor-anil-markandya>

⁴⁰⁶ <http://web.archive.org/web/20190530184908/http://www.edwardbbarbier.com/Biography.html>

references did not help Pearce to change his mind, for, as stated, Pearce helped developing the GS / ANS method at the World Bank that doesn't fit strong sustainability, see Chapter 30.

Pearce, Hamilton & Atkinson (2001) – their contribution to the Hueting Symposium of 1999 – reject Hueting's approach with some misrepresentation, see Section 21.9.11. These authors did not respond to the Hueting (2001d) rejoinder. Hamilton and Atkinson can still reply, and should feel invited again to provide a reply, also to the following.

Looking at Pearce's work now, I also would have expected more references to Ezra (Edward) Mishan (1917-2014). Mishan had his book "Cost-Benefit Analysis", Allen & Unwin, 1971, and Dasgupta & Pearce (1972) had their own book "Cost-Benefit Analysis", with Macmillan. Progress in research and education comes from competition too but part of the scientific ethic is to properly refer to intellectual precursors to allow readers to trace the argument. I would expect a reference by Dasgupta & Pearce to the earlier Mishan volume, in particular in the corrected edition of 1974, but I don't see it. (My reprint is of 1980.) While experts might fall victim to the assumption that everyone knows the literature, educators should not.

Let us first establish a dearth of referencing and then wonder why.

43.1 Pearce on the history of environmental economics

Pearce et al. (2001) state: "Roefie Hueting's *New Scarcity and Economic Growth* (Hueting, 1980) has a deserved place in the history of environmental economics." Pearce (2002) gives an "intellectual history of environmental economics" that does not refer to Hueting or the Tinbergen & Hueting approach. His statements clash.

Potentially, the latter article was written before the first, since journal publishing takes time. Potentially only Pearce's co-authors see such a place in history and not Pearce himself.

However, Pearce (2002:76) may have an implicit reference:

"The notion of strong sustainability is attractive in many respects. However, it begs the question of how the optimal stock of natural capital is determined, unless what is intended is that what there is is optimal."

Pearce does not give a reference, and we can only guess that this statement also refers to the Tinbergen & Hueting approach that has strong sustainability. It is curious that Pearce suggests that "*what there is*" (Earth, perhaps Q^*) might *not* be optimal (for the vital functions). With a footprint greater than 1 we are already using more than "*what there is*" (according to the definition of environmental sustainability), and hence the *boundary conditions* immediately become *binding* and thus optimal. It would be curious to conclude that Pearce would think it optimal when the ecology collapses and humanity doesn't survive.

Nevertheless, anyhow, Pearce (2002) clearly does not see Hueting's contribution of identifying the *conditionality* of assumptions in the *measurement* of national income. Where Pearce writes "*what there is* [Earth] is optimal" such understanding and proper reference would have given "*what there is* [Earth] provides a conditional assumption of optimality". Pearce has been opposing Hueting, and writes a history, without proper understanding, and without referencing that would allow to check such understanding.

43.2 On the uniqueness of the innovation

Pearce et al. (2001:212) recognise the uniqueness of Hueting's approach:

"Roefie Hueting's solution is to invert the process of estimating a modified or 'green' national income."

The authors in 2001 in the subsequent paragraph give a fairly decent representation of the Tinbergen & Hueting approach. However, while Hueting states that the standards for environmental sustainability are derived from the scientific literature (and then are subject to expert variability), Pearce et al. (2001:212) suggest that those would be arbitrary:

"(...) because of the difficulties of measuring sustainability targets and because, even where they can be defined, the marginal costs of achieving the last unit of sustainability is likely to be so large as to make the measure unachievable."

The latter objections are curious, given the Tinbergen & Hueting (1991) paper, with the conditional assumption of such achievement (even if it requires a reduction of the size of the population), and given the fact that the very Hueting symposium in 1999 also presented the actual calculations by the IVM team. (One would hope that Pearce et al. would be able to see the distortion by the Alleingang scenario.)

Section 21.9.11 refers to the Hueting Symposium in 1999 and Pearce's contribution there, that shows that Pearce does not see Hueting's contribution of identifying the conditionality of the assumptions in the measurement of national income, and that Pearce misrepresents Hueting's analysis as if Hueting assumes a competent and benevolent government, see the Hueting (2001d) rejoinder to Pearce et al. (2001). A word of caution is that Hueting (1986b) originally started with standards set by a government, and only a few years later adopted the conditionality of preferences and the scientific literature. Nevertheless, importantly, Pearce et al. (2001) recognise the uniqueness of an innovation concerning the "inverted method", and we see this recognition also in Pearce (1994) and Hamilton, Pearce et al. (1994).

Thus, importantly: Since an unique contribution strikes the mind, we can infer that the authors would likely have noticed the method soon after it was announced in 1986. Also, the *Blueprint* was contracted to *review the state of the art* so that there was a task not to overlook key elements in the discussion.

43.3 On the academic standard to refer properly

Regardless whether Pearce properly understood Hueting's work, the Pearce et al. (2001) contribution to the Hueting symposium clarifies that Hueting's work was known by them for a longer time, with a reference to Hueting & Bosch (1990). Thus Pearce should have referred where he didn't. By not always referring properly he may have belonged to an English tradition to which also Marshall and Keynes⁴⁰⁷ belonged, but which tradition is no longer acceptable. Not-referring may give readers – and perhaps over time even yourself – the idea that you have

⁴⁰⁷ <https://boycottholland.wordpress.com/2014/10/26/thomas-robert-malthus-visiting-maastricht/>

generated such ideas yourself, and it hinders or even blocks their access to the reasoning by the true originators. Not-referring also blocks communication: when Pearce had published his misunderstanding and subsequent misrepresentation of the Tinbergen & Hueting approach much earlier than in 2001, then this would have allowed others or even Tinbergen (deceased in 1994) and Hueting themselves to ask for a correction sooner. (Ideally Pearce would have sent a copy of the *Blueprint* to Hueting at CBS Statistics Netherlands and stated his interest in comments.)

43.4 *An obituary may be vague*

Hueting's position since 1965 focuses on environmental sustainability, which the literature also calls "strong sustainability". In this definition, ecological collapse cannot be compensated by other goods. Pearce however supports the notion that such compensation is possible. Even when humanity doesn't survive, Pearce et al. (1989:3) *Blueprint* transform this discussion topic into the following:

"This theme is that future generations should be compensated for reductions in endowments of resources brought about by the actions of present generations."

The Smith (2005) obituary ⁴⁰⁸ remains vague, since it obscures that Pearce changed the discussion topic from ecological survival into another discussion that allows for the possibility of compensation e.g. by "intellectual capital".

"In the words of the 1987 Brundtland Commission report, sustainable development was "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Pearce drew on traditional growth theory and on Hicks's concept of income to interpret sustainability as meaning that each generation should pass on at least as much capital as it inherited. Pearce saw this stock of capital in broad terms – including physical capital (machinery and infrastructure), intellectual capital (knowledge and technology) and environmental capital (natural resources). He argued that it was idle to suggest that economic activity should never damage the environment. The notion of sustainability defined the minimum conditions for such damage to be accepted, so as to maintain the inheritance of future generations."

Pearce's position may have changed over time. Pearce (2002) gives strong sustainability more weight than Pearce et al. (1989) in the *"Blueprint for a green economy"*. Still, Pearce helped developing the GS / ANS method at the World Bank that doesn't fit strong sustainability: and I am not aware of a retraction. See Chapter 30.

The obituary also mentions the emissions trading system in positive terms while it thus neglects that this was a political choice while economic science points to a carbon tax.

⁴⁰⁸ <https://www.theguardian.com/science/2005/sep/22/highereducation.guardianobituaries>

43.5 The relevance of this discussion

Normally, an unique innovation would be referred to, especially in a review. Given the wanting of references, it cannot be excluded that *if Pearce found that Hueting's work did not fit his own approach then he could ignore it*, and only refer to it when really unavoidable, like in a review for the World Bank in 1994 (who knew about the method) or at the symposium in 1999.

Thus, this discussion of Pearce's work does not only serve the purposes of history writing but may also serve the understanding of authors at the World Bank or in the UK, like at the LSE Grantham Research Institute, who have collaborated with Pearce and who might follow in his footsteps in misrepresenting the Tinbergen & Hueting approach and/or strategically neglecting or burking it. For example, the new book by Atkinson and Fankhauser (eds) (2019), *"Sustainability economics"* does not contain a paper by Hueting and especially not Tinbergen & Hueting (1991). The editors might be factually right that this approach has not been (sufficiently) "influential"⁴⁰⁹ but obviously it cannot be influential if it is sabotaged and ignored for the wrong reasons.

The 2005 obituary by Barrett (2005) states:⁴¹⁰

"When ... Pearce ... was head of the Economics Department at UCL [in 1984-88], he reckoned there were no more than five environmental economists in the whole country. Today, there are dozens. Every one has been touched one way or another by David Pearce. ..." (...) "Another reason: he gave others his time, his encouragement, and his inspiration, cultivating a new generation of environmental economists." (...) "He also created an MSc in Environmental Economics at UCL "a programme that spread the discipline to every part of the globe."

We may fear that Pearce has cultivated a misrepresentation of the Tinbergen & Hueting approach around the globe, including strategically neglecting or burking it.

43.6 What did Pearce know in 1989 ?

It is unknown now what Pearce *really* knew about Hueting's method in 1989 when Pearce et al. (1989) wrote the *Blueprint*. At this moment of writing there is no hard evidence, in particular because the *Blueprint* doesn't refer to Hueting. Circumstantial evidence however makes it rather likely that Pearce in 1989 had heard about Hueting's work. The most likely inference is that Pearce's omission of Hueting and eSNi in the *Blueprint* of 1989 has been deliberate. We must allow that Pearce in 1984-1988 was occupied with restoring a department at UCL, and that the *Blueprint* was a major undertaking of advice for the government, so that

⁴⁰⁹ The blurb states: "This timely collection highlights the contribution of economics to the study of sustainable development. It brings together in one volume some of the most influential articles on the topic by economists over the past fifty years. Environmental sustainability, an inherently interdisciplinary topic, is analysed from the perspectives of applied microeconomics, environmental and resource economics, ecological economics, development economics and public economics. Together with an original introduction by the editors, this volume is indispensable for anyone interested or working in the field."

⁴¹⁰ <https://web.archive.org/web/20190819104719/https://www.ucl.ac.uk/news/2005/sep/obituary-professor-david-pearce-economist-who-priced-environment>

omission of a reference to Hueting's work might have been a plain case of lack of time. However, without deliberation, the omission of *the state of the art* would be an implication of incompetence and the latter would be a less likely conclusion.

It is remarkable that the Hueting (1986b) (1987d) (1988) – and perhaps (1989b) if its draft had been circulated – approach of the vertical demand curve (or assumption of preferences on standards for environmental sustainability) gets no mention in the *Blueprint*. It is remarkable since the method is novel and unique, and *not in the air*. Every econometrician knowledgeable in the field can recognise its unique contribution as such. Once having seen it, such researchers may agree that it is an obvious way to approach the issue. For econometricians it is a no-brainer. To presume that Pearce would not have recognised this unique innovation in 1989 would be tantamount to suggesting that he would have been incompetent. And, he must have heard about it because of the discussions at the workshops of UNEP, and the very objective of the *Blueprint* was to *review the state of the art*.

Issues can be in the air, with more authors inventing the same ideas. Hueting (1967) (in Dutch) discussed the correction of national income as a common notion. For welfare economists also working in accounting it is natural to think in such terms. See the retrospection by Simonis (2011) also for references to Japan 1970. Also Nordhaus & Tobin (1971, 1973) "*Is growth obsolete?*" falls in that common cloud of concepts, and their paper may be said to be only original in the practical implementation. Nordhaus & Tobin use income to develop a "measure of economic welfare" and thus focus on welfare and not income. Hueting had been involved in background advising for the study by jointly IUCN, UNEP and WWF (1980). Pearce et al. (1989) in the "*Blueprint for a green economy*" discuss "sustainable national income" (p93-119) and refer to "Limits to growth" 1972, Nordhaus and Tobin (1971, 1973) and IUCN et al. (1980), and to discussions at UNEP. Thus, when they do not refer to Mishan and Hueting (1986b) (1987d) (1988) – and perhaps (1989b) if its draft had been circulated – then Pearce et al. (1989) might be excused that such ideas "were in the air", so that one might argue that there would have been no specific need to refer to Hueting's work. However, the very approach by Hueting precisely is *not in the air*.

(i) Hueting's approach is such an unique innovation that it stands out and hardly can be overlooked. Pearce et al. (2001) write about Hueting's work as a continuous presence since 1980. For Hueting's "inverted method" they refer to Hueting & Bosch (1990). The latter reference might be considered acceptable for this article in 2001, but for the 1989 *Blueprint* it is important to be aware that there are earlier references, as mentioned above.

(ii) Pearce et al. (1989) refer to discussions at UNEP / World Bank in which Hueting participated, and see the quotes on page 192 for his leading position. Hueting (1986b) – in cooperation with Nizam A. Yunus and its appendix with Toto E. Sastrasuanda – was presented at the Fifth Workshop, Paris, November 20-21 1986, see Ahmad et al. (1989:95). The latter source also clarifies that Pearce was only present at the 2nd workshop in 1984. Hueting presented a paper there that argued the inadequacies of common Cost-Benefit Analysis techniques like Dasgupta & Pearce (1972) had discussed. Hueting's approach with eSNI was discussed in those workshops regularly after 1986, see Peskin and Lutz (1990). Potentially Pearce was too busy at UCL in 1984-1988 to visit the workshops that

he refers to. However, given the research contract and stated objective of the *Blueprint* to review *the state of the art* we may however assume that he received papers and had discussions with participants. (This is also a reason just now for not further looking into what Pearce's co-authors would have known at the time.)

Thus it is highly unlikely that Pearce in 1989 would not have heard about Hueting's unique innovation that was discussed at these workshops.

(iii) We can add to this that Hueting states that he introduced the term (e)SNI, see Section 7.12.

43.7 On the likelihood of deliberate silence

Remarkably, the references in the *Blueprint* become rather vague when they refer to The Netherlands or UNEP, where a proper reference to Hueting's work would be in order.

When the *Blueprint* p57 refers to data from Holland, it refers to a Dutch Ministry and to a paper by Opschoor for a 1986 OECD workshop (who indicates environmental costs at most 1% of Dutch GDP while Hueting thinks of 50%).

Pearce et al. (1989:94) state that "natural resource accounting modelling" would have started in Norway 1974 but do not take account of the fact that Tinbergen got Hueting appointed at CBS Statistics Netherlands in 1969 with the purpose to correct national income for damage to the environment (and obviously Hueting started by first creating the required physical accounts).

Pearce et al. (1989:94) suggest that others "follow" the methods by Nordhaus & Tobin or Norway, but then neglect earlier developments in e.g. Holland and Japan. (What they present about Japan has apparently been a later study by Kimio Uno who also refers to Nordhaus & Tobin.)

The Pearce et al. (1989) "Annex: sustainable development – a gallery of definitions" lists various authors – including prime minister Margaret Thatcher in a speech for the Royal Society (p183) – but not the novel insight by Hueting, with the definition for environmental sustainability that it depends upon standards that can be derived from the scientific literature.

The reference to the UNEP workshops is e.g. Pearce et al. (1989:115-116):

"In a sequence of workshops UNEP, the World Bank and UNSO [in which Hueting participated and presented his remarkable innovation] have debated these questions and have reached a number of useful conclusions. [no reference] We agree with these conclusions. The first is that, *at this stage*, the environmental accounts should not be fully integrated into the national income accounts, but rather that a set of *satellite accounts* be established that deal with the environmental issues. Such accounts could be in physical or monetary terms or both and would seek to address the questions of the linkages between environmental and natural resource base and the economic system, as well as estimating a natural resource balance sheet and working towards a measure of sustainable income. However, the attainment of these goals is still some way off and the necessary work is only in its infancy."

Pearce et al. (1989:117-118) arrive at this policy advice:

“As far as the monetary side of the accounts is concerned, there is a good case to be made for the measurement of sustainable income for the UK. This should incorporate measures of welfare loss due to environmental pollution as well as measures of depreciation in the natural and environmental resource base. The resources required for this task are probably less than those need[ed] for a full physical accounting framework, and the rewards somewhat clearer.”

Comments on these quotes are:

- (i) At CBS Statistics Netherlands, Hueting's department of environmental statistics already provided such physical accounts, and it is only *terminology* to call these “satellite accounts” (apart from specific uniform formats for such accounts). The upshot of the UNEP / World Bank workshops is that other countries started following the examples by Holland, Canada and some other countries, and that researchers aspired at more uniformity.
- (ii) The “good case to be made” is an understatement that is quite in contrast with Hueting's analysis that the standard measure of national income is misleading, and that proper information requires the additional calculation of eSNI of necessity. Pearce shows himself to be an environmental economist, without awareness that national accounting is directed at providing adequate information.
- (iii) The reference to “sustainability” allows still some leeway as to its meaning, see also the Pearce et al. (1989) “Annex” with the various definitions. These authors thus advise to calculate something called X while leaving vague what X would be. Pearce et al. (1989:xiv) state: “But the search for precise meanings is not the subject of the current report: *we are concerned (...)* *whether it is a feasible, practical concept.*” Here they keep X vague but wonder whether it is practical ... As indicated, the original topic of discussion concerned ecological survival, and the *Blueprint* emphasized a notion of “compensation” when humanity would not survive, and these authors only managed to do so by maintaining such vagueness.
- (iv) Hamilton, Pearce et al. (1994:48): “In separate and unpublished recommendations, however, the report also cautioned about the priority that should be attached to elaborate green accounting exercises given their cost and the need to develop other accounting exercises as well.” For the issue of costs of calculating eSNI, see Section 20.6.
- (v) PM. The “Blueprint 3: Measuring Sustainable Development” sequel of 1993 apparently has no reference to the Tinbergen & Hueting approach either, but I am relying on a Google book search here.

43.8 On a possible motive

Apart from possible confusion (see below), a detective uses the scheme of *means, opportunity & motive*. Turner (2005:3) states, perhaps closer to Pearce's thinking later in life:

“Despite all this he remained uneasy about a line of reasoning that linked ecosystem diversity and resilience together with support for the precautionary principle and for strong sustainability. The precautionary

principle has his support only if it is subject to a cost-benefit filter i.e. if a safe minimum, standards interpretation is allowed, such that there is a presumption in favour of not harming the environment unless the opportunity costs of that action are, in some sense, very high.”

Pearce still did not adopt strong sustainability. He wanted to see trade-offs, established within Cost-Benefit Analysis, while ecological survival doesn't allow for such trade-offs, and while Hueting (1974, 1980) had shown that standard techniques of Cost-Benefit Analysis are inadequate here.

Pearce et al. (1989:xv) state: “Nor can we ignore the difficult issue of how to weigh up the relative balance of gains and losses between the present and the future - the *intergenerational question*.” It is curious to say so, when the very objective of their book concerns sustainability (“we are not going to ignore our topic of discussion”). The statement still highlights their focus on trade-offs.

My present hypothesis is that Pearce's motive is likely to have been his idea that economics involves the discussion of trade-offs. Apparently, Pearce rejected strong sustainability because it doesn't allow for a trade-off between ecological collapse and possible compensation (like a good meal before an execution). For him, a lack of a trade-off means that it is no part of economics per se. In this manner, he easily switched to weak sustainability that supposes trade-offs, and subsequently it was easy for him to burke the Tinbergen & Hueting approach where he should have referred. Whether this hypothesis is the true diagnosis, is unclear, because he apparently never explicitly said so. If he had expressed it, then it could have been discussed that such a view is rather ludicrous. Economic theory can clearly accept that a definition of environmental sustainability uses standards – and what those standards are is up to the ecologists in collaboration with economists who must include them in the models. The standards provide physical conditions and it would be a category mistake by Pearce if he really wanted to see trade-offs in the boundary conditions to the optimisation problem.

Observe that there was the international Brundtland report in 1987, and the UK government apparently wanted a double-check by own consultants in favour of the market system. Pearce et al. (1989) present their report as *their report*. They do not present their report as *other (foreign) authors have solved our problem for us, we need only follow their example*. Another possible motive thus is plain vanity. This relates to the academic culture on referring again. The report does not clarify why the report would be so especially different from what others already have reported upon. The report is supposed to *review the state of the art*, compiled for the UK government, and not to provide a platform for own contributions by the authors themselves. With their kind of presentation, their report became known as the “Pearce Report” instead of “the advice to follow Y” where Y might be what an (unbiased) evaluation would have generated, e.g. Brundtland, Nordhaus & Tobin or UNEP / World Bank or whatever. Then Y would have been the hero in the UK instead of Pearce himself. By excluding a main innovation from the report it would be more difficult for readers to observe its bias and vanity. The present short evaluation of this part of the history of the reception of the Tinbergen & Hueting approach obviously cannot establish whether there was such bias and vanity at the time of the publication of “the Pearce report”. Potentially, surviving co-authors of Pearce who are still active in this field of research may judge (for themselves)

whether such element might be at play, and whether it would partly explain the deficient reception of the Tinbergen & Hueting analysis (in the UK).

43.9 *A confusion of statistics and policy making*

Turner (2005:3) states:

“What seemed to trouble him most was his argument that if diversity and resilience are essential for sustainability, what we have to face, then, is that sustainability and well-being of the poor are not compatible.”

It is not impossible that Pearce was confused about the distinction between statistical measurement of national income versus advice on policy making. Tinbergen & Hueting (1991) allow that the measurement of eSNI involves the elimination of population in order to reach the standards of environmental sustainability. They obviously do not suggest that such population be removed in reality (since this argument obviously applies to an observation about the past). The argument is that the distance to environmental sustainability may also be caused by some level of overpopulation, given the current state of technology. Statistics only provides information, and it is up to policy making how to use that information. Turner's statement suggests that Pearce might be willing to reject sustainability as a useful concept, even for measurement of national income, because he apparently was focused upon his advice on what to do next. The issue of policy making however is quite different, and should not be a reason to block the information provided by statistics.

43.10 *On the influence of mathematics*

Pearce et al. (1989:106) curiously equate income and welfare, which runs against the clear distinction between income and the social welfare function.

They refer to theorems on optimality that presumably would allow such equating, and then they proceed with a discussion that the conditions for optimality are not satisfied in reality ... The reader observes a hodgepodge.

Pearce et al. (1989) apparently want to combine economic theory and practical national income accounting. Apparently they hope to be blessed with a golden touch that combines theory and practice, but they end up in category mistakes. It may be observed that none of these authors had a background in practical national accounting. Apparently of necessity their approach is more theoretical. Hueting resolves the gap between theory and practice with a background in both, and sharper reasoning, arriving at the solution approach of conditionality.

43.11 *Other references in this book*

This book already referred to work by Pearce.

Section 7.10 on terminology discussed that Pearce adopted the “capital terminology” of simple growth modeling instead of Hueting's terminology targeted at practical statistics within the SNA. When Turner (2005:2) states “Pearce has rightly been widely credited with the introduction of the concept of natural capital (K_n) and the linkages to sustainability during the 1980s” then this only concerns the terminology (that deviates from the SNA), while the concept and the linkages (environmental functions and eSNI) had been sharply defined by Hueting.

Pearce may even have read about it in the papers for UNEP and the foundational circles of the journal on ecological economics, but it is hard to say so, since we see no references in Pearce et al. (1989).

Section 5.6 calls to attention that Pearce in his textbook on Cost-Benefit Analysis (CBA) did not understand Arrow's Theorem on a social optimum, and subsequently reduced CBA to ad hoc-ery.

Section 21.6.1 already referred to the Turner (2005) discussion of the Blueprint legacy that is important for nuance that we are all fallible human beings working within settings of national discussions.

43.12 *Studies done for RIVM and the European 6th action plan*

Pearce and Howarth (2000) was commissioned by Dutch RIVM and intended for the European 6th Environmental Action Plan. The study doesn't mention the Tinbergen & Hueting approach and relies upon more standard techniques in Cost-Benefit Analysis that understate the environmental challenge. There is no effort to compare with the results from the IVM-team presented at the Hueting symposium of 1999. Simultaneously the Dutch Ministry of Economic Affairs (EZ) commissioned a study, supervised by RIVM, by Howarth, Pearce et al. (2001), "Valuing the benefits of environmental policy: The Netherlands". This study mentions on its mailing list also Kees Vijverberg at the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM). We are reminded of Section 21.10.9, with Vijverberg's involvement in the disappearance of a subsidy. Potentially EZ, VROM and RIVM reallocated the eSNI funds to Pearce's study ? It remains to be seen, but Pearce's study for RIVM anyhow has no reference to Hueting's work while such reference would be relevant for it.

43.13 *Other contacts in Holland*

Potentially it could be interesting to know whether Pearce had some discussion with other researchers about eSNI, for example in Holland, and in particular how accurate those discussions were. Pearce et al. (1998) is a paper published in a volume edited by Van den Bergh (see Chapter 35) and Hofkes (see Section 21.9.12 and Chapter 39), and potentially such contacts also generated some discussion, say starting with "What do you think about eSNI ?". In an optimal world such discussion would allow researchers to correct each other's misunderstandings. In reality each researcher might reject eSNI summarily ("It is not relevant") and then they might quickly agree about joint rejection, but for quite different reasons that they would not agree with. It is a matter of scientific quality how such contacts are handled.

43.14 *Conclusion*

I have looked at only some of Pearce's work, namely at what I could find on the connection of his work to the Tinbergen & Hueting approach. What transpires remains a hypothesis but also a very likely one. It does not seem very likely that a publication by Pearce could be found that would contradict the finding here.

David Pearce (1941-2005) has apparently never understood the Tinbergen & Hueting approach. Unless it was totally unavoidable, he ignored, burked or misrepresented the approach – i.e. represented it as he understood it. He was not

open to criticism on this. He did not respond to the Hueting (2001d) Rejoinder for the symposium of 1999. Earlier he had not responded to criticism about Cost-Benefit Analysis (CBA) by Hueting (1974, 1980), with the message that national accounting and environmental policy require something quite else than standard CBA.⁴¹¹ Hueting however managed to bring the analysis back within the confines of CBA, namely by the development of the vertical demand curve, Hueting (1986b), with the subsequent interpretation in terms of conditionality. This intellectual development however was not recognised by Pearce. Pearce was much in favour of trade-offs and he did not see such trade-off in the notion of strong sustainability. (See Turner (2005:5) on the two-tier approach that still focuses on trade-offs and compensation.) We may infer that Pearce likely made a category mistake by wanting to see trade-offs where there are boundary conditions to the optimisation problem.

In Section 30.1 we already stated: “After the UNEP-WB project with the publication in 1989, to which Hueting (1989b) contributed, the World Bank chose for GS / ANS as proposed by Giles Atkinson and David Pearce in 1993 and by Kirk Hamilton 1994, and jointly reviewed by Hamilton, Atkinson and Pearce (1997).” However, the GS / ANS approach does not satisfy strong sustainability, just as Pearce wanted.

Currently, the statistics of national income accounting and environmental policy making are still deficient with respect to ecological survival of humanity itself, and already in the daily practice of large sections of the world population. One wonders what Pearce would have thought about the “natural disasters” with their human suffering that the world has seen since 2005. Undoubtedly Pearce did the best he could, but the result is rather dismal, and quite likely because he failed on the basic ethic of science concerning study of the literature, proper presentation and referencing, and replying to criticism. The “legacy of Pearce” appears to be still cherished by his surviving co-authors, and such would seem to be proper in itself, but let this chapter be both a reminder of human fallibility and an encouragement to try to do better nevertheless.

⁴¹¹ Apparently, the OECD is still struggling with it: See (i) <http://www.oecd.org/environment/cost-benefit-analysis-and-the-environment-9789264085169-en.htm> and (ii) a podcast under chairperson Giles Atkinson <http://www.lse.ac.uk/lse-player?id=4568>

44. Cost Benefit Analysis in Holland

Cost Benefit Analysis (CBA) has such a major role in this book that it might be an option to restructure this book and put CBA at the center. However, this is not a book that only falls under the heading of CBA. This book targets a readership that is wider than only those interested in CBA. Let us accept that CBA pops up in this book frequently. This Chapter indicates some interconnections, with a focus on Holland.

(1) This book uses the term CBA where the Dutch literature has "Social CBA" (MKBA). Holland has a rich biotope for CBA since provinces and municipalities are often required to make an environmental assessment ("milieu-effect rapportage" (MER)). There is a website to provide more information,⁴¹² created by some researchers and consultants with an interest in the issues.

(2) For Holland, CE Delft (2018)⁴¹³ is a much used "*Environmental Prices Handbook*" that uses a less involved methodology than eSNI. Due to the costs of calculating eSNI (5 personyears of different competences, see Section 20.6), CE Delft has apparently not yet been able to implement the eSNI methodology. The prices in its *Handbook* thus need not satisfy the criterion of the *World Conservation Strategy* or the requirement of environmental sustainability on ecological survival, or the expectation that half of Holland would be flooded in the coming centuries. It has been quite unfortunate that the calculation of eSNI wasn't assigned in 1998 to CE Delft but was given to VU IVM that had a already 1994 stated bias against it.

Hueting is related to the history of CE Delft.⁴¹⁴ Theo Potma (1932-2017) and Roefie Hueting (b. 1929) were at the foundation of CE Delft, also with the "CE scenario" 1982 (its cover states January 1983).⁴¹⁵ About this scenario Hueting had at least four publications in English:⁴¹⁶ 1984c as chapter in Bergström (ed), 1985b⁴¹⁷ in *The Environmentalist*, 1987d⁴¹⁸ in *Ecological Modelling*, 1991b as chapter in Garrett et al. (eds) *Studies for the 21st Century*.

(3) "Trade-offs within the issue" versus "boundaries of the issue"

The CBA literature has a tendency to concentrate on trade-offs (exchange ratios, prices) that exist within an issue or predetermined question. This focus loses sight of the boundaries of the issue itself, for which no exchange ratios possibly exist. This misplaced focus or narrowing of focus can lead to absurdly unrealistic outcomes. Many CBAs relate to nature and the environment where this problem with focus comes to the fore. This Chapter looks at environmental economics but the issue is more general.

⁴¹² <https://www.mkba-informatie.nl/>

⁴¹³ <https://www.ce.nl/en/publications/2113/envionmental-prices-handbook-2017>

⁴¹⁴ https://www.ce.nl/assets/upload/file/Rapporten/CE_Delft_Missie-voor-milieu.pdf

⁴¹⁵ <https://library.wur.nl/WebQuery/groenekenis/184410>

⁴¹⁶ <http://www.sni-hueting.info/EN/SelectedPublications.pdf>

⁴¹⁷ <https://link.springer.com/article/10.1007/BF02240320>

⁴¹⁸ <https://www.sciencedirect.com/science/article/pii/S0304380087900482>

Technically it is about optimisation under conditions, in which we should not forget about the conditions. We might make the mistake of acting as if there is also a trade-off for the conditions while this is not the case. It is a category mistake when conditions are seen as exchangeable instruments. Perhaps there is a trade-off between "dying from drowning due to rising sea levels" and "dying from hunger by the extinction of bees", but that is a hopeless trade-off, and it is better to impose conditions that neither of them take place.

(4) Nature and environment versus taxes

Van 't Riet (2019) (Dutch) presents a "short history" of CBA theory. He chooses a focus on potentially disruptive taxes and effects of distribution also over generations. Much has been achieved in this area but it does not seem correct to me to restrict a "short history" to only this. He forgets the role of conditions. After all, boundaries (for which there is no exchange) are important for nature and the environment, and environment and boundaries are important for CBA as well. What Van 't Riet describes in terms of general theory also applies to nature and the environment, since it is a general theory, but the issue now concerns relevance, and then we have the situation of optimisation under conditions.

The *World Conservation Strategy* by IUCN, UNEP and WWF (1980) recommends preservation of vital environmental functions or critical natural capital, defined in such a way that the conditions of survival must be met. The conditions are imposed on the basis of a principle, survival, and not on the basis of optimisation. Current director of UNDP and former director of UNEP and IUCN Steiner (2019) states: "This is not theory, this is not the distant future, this is about survival." Non-survival, such as flooding of half of Holland, see Schuttenhelm (2019), cannot be exchanged with a shorter travel time between Amsterdam and Rotterdam.

(5) The categorical difference between 5% and 50%

Hueting and De Boer (2019b) discuss environmental Sustainable National Income (eSNI) whereby conditions of environmental sustainability are imposed on the solution space. The distance to environmental sustainability for 1990 is estimated at around 50% of national income, and for 2015 at 30% of NI, see Section 4.2. The shadow prices per sector that result from the calculation of eSNI are probably of greater importance for investment policies than what the official Dutch institute PBL ⁴¹⁹ gives. PBL has ample funds to calculate eSNI and also has a legal obligation to have it calculated, see Brinkhorst & Van Geel (2004), ⁴²⁰ but it doesn't.

At PBL, Vollebergh and Drissen (2018) estimate a "monetary environmental damage" of around 4.5% of the NI, but they then forget that half of Holland will eventually be flooded. Kruitwagen, Van Egmond and Dietz (2019) refer to Hueting in 1970 but not to Hueting since 1986 with regard to eSNI. These authors and Bos and Ruijs (2019) present "nature points" and probably produce temporarily locally interesting results, but in the long run they also allow that half of Holland disappears under water. Bos and Ruijs (2019) suggest applications of "willingness to pay", but Hueting (1974a, 1980) has already shown in this dissertation that

⁴¹⁹ <https://www.pbl.nl/en>

⁴²⁰ <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

these CBA methods are fundamentally inadequate precisely for the issue of nature and the environment. Frits Bos at CBS and CPB has described eSNI correctly but also incompletely, in the past had inadequate knowledge about the environment which inadequacy now might be repaired in 2012-2019, but he apparently does not yet see the connection of eSNI with CBA.

(6) At SEO

Barbara Baarsma, Carl Koopmans, Jules Theeuwes (ed) (2010) discuss Cost-Benefit Analysis (CBA). Koopmans was member of the steering committee of the IVM study, see Verbruggen (ed) (2000). Thus he must have known about eSNI, and it is somewhat surprising that he either wasn't aware of the link to CBA or did not appreciate it, see Chapter 44 about CBA.

(7) Systematic misunderstanding

This book discusses how the approach by Jan Tinbergen (1903-1994) and Roefie Hueting (born 1929) has been received by the scientific world. In addition to acclaim, there is also a lot of misunderstanding.

Mathematicians mainly look at optimisation without conditions, or think that these conditions can be ignored because there must be a solution anyway to keep the problem interesting, or that there is nothing interesting about a solution that is always pinned upon those conditions. They e.g. look at welfare per capita while the problem is the integral burden on nature and the environment. A *World Conservation Strategy* is not a mathematical problem anyway but above all a very practical econometric issue.

David Pearce (1941-2005), see Chapter 43, was a major figure in the literature on CBA but apparently did not like the Tinbergen & Hueting's approach likely because it did not focus on a trade-off. Pearce apparently believed firmly that economics is about exchange relationships. However, Pearce made the aforementioned category mistake of thinking that there should be trade-offs between boundary conditions.

In the Netherlands, Frank den Butter, Harmen Verbruggen and Marjan Hofkes in particular have systematically misrepresented eSNI, see both Chapter 39 and the discussion in Dutch focused on CBA by Hofkes & Verbruggen (2012) with response from Hueting & De Boer (2014a) and the bundle of articles and letters Hueting & De Boer (ed) (2014b).

These are just examples from a surprisingly long list of misunderstandings.

(8) Political economy (science about policy using science)

The stagnation with regard to the conservation of nature and the environment in the period 1975-2019 is not only due to political unwillingness but also to faults within the scientific world.

45. The European Greenstamp project 1994-1996

During 1994 – 1996, the EU gave a subsidy for the Greenstamp project, see also Neumayer (2003:182-183).

The abstract of Brouwer, O'Connor & Radermacher (1999)⁴²¹ is as follows. I include my emphasis on their inconsistency: that a greened GDP is *defined* as monetary (though deflated such that it reflects a physical development over time) but that the authors reject such estimation in monetary terms, whence *they do not really do what the project was about*, namely greening of the accounts. The authors hold that environmental standards are subjective or political, whence one can only run scenario's, and the green GDP's themselves have little informative values. However, with their work done, not all is lost, since it ought to be possible to also apply environmental standards that have been derived from the literature, see Huetting & De Boer (2019). The Greenstamp abstract is:

"The paper gives an overview of the GREENSTAMP Project (GREENed National STATistical and Modelling Procedures) which, during 1994 - 1996, developed results and recommendations concerning empirically and theoretically robust methods for greening national accounts. The recommended approach centres on methods for quantifying economic opportunity costs associated with meeting specified environmental performance standards. In this perspective, a **"greened GDP"** is a hypothetical measure of a performance potential, viz., an estimate of the level of output (or of consumption, or of national income, etc.) that a national economy would be able to achieve while simultaneously respecting specified environmental quality and resource husbandry requirements. The GREENSTAMP approach is modular, establishing linkages with different categories of data and analyses. First, information is organised in so-called satellite environmental accounts, which describe the state of the environment according to chosen categories and measures (largely non-monetary), and which establish links between economic activity sectors and environmental change in terms of the pressures acting on each environmental category. Second, cost information is obtained through various levels of analysis (firms and households, sectors and macro-economic aggregates) about the economic resource requirements - such as investments needed or consumption foregone - that would be necessary in order to reduce a specified environmental pressure. Environmental defensive expenditures, pollution avoidance cost curves, and macroeconomic comparative static and dynamic scenario modelling are among the applicable cost concepts and tools. In this cost-effectiveness perspective, the value of

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https://www.researchgate.net/publication/5172587_GREENed_National_STATistical_and_Modelling_Procedures_the_GREENSTAMP_approach_to_the_calculation_of_environmentally_adjusted_national_income_figures

environmental assets and services is **not estimated in monetary terms** directly. Rather, estimates of the costs - at various scales of analysis and timeframes - of specified improvements in environmental performance are considered in relation to **scientific, political and economic judgements** about the importance of the environmental functions, services and assets in question.”

The Greenstamp inconsistency is best seen by considering recommendation R6 (p21) in favour of eSNI and R7 (p23) blocking it.

“R.6 Country applications of model-based calculations of environmentally adjusted national income figures (that is, comparative static or scenario time series of greened GDP figures) must be carried out for several different EU countries in order to gain real experience with the diversity of environmental economic conditions and with the adequacy (or not) of country databases and information formats for the calculation of greened GDPs.”

Monetarisation follows from the modeling exercise in R6, since the model can calculate the shadow prices. However, in R7, the authors block the logical consequence.

“R.7 The environmental outputs of environmental protection activities should not be monetarized for macroeconomic accounting purposes. (There are also statistics quality reasons for this, to considering the well-known uncertainties and degree of arbitrariness of monetary estimates of many environmental damages and benefits.)”

A policy maker, who reads this paper, and notices the conflict between R6 and R7, can select whatever he or she wants. In practice, policy makers have adopted R7 (rejecting eSNI).

Why do the Greenstamp authors block eSNI ? They state a *convention*, which however runs counter to the thesis by Hueting (1974, 1980) that the environment has become part of the subject matter of economics, which *scientific* consideration is at the foundation of the Tinbergen & Hueting approach. Greenstamp:

“In this project, we have adopted the convention that economic and ecological sources of welfare should be treated as complementary but not commensurate.” (p23)

There is a sequel in the chapter by Faucheux & O'Connor (2001), who are open to “changing assumptions” (p270). The rejoinder by Hueting (2001d:371-375) suffers from a collaboration with De Boer who extends on optimal control issues for the future and looking at welfare too. It would have sufficed to say that eSNI is a statistical measure of income, not of welfare, and that criteria for conservation apply, and not issues of optimal control. The Rejoinder does not take the opportunity to clarify to O'Connor that the standards of environmental sustainability may be subject to expert variability but surely are not political.

46. *Walter Radermacher at Statistisches Bundesamt and Eurostat*

Walter Radermacher (b. 1952) retired in 2016 as DG of Eurostat,⁴²² though the EU still has a page about him in 2019, with his CV.⁴²³ In 2019 he defended his thesis⁴²⁴ at Sapienza Univ. di Roma.⁴²⁵ There is this information dated 2015:⁴²⁶

“Walter Radermacher, studied business economics in Aachen and Münster. From 1975, he was member of the academic staff in economic mathematics and operations research at the University of Münster. He started his career at the Federal Statistical Office of Germany (Statistisches Bundesamt Deutschland) in 1978. During the nineties, he set up the environmental economic accounting (Umweltökonomischen Gesamtrechnungen – UGR) which brought him wide international acknowledgement. In 2003, Walter Radermacher is named Vice-president of the Federal Statistical Office and in 2006, he passed President. During the German Presidency of the Council of the EU (first six months in 2007), Walter Radermacher was in charge of the Working Group for Statistics. He was the first chair of the UN Committee of Experts on Environmental-Economic Accounting (UNCEEA) from 2005 to 2008. Since August 2008, Walter Radermacher is Director General of Eurostat and Chief Statistician of the European Union.”

46.1 *Major point about politics 1994*

Radermacher (1994) has this abstract:

“A standard demand made in connection with structural economic reform, ecological tax reforms and the like is that national product computation be corrected in order to obtain a ‘Green GDP’. Prices ought no longer to ‘tell the truth’ only in individual cases but also at the macroeconomic level, and take into account the scarcity of natural resources. This contribution analyses the chances of meeting this demand in practice. It is shown that the opportunities of obtaining information and the knowledge available are so limited that the statistical implementation of theoretical models has not been successful. This means that the informational problem is no longer a marginal issue but of a central nature and must influence the way theoretical models are set up.”

While, Hueting et al. (1991, 1992d) presented a practical approach to an unsolvable problem, Radermacher (1994:35) looks at their paper and answers: “so far, there have not been any feasible models or practicable [sic] approaches to this complex of novel problems.”

⁴²² https://ec.europa.eu/info/persons/director-general-walter-radermacher_en

⁴²³ https://ec.europa.eu/info/sites/info/files/radermacher_en.pdf

⁴²⁴ <https://iris.uniroma1.it/handle/11573/1237923>

⁴²⁵ https://phd.uniroma1.it/web/WALTER-JOSEF-RADERMACHER_nP1695225_EN.aspx

⁴²⁶ https://ec.europa.eu/eurostat/cros/content/walter-radermacher_en

Radermacher (1994:48) section 4.2 discusses and rejects eSNI:

“Hueting considers ‘sustainable standards’ as values that can be determined in an objective and scientific way. This opinion must be rejected here. In the case of CO₂, for instance, Hueting takes the natural receptivity as a basis. Closer examination shows, however, that this uptake capacity can be estimated on a global scale only – if estimation is possible at all – while the Dutch, German or Brazilian share can be ascertained only by solving a problem of distribution [35]. (...) In other words, setting national standards for individual types of pressures cannot be the task of statistics. After all the standards have definitely been fixed, it is of course possible to calculate also an a posteriori Green National Product.”

Thus, while these standards can be derived from the scientific literature, Radermacher confuses this with politics. Hueting doesn’t recall that Radermacher sent him a copy of this publication. Quite likely, if Radermacher had done so, then Hueting would have responded, in this *Statistical Journal of the United Nations ECE*. Journal editors should take notice when a third researcher’s analysis is misrepresented. Researchers mentioned in the list of references should rather be alerted about the existence of such discussion. It is worrisome when authors are not keen enough to do this themselves.

The argument in the latter quote does not get a sound proof in the article. Scientists can provide for measures for distribution. When you haven’t studied distribution then it might seem a daunting issue, like each subject is daunting if you haven’t studied it. The criterion that standards must be *definitively* fixed also falls from the sky. Radermacher only expresses opinions, perhaps popular opinions, but it is worrying that he isn’t aware that it are merely opinions, and that he doesn’t try to figure out why he has arrived at such opinions, and that he doesn’t mind presenting Hueting as someone who is confused about science and opinions.

There can be an issue of “fairness” e.g. on the weights attached to $P A T$ (population, affluence or GDP, technology)⁴²⁷ but also land and livestock and footprint. One can also imagine that “pollution rights” generate trades about those rights. However, “fairness” is not at issue here.

The purpose of the eSNI measure is to indicate the distance $e\Delta = NI - eSNI$, and it suffices to make an adequate distribution that generates environmental sustainability when $e\Delta = 0$. Hueting & De Boer (2019:103) apply proportional reduction. If CO₂ emissions must be reduced by 80% for the whole world for the return to pre-industrial levels, then it must be 80% in each country. This would seem to allow larger polluters to maintain a higher standard of living, but, again, eSNI is not intended for the policy issue of distribution of pollution rights, but only to provide an adequate measure for the distance to environmental sustainability. They also mention the usefulness of sensitivity analyses.⁴²⁸

⁴²⁷ Wikipedia is no source but a portal: https://en.wikipedia.org/wiki/I_%3D_PAT

⁴²⁸ If one country has achieved $e\Delta = 0$ and the world would still require 80% reduction, then this country should not be affected. Hueting & De Boer (2019) do not state this. All countries are so far from environmental sustainability that this aspect is not relevant yet.

Radermacher (1994) puts eSNI in a cupboard and throws away the key, while it would be more sensible to develop it and perform sensitivity analysis indeed. He also should have alerted Hueting to his article for the option to respond.

46.2 Minor points 1994

Some minor points w.r.t. this article are the following.

Hueting (1974a, 1980) and Tinbergen & Hueting (1991) are not in his list of references, and thus Radermacher seems to miss out why these authors arrive at eSNI. Radermacher (1994:44) has this problematic statement:

“On the whole, the relations must thus be reversed: so far, nature has been considered as a component of the economic system; from the aspect of sustainability, it is obvious that the economic system is an element of the global ecological system and that consequently there are natural limits to the growth of the economic system.”

He might not be aware that the Hueting thesis establishes that the environment has become part of the subject matter of economics, because of scarcity. Thus what Radermacher calls ecology can still be looked at from the angle of economics, so that the “natural limits” are also “economic limits”. His statement derives from his terminology but it is an antiquated one. Radermacher’s conceptual mistake seems to be that he doesn’t show any interest why Hueting arrived at his analysis. It seems as if he takes it as “there is a fashion on green accounting and Hueting participates in this fashion”, while Hueting fundamentally shows that *national accounting* must include the *environment*.

Radermacher (1994:37) presents the equation $U = A k e$, which is the $I = P A T$ equation. It is not clear why he does not provide a reference and uses different symbols, but it might be a German convention. His discussion on this has a strong focus on policy questions and not on statistical measurement.

Radermacher (1994:39) distinguishes “environmental economics” and “ecological economics” but doesn’t state clearly that the latter is not economics. Radermacher (1994:40) refers to optimisation, and reproduces, with reference to a German source of 1989, a figure of demand and supply of some “environmental quality”. Hueting (1974a, 1980) has this figure too, and it may be original there or derive from again others, but I am no environmental economist.

Radermacher (1994:41) states on asymmetric bookkeeping: “An abandoned hazardous site from 1954 which is redeveloped today should have been entered on the liabilities side of the accounts in 1954 rather than today when the natural capital is restored.” This might hold for the balance of assets and liabilities, but the issue of asymmetric bookkeeping concerns the income account in particular, and then it is sensible that current restoration costs are not accounted as income.

Radermacher (1994:41) claims that there would be a confusion between micro-economics with the working of markets and macro-economics with the global challenges of environmental sustainability. It is not clear what the confusion would be here, when his reference example on asymmetric bookkeeping falters.

Radermacher (1994:41) refers to Hofstadter “Gödel, Escher, Bach”, but does not debunk it, so the reference falters. Some so-called rational people can have a strange liking for irrationality.

Radermacher (1994:41) discusses “nature as capital” but doesn’t notice the terminological issue, see Section 7.10.

Radermacher then has a discussion on epistemology. Overall, his reasons to be skeptical are sound. His statement on p43 seems also correct: “Thus the question arises, even before the individual items are discussed, whether an optimization approach is a suitable model at all.” For the environment, the precautionary principle and the notion of conservation suffice, and it is a mathematical distraction to optimise for future generations (who would have their own views), see the preface to this book. On p44 he restates Hueting’s reasons to be skeptical of methods of valuation (but Radermacher does not accept Hueting’s solution approach of the vertical demand curve).

Radermacher (1994:45) in somewhat dense German-English:

“In fact, criticism of an approach adhering to theory is nothing new [29,40]; there is still the demand for ‘a reorientation of theory with respect to (1) a greater openness towards the idea of an approach with a diversification of tools and (2) a stronger inclusion of deviating framework conditions in the real sphere’ [30]. Representatives of the neoclassical approach, however, argue that no principles of action that are relevant to decision-making have so far been derived from the criticism [31]. For setting up an information system on sustainability, this situation is close to a catastrophe. Without an agreement on the problem to be described it is, strictly speaking, not possible to start data collection.”

Radermacher (1994:47) *ex cathedra* about the determination of standards for environmental sustainability, again stating that it would not be science but politics:

“It must be made absolutely clear here that the information cannot be expected to provide clear indications suggesting one ‘optimal’ solution. There will be more or less scope for defining the target values which cannot be delimited and reduced by scientific and neutral assessment or the ascertainment of preferences but only by a social process of decision-making.”

Again, contrary to Radermacher’s confusion, it would be scientists who determine the *definitions* of the phenomena involved, and it would be politics to determine the social preferences about those well-defined phenomena. Subsequently, there is the Tinbergen & Hueting approach to make conditional assumptions on such preferences, so that the latter allow to calculate the different outcomes. This provides information to policy makers and the general public about what their preferences entail. Information about $e\Delta$ is important to counterbalance the misleading information provided by the figure of “economic growth”.

46.3 Greenstamp 1994-1996

Radermacher was involved in the European research group “Greenstamp” during 1994-1996 (with reports till in 1999), see Section 11.7, Section 21.10.7 and former Chapter 45. The Greenstamp group created confusion about the Tinbergen & Hueting approach, as if the conditional assumptions would be “political” and not derived from the scientific literature. These environmental standards concern vital

conditions for human survival that are discussed within the scientific literature, so it is not clear why Radermacher considered them to be “political”. The discussion of Radermacher (1994) shows that he presents this view also *ex cathedra* again. When scientists indicate that you are likely to die at a body temperature of 45 degrees Celsius then Radermacher would still propound that this would be a political statement.

Obviously, though, Radermacher is motivated to keep out of statistics what he *perceives* as “politics”. This is a somewhat difficult issue. You may trust other scientists (your doctor) or you don’t. In the latter case you have to create your own idea what this other science (medicine) would be. There is a risk that you soon become both incompetent and opinionated about areas that you haven’t studied properly.

46.4 Radermacher’s thesis 2019

Like any article, a thesis must also be considered as a whole. Presently, we have no time for such integral assessment of Radermacher (2019). His German-English also makes for slow reading. One easily stumbles over inaccuracies, that need not be relevant for the thesis itself but that take up time too. For example, on page page 16 with the distinction of ground material (“data”), accounting systems and indicators, Radermacher doesn’t mention that figures like GDP are both results of accounting and an indicator, and similarly for eSNI, so that his distinction is either merely inaccurate or a way to remove eSNI from accounting. Since we lack the time to fully read the thesis, we concentrate on its treatment of the Tinbergen & Hueting approach.

In his PhD thesis, Radermacher (2019) does not refer to Tinbergen and Hueting, and actually does not refer to his own paper of 1994 or the Greenstamp project. He refers to a 1999 paper on green accounting and a 2008 paper on Beyond GDP and ecosystem services. Though the environment as such is not lacking, the word seems more often employed for the “changing working environment of official statistics”. He actually discusses the environment from the angle of sustainability. Thus we locate, in German-English, Radermacher (2019:61):

“The first category includes, for example, hidden, not quantifiable phenomena or issues that lie in the future or those that belong to fiction. The example of Sustainable Development explains the issue: When it comes to achieving progress for the present generation without jeopardising the opportunities of future generations, it is expected that the relevant statistics will consider not only the present but to some extent the future. Whether and to what extent this should be a task for official statistics are the questions. Answering these questions positively, one accepts that this is a border shift that could have negative consequences for confidence in official statistics. Answering negatively, the official statistics deprive the great opportunity to become the responsible and central coordinator for the informational infrastructure of the strategically important policy area of Sustainable Development.

The second variety includes, for example, the monetary valuation of goods that are not traded on the market. The imputation of missing data

(and also of prices) is part of the national accounts. However, this is limited to values that can be derived from existing output data with clearly defined procedures. But when it comes to simulating entire non-existent markets and fictitious prices for goods (permissions for CO2 emissions, for example), this presupposes heroic assumptions; this is certainly not part of the remit of official statistics.”

We can infer that Radermacher entirely overlooked the fundamental contribution by the Tinbergen & Hueting approach on national accounting. He missed that NI as “income” is misleading. He missed that eSNI belongs to statistics of the past as well. It may be that Radermacher in 2008 on good grounds rejected proposals by others about “ecosystem services” for the 2012 UN SEEA, as such proposals might be unconvincing indeed, but this does not mean that the same would hold for the Tinbergen & Hueting approach (see also Section 7.10 on terminology).

Radermacher refers to more recent papers by him concerning sustainability and the UN SDGs, but it leads too far for us to look into those. If he had grasped the Tinbergen & Hueting approach then he would have mentioned this approach in his thesis, and since he didn’t, we may infer that those other papers are less likely to be relevant for our purpose.

Subsequently, Radermacher (2019:84) employs the European Code of Practice to ban eSNI from statistics because it might lack in quality. The appeal to quality kicks in an open door, in itself, since no-one would wish statistics without quality. But it is awkwardly suggestive that absence of eSNI from official statistics would be explained by lack of quality, and then be codified in stone for every European nation, instead of an admission by Radermacher that he was incompetent to deal with the topic since at least 1994.

“Taking note of this fact leads consequently to different questions, expectations and approaches concerning also an envisaged indicator methodology. As pointed out in the example of Sustainable Development (see section 3.5), it is not a question of carrying out a ‘measurement of sustainability’ as a mere academic and analytical undertaking, which is then fed into the political discussion. Rather, the point is – and this is demonstrated by the current process at the global level – to develop and constantly improve in close connection between the political and statistical worlds the measurement and use of these measurements. The particular challenge is, here, to ensure the quality of indicators (see quality principles and Code of Practice in earlier sections) when they are produced under these circumstances. It must therefore be the goal to ensure both this quality and convince the users of this quality in communication.”

46.5 *In sum*

With his background in business economics and venture into environmental accounting, Radermacher apparently lacked the theoretical framework of welfare economics and national accounting to grasp the Tinbergen & Hueting approach.

Section 21.10.7 indicated that Radermacher, when working on environmental statistics, confused politics and science. His “international acknowledgement” from

his work on environmental statistics (as indicated in his CV) derived perhaps partially from his blocking of the Tinbergen & Hueting approach when it was unpopular in many circles. Radermacher's confusion has been a major stumbling block for adoption of green accounting in Germany, Europe in general and at Eurostat in particular.

With Radermacher as DG and single authority for European statistics, scientists would have a hard time to show him that he was confused and wrong since at least 1994 about national accounting and the measurement of environmental sustainability.

46.6 *Consequences for other areas*

When an author is inconsistent in such manner in a subject for which he is supposed to be an expert, then I would tend not to rely upon his judgement in even other issues. Radermacher was supposed to be an expert on environmental statistics but appears to have misrepresented the Tinbergen & Hueting approach, and we can find a possible explanation in a deficient background. Subsequently, Radermacher was involved as DG Eurostat in the 2010 ordeal at Statistics Greece, and not unproblematically so, see Radermacher (2019:56) and Colignatus (2020) (draft).

47. Reaction to Bjørn Lomborg

47.1 (A) “The skeptical environmentalist”, CUP 2001

Note: This was written on September 24 2001, before the UK Stern Review (2006), and has been polished up.⁴²⁹

47.1.1 Introduction

I am not an environmental economist, only an economist who has some comments on the work of other economists who discuss environmental issues.

Also, my main advice is that democratic nations adopt a constitutional amendment for an Economic Supreme Court – see DRGTPE (Colignatus (2000a, 2011)) or, if you are in a hurry, see the earlier working paper on the internet Colignatus (1996a) (though DRGTPE improves on it). See also Colignatus (2009) for the 2007-2008+ crisis. Having an Economic Supreme Court makes that science gets a level playing field with political management – and note that economics is the science of management of the state. Having an Economic Supreme Court makes that we have a better decision making structure to settle complex issues.

For example, Bjørn Lomborg’s book is thick, and the issues are very complex, and few people will have the time and resources, and the capacities, to tackle these issues. Those who could tackle the issues, might decline the challenge, since politicians would not need to listen, and all the work done could well be fruitless. Hence, we should work towards having an Economic Supreme Court, well embedded in a democratic structure, that could provide guidance in such complex issues.⁴³⁰

Since we do not have an Economic Supreme Court now, I think that it is pretty useless that I spend much time on the issue. I would have the capacity to do so, see my cv, but who would listen to me ? The following hence is preliminary. But the following comments are crucial – so if you read this, please pay attention.

Lomborg’s book indicates that coping with the environment would cost about 2% of national income for the next 100 years. I myself have presented an analysis that solves unemployment and the stagflation issue – see DRGTPE – and for the US that amounts to earnings (not costs) of perhaps 4% of national income and for Europe that would be decidedly more. So I can only urge that people also look into this angle of the DRGTPE argument. However, Roefie Hueting argues that a proper approach for the environment might well cost 50% of national income, potentially using a different definition and also with a transition of at least 50% / 2% = 25 years. Lomborg’s book does not refer to Hueting’s analysis. Given the complexities, we all should hope for an Economic Supreme Court indeed.

The following discussion will look at the Hueting – Lomborg difference.

⁴²⁹ Addendum: We now have also Rennie (2002) on Lomborg (2001).

⁴³⁰ Colignatus (2018b) in Dutch advises that the scientific world sets up parliaments of itself, to discuss issues pertaining to science policy and education on science. The 1900s gave us the Academies of Sciences, in hierarchical fashion, but let us allow for more bottom-up procedures for the management of science and its education.

47.1.2 *Three angles*

First note these three angles:

(1) The Club of Rome report 'Limits to growth' was published when I had just started university. The report caused concern, but later I learned that it overlooked price and income effects, so I became more of a fan of Julian Simon. Also, while I was concerned more about the issue of development and world poverty, it was also obvious that dictatorial regimes prevented development proper.⁴³¹ Hence, I concluded that mass unemployment and stagflation in the OECD countries were the most important economic issue – and this became my topic of study.⁴³² The argument namely is: If we solve unemployment, then the OECD does no longer need trade barriers to protect its own employment, and then 'trade not aid' has a better chance to be selected as the proper policy. Also, if we solve unemployment in a decent way, then the OECD model of democracy presents a more convincing model for developing countries. Hence, it was with joy and relief, when I finally could present, after years of study, an analysis on unemployment that solves it in a democratic manner (see DRGTPE). It is up to policy makers whether they adopt this policy, but at least the economic analysis clearly shows that it would be optimal if they did.

(2) In these last years I also got acquainted with the work of Roefie Hueting. His background is in welfare economics. He is not a pure environmental economist, and his focus on the interaction of economics and the environment is special. As head of the CBS Statistics Netherlands department of environmental statistics he had made sure that the environmental data were fine, and he then considers the impact on national income accounting. Hueting argues that the standard figure of national income (NI) depends upon some assumptions, and that there is another figure of environmentally sustainable national income (eSNI) that depends upon the assumption of a social preference for such sustainability. In doing this analysis, he is critical of the standard environmentalists who appear less versed in economics. But due to Hueting's work, I have grown more conscious of the environmental problem again: see my papers on his work.

(3) Interestingly, Lomborg now shows that many current environmental 'data' would be just as overly alarmist as the Club of Rome report was in the past. The 'data' that (likely also) Roefie Hueting's analysis relies on, might not be real data.

I find Lomborg's book lucid, illuminating, balanced, and very useful. It reads easy, has a clear reasoning, uses the relevant sources, and, indeed, exposes some rather shocking errors on the part of some participants in the debate on the environment. However, Lomborg apparently has not studied Hueting's analysis, and that makes the argument seriously unbalanced again.

47.1.3 *Points in more detail*

Combination of these three angles gives an interesting result.

(a) Both (welfare economist) Hueting and (political scientist) Lomborg take the position of statistical scientists.

⁴³¹ Addendum: Dutch readers may see Colignatus (1981).

⁴³² Addendum: The same reasoning is used by Moyo's (2009).

(b) Hueting is critical of the same environmentalists whom Lomborg criticises, so there is already the seed of agreement. However, Lomborg criticises the environmental data and does not quite question the use of economics, while Hueting criticises the use of economics and does not quite question the environmental data (that he has been developing at CBS) (that may differ from the ones that Lomborg refers to).

(c) Though Lomborg e.g. on page 156 shows him aware of the issue of increasing scarcity and the rising prices of environmental functions, he at other points seems to make errors that Hueting has shown us to avoid. Lomborg relies heavily on the issues of “economic growth” and the measurement of welfare, which is precisely Hueting’s topic. Lomborg writes: “(...) only when we are sufficiently rich can we afford the relative luxury of caring about the environment” (page 33) and “can we start to think about, worry about and deal with environmental problems” (page 327). Hueting however shows that national income commonly is measured in a wrong manner. If we grow then it is precisely at the cost of the environment. Lomborg’s graph on page 33 is improper. This is not only so, simply, since the ‘high income’ of the US depends upon pollution caused by imports from the poorer countries – as ‘ecological footprints’ could correct these. I have to be careful here, though, since the ‘sustainability index’ might do precisely that. More complex, however, is that Hueting shows that national income is the wrong index.

(d) Hueting’s analysis remains valid whatever the environmental data. These data are taken as given, and the analysis can be performed whatever their value. For example, Julian Simon presented the argument of ever lower prices for raw materials, and Hueting’s answer is that the environmental costs are not included in those prices. Lomborg may show that those costs would be much lower than commonly stated, but this does not invalidate the idea that those costs should be included. It would be a great advance in the statistical measurement of “economic growth” if this principle could be established.

(e) Hence, if statistician Lomborg adopts the analysis of statistician Hueting, and national income and “economic growth” get measured properly, then the next focus is on properly measuring the environment. Here Lomborg’s critique on environmental statistics becomes relevant. But here the ecologists must react. Lomborg is rather convincing that a claim concerning 40,000 species is shockingly wrong – but it is not clear whether this claim was widespread or just from a few people. The true ecological worry may still be very relevant.

(f) Lomborg argues in the same way as I used to do: “(...) the major problems remain with hunger and poverty.” (page 327) See my analysis DRGTPE on unemployment, that shows that the main issues are social and psychological. But, subsequently, due to Hueting’s analysis, I have grown more conscious of the environment. Being rich also requires a certain use of natural resources, and this has an impact on the environment. Lomborg refers to the DICE / RICE models, but it is not clear whether this model is adequate. How does CO₂ relate to temperature, and this again to the extinction of species? And again, national income should be properly measured in Hueting’s fashion. I still discern a lot of uncertainty.

(g) Lomborg is optimistic about the possibilities of technology. Basically I am optimistic too, about the combinations of social and technical possibilities. But the issues of the future should not be confused with the issues of statistical measurement of the past. In the volume of Van Ierland (eds, to appear September 2001), Hueting replies to Wilfred Beckermann about such technological assumptions, and this applies here as well. For statistical measurement, we should rely on observations (known technology). And for forecasting technology we should do better than just punch in 2 percent productivity growth.

(h) Concerning the future, indeed, Lomborg has a decent discussion on the precautionary principle (page 349), but he does not really answer the key policy question since he does not use a model. He writes: "Of course, if large-scale ecological catastrophes were looming on the horizon we might be more inclined to afford the extra margin of safety just for the environment. But as is documented in this book, such a general conception is built on a myth." No, the book punches some major balloons, but it does not provide the econometric model required. Merely referring to DICE / RICE does not convince, see the argument above. Note that Lomborg himself (page 30) emphasises that we should use the best data and the best models – but apparently much work still has to be done.

(i) Lomborg has a discussion on discounting (page 314). Hueting emphasises that the rate of discount reflects a choice of preference. Zero interest is a preference for equality of generations, higher interest shows a preference for current generations. Hueting then adds: *But we don't know the preferences*. All kinds of mechanisms, like the prisoners' dilemma, prevent that true preferences are expressed in the economy. Thus, a statistician must provide all information, both the national income figure as currently measured, and the measure that includes the norm for sustainability. (Interestingly, Lomborg studied the prisoners' dilemma.)

(j) Lomborg uses the word 'risk' in a proper manner. However, he and other readers still could be interested in Colignatus (2001a) on the definition of risk. (In some respect, this is about how to aggregate risks.)

(k) If we combine the analysis on the environment and the one on poverty, then there is a really powerful statement – dealing with democracy and the structure of decision making.

Lomborg writes: "My point is simply to stress that in important fields of research it can also be difficult to present information which goes against institutional interest." (page 38). Of course, this should not happen in science. But apparently, it happened in the discussion on the environment – and it happened with my own analysis on unemployment.

Also, Lomborg writes: "In a surprisingly frank statement the UN states that "it is not the resources or the economic solutions that are lacking – it is the political momentum to tackle poverty head-on."" (page 66).

I noted that Lomborg also has an interest in voting theory himself, and I look forward to his reaction to my analysis in that area. The whole issue would also be relevant for Lomborg's colleagues at his political science department.

(l) On taxation, Lomborg discusses the 'double dividend' (page 308). He refers, among others, to an AER article by Bovenberg and De Mooij. However, this

depends upon the treatment of taxes and for this there are alternative analyses.⁴³³ Thus, Lomborg's statements on the 'double dividend' are seriously flawed.⁴³⁴

47.2 (B) "Cool it", Knopf 2007

Lomborg (2007) reconsiders the case and deals with the Gore and Stern arguments.

(1) A major point now is that Lomborg no longer is an assistant professor in statistics but engages in policy advice on the future. The point is subtle. Consider two paths, business as usual BAU and sustainability SUS. Tinbergen & Hueting are concerned with calculating eSNI at the base year using the information on SUS. They do not express a choice as has been discussed in Chapter 8 in this book. Lomborg has a different position: (a) sometimes arguing that BAU is socially better than SUS, (b) sometimes questioning whether SUS is really sustainable and whether it should not be SUS*, (c) sometimes wondering whether we should rather target some BAU/SUS* path between BAU and SUS*. Thus, we find a quite different kind of discussion. Naturally, when true sustainability is SUS* rather than SUS, then also eSNI will be affected. Thus there is a little overlap in these different realms of discussion. But the main focus of Lomborg now is "what are the costs and benefits of a choice ?" while Tinbergen & Hueting are focussed on "where are we ?".

(2) A major type of argument by Lomborg is that BAU has advantages (e.g. less deaths from a warmer climate) that should also be included in the cost/benefit evaluation of SUS (thus more deaths than BAU due to maintaining the present colder climate). Here I would say: (a) Yes, all reasonable angles should be included. It would be very confusing when calculations would be biased, not only because of the bias but also because of the discussion about the bias.⁴³⁵ (b) It is necessary to accept that all scenario's are subject to scrutiny. Thus it will not do to take BAU as the status-quo scenario and to calculate SUS as the change that needs to show an improvement in welfare. The Tinbergen-Hueting point is that we do not know what is the true basic scenario. (c) Again, we first must have calculations on eSNI so that we have the proper information, before we can start proper discussions about what we would want to choose given that information. (d) It is important to see that the proper discussion is about risk and not about changes in social welfare that can be stated with certainty. Given what already has been calculated on eSNI and given what we know about the risks (i.e. that we don't know enough) it is not unreasonable to be risk-averse and choose the conservative SUS path – and in the "where are we ?" discussion the option of environmental sustainability thus should be put in that manner.

(3) Another major point is that Lomborg seems to have taken 2100 AD as a fixed target. But when writing in 2001 on 2100 then writing in 2007 would rather be on 2106, and so on. Tinbergen & Hueting anyway have a longer horizon, that is

⁴³³ Addendum: See Colignatus (2005) on the dynamic marginal tax rate. Dutch readers can benefit from Colignatus & Hulst (2001:124).

⁴³⁴ Addendum: See also Jaeger (2001, 2003) for a rejection of the analysis along lines of more traditional economics.

expressed in the environmental sustainability standards, while eSNI is calculated for the base year only. Admittedly, in the next 200 million years the continents are on the move and it may be doubted whether we can retain Amsterdam as it is. But if the sea level would rise by 50 meters in the next 300 years then it seems relatively myopic to stop thinking at 2100 AD. Archer (2009) "The long thaw" considers the next millenia but 300 years might do.

(4) Lomborg's discussion of the reactions of his opponents (Schneider, Lynas, the IPCC, itself) and the dangers to the climate of discussion, is troubling. In that respect the "cool it" title is well-chosen. Lynas throwing of a cream pie in Lomborg's face has hopefully been duly penalized. IPCC should control its language. Schneider's recognition of the "unsolvable ethical dilemma" that a scientist also has a social responsibility is important. Scientists better always clarify what hat they are using when communicating to the general public. Lomborg's suggestion for much more R&D can be supported and part will have to go to clean, effective and efficient communication.

⁴³⁵ For example, eSNI calculates a value for the base year only, for the current population. There is no choice here between the deaths prevented by warmer weather and the deaths prevented by the cooler weather.

48. Summary of the comparison and reception

The "Report of the United Nations Conference on the Human Environment, Stockholm 5-16 June 1972" causes embarrassment: so much was known already so early, and actually so little has been achieved (United Nations 1973).

The IUCN, UNEP & WWF (1980) "*World Conservation Strategy: living resource conservation for sustainable development*" argues "that for development to be sustainable, it should support conservation rather than hinder it". The Tinbergen & Huetting approach adopts this principle of conservation.

The approach is to make the measurement of national income conditional upon assumptions about preferences for environmental sustainability. The statistical measurement of environmentally sustainable national income (eSNI) requires that the vital environmental functions remain available for future generations. This approach puts physical boundaries upon economic welfare optimisation. For statistics it suffices to look at only the one year of observation, and not all future generations. The vital environmental functions are conserved by the criterion that they should not be less at the end than at the beginning of the year of observation. While the prime result is the distance to environmental sustainability $e\Delta = NI - eSNI$, the method also provides for a rich biotope of indicators at the individual level of resource use.

Remarkably, academic economists inverted the conservation strategy. They interpreted the issue in terms of economic theory as a problem of optimising welfare over an infinite horizon of generations, while neglecting the boundary condition, regarding the boundary as not very relevant if there was a solution anyway. They started discussing whether "sustainability" meant equal consumption over the generations, or equal welfare, or discounted forms, or integral value or per capita, and so on. We may think of authors like Kuipers & Nentjes 1973, Weitzman 1974, Solow 1974, Mäler 1974, Hartwick 1977, Pearce, Hamilton, Atkinson 1994, Withagen, Vellinga 1996, Lofgren 1997, Zeelenberg, De Boer, Brouwer 1997, and others.

In practical calculation, various "green GDPs / indicators" have been proposed such as MEW, ISEW, Ecological Footprint, Adjusted Net Savings / Genuine Savings and Genuine Progress Indicator, and lately there is an increased interest in happiness as a re-interpretation of economic utility and social welfare. With respect to both ecological survival and requirements of economic theory these alternatives however fail.

(1) David Pearce (1941-2005) apparently dominated the discussion and managed to get his view adopted by UNEP / Worldbank in the "Genuine Savings" indicator, nowadays "Adjusted Net Savings", see Chapters 30 and 43. Pearce had a background in Cost-Benefit Analysis (CBA) that has a tradition of looking at substitutions and trade-offs. Pearce suggested that there would be trade-offs in "the environmental issue", and between the generations, and he regarded sustainability as relying upon such trade-offs. If a current generation destroyed resources then a next generation might be "compensated" by more man-made capital like human capital. In this manner he created a discussion about the distinction between "weak" (trade-offs) and "strong" (conservation) sustainability.

He portrayed the issue as if the proper notion of sustainability within economics would be the “weak” one, while the original proposal of conservation was marginalised and no longer called “conservation” but “strong” sustainability. He stated that the Tinbergen and Hueting approach provided an “inverted” solution, while it was actually he himself who had inverted the IUCN, UNEP and WWF (1980) “*World conservation strategy*”. Potentially his wish to join in the abstraction of mathematical economics suggested to him that such boundary issues could also be neglected. His inversion was actually a category mistake, since boundary conditions for an optimisation problem would have no trade-offs for themselves. At the World Bank, El Serafy, Chapter 32, apparently was no strong defender of the approach by Tinbergen & Hueting, perhaps because he had an own approach to defend.

(2) Chapter 38. At VU Amsterdam, Hans Opschoor presented his thesis in the same year 1974 as Hueting. A difference is that Hueting was in applied economics and statistics at CBS Statistics Netherlands while Opschoor was an academic researcher. Later, Opschoor copied a part of the Tinbergen & Hueting approach, and presented a notion of “eco-space” as if it would be practical, while such “space” actually only is 1 point, namely the boundary solution.

(3) Chapter 39. In Holland, the Tinbergen & Hueting approach was misrepresented by Frank den Butter and Harmen Verbruggen. They joined the international attention for the optimisation over an infinity of generations. They seemed to accept that its solution was a technical one, in which economic experts could provide the parameters for production and welfare functions. However, they regarded the parameters on the boundary conditions as suspect. The statistical derivation of the physical boundaries of the vital environmental functions was judged by them to be “political”. Apparently they were not willing to accept that it is a mere matter of definition: “conservation” means that the vital environmental functions are kept intact. Obviously the Tinbergen and Hueting approach leaves it upon politicians to decide whether they want to adopt a conservation strategy or not. The method at least provides the relevant information about what such would entail. Den Butter and Verbruggen argued, though in vague manner and apparently irrationally, that this information itself would be “political”. Instead it is science to provide for information.

(4) In 1969 Hueting was hired as head of the new department of environmental statistics at CBS Statistics Netherlands, and he started by creating environmental statistics in physical terms, i.e. also in terms of chemistry and biology and such. The organising principle was that the standard figure of national income would need correction for the environmental damage. These statistics were later transformed by Keuning et al. using the label NAMEA, and subsequently by the UN SEEA system, using the term “satellite account”. With new terminology, there was no longer reference to Hueting’s work. Similarly for the Canadian statistician Anthony M. Friend and others. There is much to say for an expression of collaboration and the genesis of new unifying labels, but there are still ways of proper referring, like including Hueting in the list of authors, that have not been used as one would want to see. Subsequently, national accountants apparently still entertain the idea that NI would be a proper statistic, while it by itself only is

valid for a particular domain and contains misinformation for another domain, see Part 2.

(5) Chapter 35. While Hueting had pointed to the issue of welfare optimisation and the problems with the term “economic growth” with the policy focus on production growth, all with proper reference to the international literature, Jeroen van den Bergh, with apparent deficient knowledge about welfare theory and national accounting, misrepresented Hueting’s work by suggesting that eSNI had been proposed as a welfare indicator. Subsequently, Van den Bergh styled himself as an expert in welfare theory, and rejected eSNI because it was *income* like NI. Without stating this explicitly, he implied that Hueting had confused welfare and income. In all of this, he misjudged that the Tinbergen & Hueting focus was on $e\Delta = NI - eSNI$ as an indicator for the environment.

(6) Chapters 28 (economic historian Jan-Pieter Smits) and 27 (Rutger Hoekstra, PhD student of Van den Bergh). Van den Bergh had some success in drawing attention to the issue of welfare optimisation. At CBS Statistics Netherlands the same misrepresentation was used to eliminate eSNI from the monitor on environmental sustainability.

(7) Chapter 37. Wouter van Dieren was a social psychologist and no economist, and usurped the role of editor on a book for the Club of Rome about Hueting’s research subject, basically stripping Hueting from the opportunity to present the analysis himself on such a relevant forum. Readers were apparently supposed to regard Van Dieren as the originator and expert on the issue. Subsequently the book wasn’t edited well and mainly caused confusion, where Hueting would have been able to create clarity.

(8) Chapters 41 (mathematician Aart de Zeeuw mentioning Tinbergen but not Hueting) and 42 (UvT) highlight both the distraction by mathematics and the disinformation by Van den Bergh, that again cause a misrepresentation of the Tinbergen & Hueting approach. The two works discussed must be retracted.

(9) Chapter 23. Economist Frits Bos writes about the national accounts and inserts so much history that one is tempted to see him as historian, but the focus remains upon the national accounts. His 2003 thesis and earlier papers may remain intact as a learning phase and all papers after 2003 on national accounts and their history must be retracted because of incompleteness and deficiency w.r.t. the Tinbergen & Hueting approach w.r.t. national accounting and the environment.

(10) Overall, mainstream economics at first was not open to the issue of the environment, while the alternative of “ecological economics” was no real economics, with its focus on thermodynamics, see Section 21.9.10. The ecologists who suggested “conservation” might have been open to the idea that economists Tinbergen and Hueting accept that idea too, but De Groot in Section 21.9.4 did not make the proper transfer to economics, see also the discussion of terminology in Section 7.10.

Conclusion

49. Conclusions of this book

We looked at Tinbergen & Hueting (1991)⁴³⁶ and Hueting & De Boer (2019b) from the meta-level and political economy. These authors provide an approach to the *economics and national accounts of ecological survival* that still is unsurpassed. The approach is:

- (1) rooted in the economic subject matter (scarcity)
- (2) rooted in fundamentals of ecology (collapse is observed when it is too late)
- (3) applicable within the statistical framework of national accounting and thus fully practical
- (4) demanding in economic and environmental expertise but concerning its result easy to understand by policy makers and the general public, for, with *standard national income* (NI) and *environmentally Sustainable National Income* (eSNI), then $e\Delta = NI - eSNI$ namely gives the distance to environmental sustainability.

Given the challenge on ecological survival, and the clarity of exposition by the original authors, we would expect a quick and easy adoption of this approach by our fellow economists. Indeed, we see some advance, like the calculations for the Netherlands shown in **Figure 4**, but we also see remarkable adversity, as the paper *“The Old Man and the eSNI”* – here Chapter 21 – has highlighted. There appear to be huge misunderstandings amongst our fellow economists. To deconstruct those misunderstandings requires quite some knowledge as well.

There is a conceptual distinction between statistics and planning, and this has also generated an institutional divide, e.g. in Holland between CBS and CPB. We can look at environmental sustainability from both perspectives. Tinbergen had both scopes, and Hueting concentrated on statistics.

- Measurement of the current situation is relevant. We can observe that the economy is not environmentally sustainable and it is relevant to know “how far” we are from environmental sustainability. There is the conceptual twist that statistics deals with the past and that sustainability deals with the future, but when we take the proper accounting perspective (“income keeps capital intact”) then the statistical approach makes eminent sense.
- Subsequently we must plan for the future. It may seem that planning then becomes more important than statistics. We might surmise that Tinbergen would have emphasized the planning perspective. William Nordhaus also started with statistics and then tended to focus on the planning perspective on climate change. Even then, the environment may lose out from planning traditions on “economic growth”. While the issue was formulated around 1970 in clear terms, it still took some 45 years till 2018 before there was the recognition by the Nobel Prize in economics for Nordhaus. (The 2007 Nobel Peace Prize was awarded as late as in 2007 to IPCC and Al Gore on climate

⁴³⁶ <http://www.sni-hueting.info/EN/Publications/1991-Tinbergen-Hueting-GNP-and-market-prices.pdf> and in this book highlighted in Appendix 50.

change, and economic science should have been quicker.) Such conceptual bottlenecks like on “economic growth” likely also affect statistics.

The mismanagement at CBS Statistics Netherlands is shocking. Since Van Tuinen (1975), its Department of National Accounts rejected the calculation and publication of NI-A alongside the standard figure of NI. Since 1992, similarly for eSNI. The official statement CBS (1997) fails, see Chapter 15. There is no official statement after the *proof of concept*, discussed in Chapter 4, which hinders the discussion. De Vries (ed) (1993) is misleading and Hueting was not included as an author only because he hadn't worked at that department. The article by Van Tuinen (2009) has been deconstructed in Chapter 25 and found to be deficient. In 1996 / 1997, calculation of eSNI was moved outside of CBS and after 2008 killed out there in the wilderness in unknown manner. New and younger researchers at CBS refer to eSNI with wrong references, which suggests that they did not really study the issue. It was only because of the expression of interest by Jan Pronk and Herman Wijffels in 2014 and the parliamentary interest in “broad welfare” (a pleonasm) in 2016 that eSNI returned on stage again in CBS (ed) (2018).⁴³⁷

Within the realm of statistics, we e.g. deconstructed the following statements. We found that this statement in Section 18.8 was wrong:

“The prices for environmental sustainability have not yet occurred, and their actual effects are unpredictable. In reality, the economy was not sustainable, thus environmentally sustainable national income is no estimate of reality and therefore no statistic. Statistics describes reality as it has occurred and can indeed use models to scale up from a sample to a population, but remains a description of reality, just like a MRI-scan.”

We found that this report to the World Bank in Section 18.12 was wrong:

“A general equilibrium model of the Dutch economy was developed (the SNI model), but still no clear SNI could be determined. The assumption that a sustainability policy is implemented in other countries in the world, whether or not in a similar form to that in the Netherlands, resulted in particular in large differences in the outcomes.”

We found that this statement in Section 25.13 was wrong:

“Official statistical institutes have to provide society with undisputed information. (...) Relatively inaccurate statistical information is only published if a consensus exists that the information is by far the best available and it may be accompanied by some sensitivity analysis.”

William Petty's foray in 1660-1687 on national wealth can be extended with the investigation of the natural resources and conditions for ecological survival. Tinbergen and Hueting will remark that environmental sustainability concerns global conditions, and Tinbergen then points to global governance. This book provides a catalogue and review of various misunderstandings that hinder such developments. Statistical offices that associate 'facts' with 'the past' and not with 'reality' that includes a future, have to face the paradigm switch that was

⁴³⁷ <https://www.cbs.nl/nl-nl/achtergrond/2018/20/toelichting-mdni>

discussed in Section 11.3. Planning bureaus have to face the inadequacy of their paradigm of “economic growth” for their forecasts, see Chapter 17. Prudence would be interested in survival, but this is a conditional assumption only.

Appendices

50. GNP and market prices: Wrong signals for sustainable economic success that mask environmental destruction

Jan Tinbergen and Roefie Hueting 1991⁴³⁸

This article by Tinbergen & Hueting can be found most easily in the volume by Hueting & De Boer (2019b).⁴³⁹ It is a classic paper that needs referral and reading. Hueting wrote 80-90% of the text and Tinbergen mainly the concluding paragraphs – Hueting informs me. Hueting has given permission for reproduction here, but at this moment of writing Stichting Wetenschappelijke nalatenschap Jan Tinbergen has declined permission for reproduction here (yet). For this book, it remains useful to show a quote of the beginning and conclusion of the paper.

One must distinguish Tinbergen's support for Hueting's analysis on content, which Tinbergen could do easily with his background in the development of the system of national accounts (SNA) and economic modeling, and Tinbergen's encouragement to environmental economists to express what Hueting contributed to that particular field – see the letters in support of an UNEP prize.⁴⁴⁰

Abstract

Jan Tinbergen (1903-1994), who helped develop the system of national accounts (SNA) in the 1930s, expresses support for Hueting's 1986b concept of environmentally sustainable national income. The authors reason that its level is around 50% of standard national income (net and not gross). They advise stabilisation of population and production, and that the North makes room so that the South can still grow in per capita income, reducing the income gap between rich and poor countries from 10:1 to 4:1.

QUOTE

50.1 Society is steering by the wrong compass

The market is rightly considered a mechanism that generates manufactured goods and services according to consumer preference. This mechanism allows culture and technology to put into practice inventions enriching human life. It works efficiently and stimulates productivity increase, which is the motor raising the

⁴³⁸ Published in 1991 in R. Goodland, H. Daly, S. El Serafy and B. von Droste zu Hulshoff (eds.), *Environmentally Sustainable Economic Development: Building on Brundtland*, Ch 4: 51-57.

United Nations Educational, Scientific and Cultural Organization, Paris, 1991. Also published in: R. Goodland et al. (eds.), *Population, Technology and Lifestyle: The Transition to Sustainability*, Ch. 4: 52-62. Island Press, The International Bank for Reconstruction and Development and UNESCO, Washington, D.C., 1992. Also published in: *Environmentally Sustainable Economic Development: Building on Brundtland*. R. Goodland et al. (eds.), Environment Working Paper 46, The World Bank, Washington, D.C. Included in Hueting & De Boer (2019).

⁴³⁹ <http://www.sni-hueting.info>

⁴⁴⁰ <http://www.sni-hueting.info/EN/Others/2019-05-02-Tinbergen-1990-UNEP-Sasakawa-Hueting.pdf>

quantity, quality and diversity of manufactured goods thus becoming available to consumers.

(....)

The uncertainties are, of course, far too great to attach great value to the outcome of this scenario. But the above clearly demonstrates that continuing prevailing growth paths is blocking our chances of survival, for which possibilities still remain.

50.2 Conclusion

In order to achieve sustainable use of the environment, we conclude that the highest priority should be accorded to devising and implementing economic policies that: (a) accelerate development of new technologies, such as flow energy and recycling; (b) permit no further production growth in rich countries; (c) stabilize the global population as soon as possible; (d) improve international income distribution.

50.3 References

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UNQUOTE

51. *In Memoriam Jan Tinbergen*

Some thoughts and personal experiences with him

June & November 1994 ⁴⁴¹

I first met Jan in the late 1970s. The Econometric Institute of Groningen University celebrated a lustrum, and during the deliberations in the lustrum committee Theo Junius proposed to invite Tinbergen. We worried whether we could burden Tinbergen at his high old age with that long train journey, but Theo persuaded us, seemed to know the situation – and of course we wanted to make the lustrum a success.

“Tinbergen” was still a very blank concept for me. As a student I had heard of him as the official Nobel Prize winner and nestor of Dutch econometrics. Nothing else. In retrospect this is strange, because we already had much in common with econometrics, the Dutch social-democratic party PvdA and development co-operation.

The blank slate can still be understood. At a younger age you probably are more sensitive to labels. The resounding name for development co-operation was “Pronk”. “Tinbergen” sounded boring, like “Pearson” – from those booklets that were stacked in the second-hand bookshop De Slegte. The Groningen econometrics study did not much mention the name of Tinbergen. There is no “Tinbergen Theorem” or any other specific landmark that provides guidance. The first model for the Netherlands from 1936 is of course not so interesting for PvdA-member students in the Den Uyl cabinet period around 1975. Only later you notice how Jan’s work can be found in all niches of the profession.

Tinbergen did not make a sparkling impression at the lustrum. Old, friendly, clear, yet with a surprisingly fine sense of humor – but I don’t remember what he has said. More important was the conclusion by another speaker, whose name I have forgotten though, that econometricians rely too much on statistics produced by CBS Statistics Netherlands and are not enough inclined to collect data themselves. This conclusion is still valuable.

Since that lustrum, I have come across “Tinbergen” more and more often, in areas that I myself have found increasingly relevant. Likely my eyes had been opened – and somewhere a switch has been turned, so that when I come across that name I have to read it.

In 1980/82 I sent him, Pronk and Emmerij an analysis that the existing concepts of development co-operation and at the time the notion of a “New International Economic Order” (NIEO) were no good. [⁴⁴²] The most useful comment came from Tinbergen.

I have been fortunate to work at CPB since 1982. This reinforced the feeling of like-mindedness. I focused on the profession itself, on the explanation for the

⁴⁴¹ English translation 2019 of the text included in Colignatus (1994)

⁴⁴² For Dutch readers: <http://thomascool.eu/Thomas/Nederlands/Wetenschap/Artikelen/1981-07-20-NIEO-is-geen-BBS.pdf>

ongoing economic problems, and because of my position at the planning agency, I also had more distance to the internal affairs within PvdA.

In 1983 the PvdA was at loggerheads with itself again. An idea came up of how, remotely and in an appropriate indirect manner, leadership and supporters could be put on the right track again. I approached the PvdA scientific bureau WBS and suggested Joop van den Berg to make a TV series about the ideas of Tinbergen. Van den Berg responded with interest. I then visited Tinbergen at home. We decided that we were both convinced Social Democrats and econometricians, and we switched to first names. He agreed with the proposal of such a series, was eager to cooperate, but we were both convinced that the ideas were central, not his person. I then submitted a project proposal to the WBS, that proposed many interviews with experts and politicians, and also Tinbergen. There was regular contact with the WBS. How the project evolved remains foggy. In the end there was a TV-broadcast in which Jan walked around the Peace Palace with an umbrella. The program makers apparently thought that TV was only interesting for the public when the person was put at the center. Jan was not satisfied with it. I can still strangle Joop van den Berg on this point.

I met Jan again at a few congresses in the following period. It was nice to shake hands and to enquire how he was doing. There was no real reason to say more.

The real 'communication' was what I read about him, in WBS texts such as by Jan Nekkers, Knegtmans' thesis, and by himself in books indeed at De Slegte, such as "Lessons from the past" from 1963. My respect for him grew. The kindness in conduct, praised by many, was in my judgement – spoiled as econometricians are – only natural. No, impressive was the non-friendliness, the absence of confusing sentiments, not only in his scientific work, but also in how he substantiated his political position. He unremorsefully steered mankind from this armchair this way or that, wherever logic indicated. His strength was that he did not participate in opportunistic reasoning, but instead relied upon the inherent logic of economic and scientific developments that would eventually provide the fundamental considerations that decided issues – at least as he deliberated as best as he could think of in his well-considered manner.

From WBS circles, the message was increasingly being sent to the world that Tinbergen was naive. Instead of building upon Tinbergen's legacy, adapting it to this time, it was demolished. The community of discussants that determined this narrative began to consist of sociologists and political scientists who informed each other and the outside world that they had discovered the calculating citizen. It was forgotten that economists had already taken the homo economicus as their point of departure. It was claimed that Tinbergen had not seen the flaws of the welfare state, and it was forgotten that he had warned about the minimum wage around 1960. Where such discussants criticised him and spoke about the calculating citizen, they did not see that he was the master of calculation. They took the liberty to ignore that he was hugely intelligent and had a wealth of experience on society and human nature.

In 1989 the Berlin Wall fell. A milestone in the history of East and West. And also for the thinking of Tinbergen, who has constantly pointed to the forces that cause convergence. It is Gorbachev who must be thanked that this convergence has

taken the form of a rapid surrender, but it was precisely Tinbergen who helped clarify the interplay of forces, and who made a substantial contribution to creating the social market economy to which Gorbachev wanted to surrender. When Gorbachev visited the Netherlands it was fitting that he also visited Jan.

The OECD countries have been given an important new responsibility here. For the manageability of the developments in the East it is crucial that the OECD opens up borders to trade. However, the OECD keeps these boundaries closed for fear of unemployment. Thinking that economists have an informative task here, I took the initiative to a proclamation in 1991 – before the coup attempt against Gorbachev in mid-August 1991. Jan was the first co-signer, others were Harry van Dalen, Robert J. Gordon, J.P. Bénassy and N. Mata. This was submitted to the European Economic Association (EEA) congress in September 1991, which, unfortunately, did not see it fitting to adopt it. Another angle concerns the policy in the East itself. With the help by André Gerrits and the Alfred Mozer Foundation of the PvdA, Jan and I wrote a political article in 1991 – a short social-democratic version of “Lessons of the past” for the USSR – and sent it to Shatalin and Yavlinski. ^[443] It seems that little has been achieved here, but it was worth trying. Incidentally, in February 1994, an ILO study still talked about a time bomb. Some confidence in the fundamental processes is also appropriate because at least a trade agreement was concluded with the CIS at the European summit in Corfu.

In 1992 there was a conference “Economics of International Security” in the Peace Palace. *A lieu de mémoire*. In a session and discussion with Jan Berkouwer, I said, in a by-line and in the context of the cross-border issue of the environment: “this world government, it will be there once.” This elicited a smirk from Jan that spoke volumes. In the margin of the conference, I explained to him my analysis of unemployment. We agreed that it had to be calculated. It was a very special moment for me to see from a distance the two old friends Jan Tinbergen and John Kenneth Galbraith talking in a small secluded corner.

At the beginning of 1993, shortly after my 1992 book was published by Guido den Broeder, I sent him a copy, made an appointment, visited him at home, and gave an explanation of the CPB issue. We agreed that there had been more directorates since his departure and that younger generations would need to resolve the issue. He appreciated that I informed him, and that was the only intention. I could tell him that I had left the PvdA, which hadn’t been easy. He was writing about the future of social democracy [and in the 1994 European elections he supported the candidate of the environmental party the Greens]. His 90th birthday received an official celebration at the Tinbergen Institute that year. Unfortunately, due to my stay abroad, I could not be present and we made up for that by mail.

The last time I spoke with him was on the phone in early 1994, when I could tell him that we – the Samuel van Houten Genootschap – had awarded his student Hans van den Doel, whose thesis he had supervised, the first Samuel van Houten Medal. He thought this – like so many others – fine and deserved. ^[444]

⁴⁴³ “What might the Soviet Union learn from the OECD countries in economics and politics ?” <https://ideas.repec.org/p/wpa/wuwpgt/0506003.html>

⁴⁴⁴ For Dutch readers: <http://thomascool.eu/SvHG/SvHPVdDoel.html>

In this context I came into contact with Jos de Beus, who himself wrote his thesis with Hans van den Doel. De Beus gathered some economists in April this year [1994] for a congress entitled "In the shadow of Tinbergen". I thought this was perfect and it was time that the debate moved in the direction of the riverbedding again. [⁴⁴⁵]

If you take stock, since the late 1970s, and start quantifying econometrically: some five congresses, two home visits, once cycled along to deliver a paper, ten phone calls, ten notes back and forth. So I mainly read and thought a lot about his work and his design of his position. Is it useful to write about this for others ? What does it matter to another person to see such comments, when an *In Memoriam* should focus on the person himself, or, when grief can only be for deeper personal contact ? In part: I don't know. I don't think that this is of my concern either. He – his person and image – was dear to me, and I want to express that. Blazing enthusiasm. For another part, the following. It seems useful to me to express an important observation, and it is also useful to provide substantiation to this, because someone from a younger generation is further at distance anyway.

Jan has been called "tragic" by some because so much happened in the world where he hoped otherwise. (Footnote)

Undoubtedly a lot happens that you might worry about. Still: Tinbergen's autobiographical contribution to Szenberg's "Eminent Economists", CUP 1992, is a testament to the joy of living. Jan had humor that may have escaped many. He had courage and well-considered hope. Tragedy is when someone sees his fate coming and is forced to consciously cooperate with it and promote it. This does not apply to Tinbergen.

Jan sees the possibilities for and developments towards a hopeful future for humanity. Jan is the advanced scout at the frontier of science. Jan is the herald who, from his armchair and with a private smile, has already enjoyed the effect of what he has discovered and what he can soon tell others.

(Footnote) Jan Pen writes in *Vrij Nederland* June 18, 1994: "He was confronted daily with facts that he did not like and that sometimes made him very sad – people don't stop slaughtering each other, they follow the wrong leaders, the generals continue with their terrible work – but he always tried to see the positive in the development. (...) He actually exhibited in general a curious mixture of despair and yet solemn persistence. And that hasn't gotten better in recent years. Tinbergen was without doubt a tragic man."

⁴⁴⁵ For Dutch readers: Van den Doel made a painting that depicts Tinbergen, Hennipman, Sen, De Beus, Huetting and himself. <http://www.sni-huetting.info/NL/index.html>

52. Memo on a motion in Parliament on eSNI

Roefie Hueting, November 2001 ⁴⁴⁶ ⁴⁴⁷

I have been informed that a motion is being prepared in which it is implicitly proposed that the Dutch Central Planning Bureau (CPB) should calculate eSNI from now on (based on CBS data and RIVM standards). I am of course very happy with the motion, but I am very concerned about the assignment to CPB. In my consultation with Minister Pronk, RIVM has been named as the next best. [⁴⁴⁸]

eSNI as a historical statistical figure belongs to CBS (with RIVM as the next best). It is nonsense that eSNI would not be a statistic because a model is being used. CPB must then, if it is prepared to do so, make the following forecasts: (1) A forecast of standard NI, i.e. of an unaltered policy. (2) A forecast of the transition path to sustainability. (3) A forecast of eSNI, that is, of the environmentally sustainable path, based upon the statistical eSNI figure as an anchor.

It is incorrect in principle to put both the forecasts and the statistical measurement of the outcomes (as a check on the forecasts) in one hand, just as contracts and cash do not belong in one hand. This is a key point for the greatest possible guarantee for independent information.

In addition to this objection there is the fact that CPB has still not accepted the theory upon which eSNI is based. Assigning eSNI to CPB would in all likelihood mean that my work would run aground in sight of the port. I have clear indications that, even if CPB would be prepared to calculate an eSNI, they will ignore my substantiation and turn it into something that is at odds with the theory that I (and others) have designed. I still would have lost all, despite everything that has been achieved so far. Over time, I have developed the strong impression that the Ministry of Economic Affairs (EZ) and CPB co-ordinate their statements about eSNI, which makes me doubt the scientific independence of CPB. I mention a few facts.

(1) In 1993, CPB demanded the revocation of my ESB article about eSNI [⁴⁴⁹] and threatened the CBS directorate with "war" in the form of a countering article in ESB if this did not happen. I did not find their arguments valid and did not revoke. A few weeks later the editor-in-chief Leo van der Geest called me and told that he intended to reject the countering article, because it created a straw man of my assumptions in the article. He wanted to verify this with me. After my confirmation Van der Geest said: "I am going to reject the article, but apart from my objection on content, ESB does not tolerate such a tone in its columns." The director of CPB was one of the signatories. [⁴⁵⁰]

⁴⁴⁶ <http://www.sni-hueting.info/NL/Documentatie/2001-11-HuetingNotitieMotie.html>

⁴⁴⁷ Translation and comments within square brackets are by Colignatus.

⁴⁴⁸ This became: <https://zoek.officielebekendmakingen.nl/kst-29200-XI-125.html>

⁴⁴⁹ This must be the Dutch version of the three myths, 1994a, ESB 3986 p1056-1060.

⁴⁵⁰ In this period: Gerrit Zalm.

(2) CPB does not seem to understand some issues that are crucial for eSNI. My research on the basic observational data for the national accounts showed that around one third of the activities, measured in labour volume, does not contribute to the growth of the volume of national income, one third only a little and one third very much. The latter part consists of the activities that put the greatest burden on the environment. From this I concluded that a shift to more environmentally friendly activities has a substantially negative effect on the level of the NI. According to CPB, the effect is close to zero. One of my counter-arguments is: then there is no environmental problem, because the environment can then be safeguarded free of charge. I asked Tinbergen what he thought of it. Answer: "I think it's a strange question because you are dealing with a statistical fact." The Tinbergen-Hueting article for the Rio environmental conference was partly based on this fact and came with a roughly estimated sustainable world income of around 50%, the same range as the IVM study. This issue concerns the crucial difference between changes in volume [*]⁴⁵¹ and added value per sector, which my critics do not seem to understand, see also point (5) below. The development per sector does not differ much in added value, but does so when measured in volume [*].

(3) In 1996, the [Second] Chamber [Dutch House of Commons] requested a green NI, and the reply by the Ministries of EZ and VROM misled the Chamber. I am convinced that CPB has been involved by the Ministry of Economic Affairs (EZ) in formulating its reply. This led to an invitation from minister Margreeth de Boer to me for an interview with her and minister Hans Wijers. In particular Wijers (an economist) immediately understood what I meant and subsequently granted a subsidy to the IVM for modeling and calculating eSNI, because CPB refused to do so and at the same time 'prohibited' CBS to use a model, although there is sufficient expertise available at CBS – think of the Keller-model, that IVM adapted when estimating eSNI (prof. dr. ir. Wouter Keller has a background at CBS!).

(4) Letters of communication between economists at CPB and me about eSNI never led to an agreement. This is in contrast to my correspondence with Harmen Verbruggen (IVM) and Frank den Butter (member of the scientific council to the Dutch government (WRR) and chairman of steering committee for the calculation

⁴⁵¹ This translation puts a marker [*] here, because Hueting does not explain his term "volume" here. This term is basically explained in Hueting et al. (1992d), Appendix 3. Preliminary: He clearly refers to the issue that is also discussed on page 142 in this book, and see the references there. Conventionally, CPB is versed in the distinction between value added and gross output by sector, in both nominal and real or deflated terms. It makes no sense to criticise CPB on this aspect. There are three main possible causes for confusion in terminology. (1) The term "development" might refer to changes in the levels rather than relative changes or growth. The impact upon the environment is rather by the levels than by growth rates. (2) Conventionally, the volume refers to real terms, in this case real value added, but perhaps Hueting here refers to the volume of gross output. (3) Alternatively, Hueting might refer to asymmetric bookkeeping. See Section 12.7 for an example of the calculation of real value added by conventional accounting for price and volume changes. The growth of NI will be overstated compared to the proper growth of NI-A. Now in 2019, CPB might say that Hueting should have better explained asymmetric bookkeeping rather than the method of deflation. Conversely, CPB still should have tried harder to develop the math behind Hueting's reasoning, because that is what the econometricians at CPB are for. There was every reason for such an effort, given the interest by Dutch Parliament.

of eSNI). In 1994 they wrote a 'destructive' article about eSNI, but both have since acknowledged their erroneous interpretation of my work. This correspondence is available for perusal with permission by my correspondents. I enclose a page with an interview with Verbruggen, in which he recalls that article and states that he was convinced by me. [See the quote in the Appendix to this memo. ⁴⁵²] It is known how much opposition and misunderstanding I have had to resolve over the decades. But those at CPB have been and are the fiercest and most persistent. CPB does not seem to be a good listener on the issue of the environment. A staff member of the RIVM (an engineer in chemistry, with a Ph.D. on an environmental subject) said to me a while ago: "It is making me crazy, they know everything better, including in my field, that it is not theirs."

(5) Of course there are always exceptions. Last year I invited Herman Stolwijk (CPB) as a co-author for an article about environmental valuation (thus not about eSNI) because I wanted to know what would happen if we would put an argument in writing both jointly and without urgency. Namely, Stolwijk was one of the opponents against the article by Lucas Reijnders and me on the objectivity of sustainability standards and the subjectivity of preferences with regard to those standards. The cooperation between Stolwijk and me ended very well. [See Hueting et al. (2000).] But along the way Henk Don, director of CPB, who read the drafts too, criticized the use of the notion of volume. At Stolwijk's request, I wrote a memo for Don, that I had checked by three staff members at the CBS department of National Accounts. That memo could not convince him. My conclusion: he does not really understand the difference between added value and volume [*], at least in the context of environmental valuation (see point 1 [and footnote in 2]). (Needless to say: copies of all mentioned documents are available, and the people mentioned here can be reached by telephone.)

At stake are more than three decades of hard work, and, although unfortunately unanimity among economists has not been achieved yet, the line of reasoning that I have developed has received the support of very prominent people among them. CBS Statistics Netherlands has also stated that it finds the theory on which eSNI is based solid [⁴⁵³]; the CBS management has repeatedly stepped into the breach for that theory, although unfortunately it remains reluctant to calculate and publish it when there is no clear request by politicians.

Appendix: The relevant quote by Harmen Verbruggen is:

"Verbruggen acknowledges that he was initially very critical about the 'eSNI according to Hueting'. "I expressed this criticism in 1994. In particular I found the sustainability standards problematic and uncertain. eSNI depends on those standards to a large extent. Since that time I have been in discussion with Hueting and he has always succeeded in refuting my objections, so that I have started to think about it with nuance." " Magazine "Milieudefensie" 2001-10 page 29.

⁴⁵² This willingness to communicate however ended when Den Butter and Verbruggen created the misconception of the Alleingang scenario, see Section 21.9.12.

⁴⁵³ Van Tuinen (2009:451) repeats: "A theoretically sound concept of a green GDP (...)"

53. *Shouldn't economists get involved in the making of the national accounts?*

Salah el Serafy, 2014 ⁴⁵⁴

The editor of the RES Newsletter: Writing from America Salah el Serafy argues that economists should pay more attention to national income estimation especially where natural resource deterioration is overlooked

This note is prompted by a recent publication related to national accounting issued under the names of the United Nations Secretary-General and the heads of five eminent international organizations (see references). I take advantage of the emergence of this document with its curious sponsorship to urge my fellow economists to play a more active role in the compilation and evaluation of the national account numbers which they consume with abandon discarding their 'caveat emptor' precaution. The overpowering sponsorship of this work to which I bring attention looks decidedly odd considering the relative smallness of the objective. For the objective is merely a standardized format that had been missing from a set of peripheral accounts for the environment introduced two decades ago by the 1993 System of National Accounts (SNA93).

The notion that the SNA should reflect natural resource losses to the extent possible had been researched for many years though how to integrate these losses meaningfully in the national accounts has eluded consensus. Over the years hope has gradually faded for such integration, and the recent work appears to close the door firmly against it. All that can be expected now is the collection of 'relevant' information on so-called 'links between the economy and the environment' to be deployed in subsidiary Satellite Accounts — as if natural resources were not an integral part in the structure of most economies. The fact that natural resource losses are ipso facto economic losses appears to escape the national accountants who one can surmise are the true begetters of this document, hiding behind a façade of an imposing edifice. Their message in brief is that no adjustment for environmental losses can be expected within the mainframe of the national accounts. This in effect is a death sentence on 'green accounting'.

Economists tend to take the national accounting estimates at face value, often feeding them into sophisticated models without questioning their accuracy or veracity. Reasons behind their presumed apathy are not difficult to disentangle. National accounting is generally absent from teaching curricula. It neither excites teachers' interest nor attracts students who are often enticed by what look like more glamorous lines of learning. This present-day neglect contrasts with the past when economists considered the national aggregates and what they stand for as fundamental to economic inquiry. Need I mention Adam Smith's work on the

⁴⁵⁴ Published as Salah el Serafy (2014), "Shouldn't economists get involved in the making of the national accounts?", Newsletter of the Royal Economic Society, no 167, October, p14-15. Included with permission by his heirs.

nature and causes of the wealth of nations (meaning income of nations)? National income has been central to the work of economists, describing and analyzing its sources, size, composition, distribution, changes and much else.

In the course of the past century the names of Bowley, Colin Clark, Pigou and Keynes forged the national income concept and guided its measurement in England, together with Simon Kuznets and others in America. Of outstanding significance in this regard is Hicks's dogged pursuit of the subject beginning with his book *The Social Framework* (second edition, 1952) where he blended theoretical analysis with attempts to overcome estimation problems. He wanted to initiate the study of economics from the macro end to supplant (or perhaps complement) the then-dominant micro approach of supply and demand. In a posthumously published article in the *Economic Journal* (EJ, 1990) on the '*Unification of Macro-economics*' Hicks credited the availability of the national accounts with nothing less than the development of modern macroeconomics. However, as the economists' interest in studying social accounting faded the accountants and statisticians have taken over, often disregarding the concerns of economics, and disclaiming any hint that the national accounts should be estimating income. One remarkable feature of the recent publication is its omission of any reference to the account-greening efforts of Dasgupta, Hartwick, Mäler, Nordhaus, Solow and Vincent (see El Serafy 2013).

Some rudimentary statements about GDP are perhaps here called for to justify what follows. Ask economists what GDP essentially imparts and the common answer, I believe, will be 'the level of national income'. This is important as the accountants, judging from previous attempts at integrating the environment and the economy, have denied any relevance of GDP to income. Without using the familiar acronym Pigou called GDP the '*National Dividend*', revealingly defining it as the total of consumption and investment (Pigou, 1948, p. 6). That GDP/GNP should denote income is a view that has been shared by major economists, but whether or not national income may be construed also as signifying happiness is another matter. On its own it cannot express welfare since it contains no reference to the number of people who share it, and even when converted to a per caput basis, it still remains devoid of how it is distributed, let alone the capacity of individuals to derive happiness from their share in income. Disappointed in GDP estimates which ignore ecological losses, many environmentalists have advocated the abolition of GDP though adjusting its estimates would be preferable and more practicable. This is because GDP has become so interwoven in the fabric of modern society that its estimates, however supposedly flawed, are cherished by business, academia, the media and the general public. Moreover, if its 'flaws' are consistently maintained it will reveal growth rates (the pet interest of many economists) that are grosso modo accurate. However imperfect these estimates may be they meet quite adequately the needs of short and medium term macroeconomic management particularly for monetary and fiscal purposes. And yet while this is true for perhaps a large number of countries, it fails the macroeconomic needs of the primary producing economies where the conventional estimates of GDP are not just inaccurate but are often misleading. Running down their natural heritage through commercial exploitation is falsely

portrayed as 'value added' whereas only the income content of the sale proceeds should appear in GDP. Exploiting finite natural resources without replenishment is akin to mining and Marshall had taken pains to explain that the surplus realized in mining, often miscalled rent, should be split into proper 'rent' which is income and 'royalty' which is capital.

Any presumption that removing 'royalty' (the capital element) from GDP entries relating to natural resources might be taken care of at the level of estimating NDP cannot be accepted for more than one reason. First, NDP is not often reckoned at all, and if reckoned there is no unanimity over the amount to be used for the capital consumption involved. Second, natural resource deterioration due to commercial exploitation is not '*depreciation*' in the accepted sense; it does not conform to standard wear-and-tear allowances applied at year-end to asset categories, and may in fact amount to as much as 100 per cent of the asset. In the latter case proceeds of the asset sale will all be a *User Cost* and must be exiled altogether from GDP. Third, if stock erosion is viewed correctly as Marshall advised as emanating from 'Nature's store', accounting conventions dictate that using-up stocks must be dealt with at the gross income estimation stage. Clearly natural resources are not 'fixed capital' but inventories, and the User Cost implicit in using them up should be recognized for correct accounting. Such economic reasoning appears to escape the concerns of the estimators who have taken charge of the accounts resisting the economic logic behind the 'greening' quest.

Apart from the mistreatment of natural resources a few additional faults have been recognized in the GDP estimates, but most of these have been taken in their stride by analysts. Criticism has touched among others on overlooking unpaid voluntary and household activities and in many cases also inadequate covering of subsistence production. More significantly perhaps is the omission of transactions that evade imposts such as value-added taxation. Whilst such economic activities are left out it would be foolhardy to deny that what is being caught within the catchment of GDP is appreciable enough to make its estimates worthwhile, and this argues for a 'better'-estimated GDP involving serious economist participation, if for no other reason than that no single metric available can yield as comprehensive a cornucopia of information as that which GDP/GNP provides.

Finally I do not wish to appear against gathering the kind of relevant information the UN Secretary-General and his colleagues are encouraging. The availability of detailed and organized information on the environment collected in satellite accounts or elsewhere will be greatly beneficial. This information may also prove invaluable for a systematic analysis of environmental issues in the various compartments delineated. Additionally the availability of data may well attract the attention of economists and trigger their interest in taking national accounting more seriously. But promoting the satellite accounts as a substitute for reforming entries in the accounting mainframe should be strongly resisted. The national accountants seem to prefer a 'catalactic' view of GDPs as a medium for enumerating market transactions. This if accepted will jeopardize the proper estimation of national income. Their fear of an environmental invasion is understandable, but exaggerated, and the SNA after all must live up to its claim of being a universal system. A universal system should cater to the economic

conditions of rich and poor, and not be blind to the requirements of some of the world's poorest economies whose GDP is rooted in primary production.

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54. About the author

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55. Literature

MPRA is the Munich Personal RePEc Archive. EWP references are to the precursor Economics Working Papers Archive at the Washington University at St. Louis: <http://econwpa.wustl.edu>. See also <http://thomascool.eu>.

Note: Colignatus is the name of Thomas Cool in science. Some archives may not recognize that name.

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