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Towards Sustainable Development

Alternatives to GDP for measuring progress

WUPPERTAL SPEZIAL 42

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List of Abbreviations

ANS	Adjusted Net Savings
CBA	Cost Benefit Analysis
CPI	Consumer Price Index
DI	Disposable Income
DMC	Domestic Material Consumption
EF	Ecological Footprint
EPI	Environmental Performance Index
ESA95	European System of Accounts 1995
ESI	Environmental Sustainability Index
GDI	Gender Development Index
GDP	Gross Domestic Product
GEEA	German Environmental Economic Accounting
GNH	Gross National Happiness Indicator
GNI	Gross National Income
GNP	Gross National Product
GPI	Genuine Progress Indicator
GVA	Gross Value Added
HDI	Human Development Index
HPI	Happy Planet Index
ISEW	Index of Sustainable Economic Welfare
LCA	Life Cycle Assessment
MDGs	Millennium Development Goals
MEW	Measure of Economic Welfare
NAMEA	National Accounting Matrix including Environmental Accounts
NDP	Net Domestic Product
NNP	Net National Product
OECD	Organisation for Economic Cooperation and Development
PI	Personal Income
PPP	Purchasing Power Parity
QUARS	QUAlità Regionale dello Sviluppo — Regional Quality of Development Index
SAM	Social Accounting Matrix
SCP	Sustainable Consumption and Production
SDI	Sustainable Development Indicators
SDS	Sustainable Development Strategy
SEEA	System of integrated Economic and Environmental Accounts
SESAME	System of Economic and Social Accounting Matrices and Extensions
SNA	System of National Accounts
UN	United Nations
UNDP	United Nations Development Programme
USD	United States Dollar

Executive summary

Assessing existing policies or developing new policy options requires indicators showing where a community stands, where it is going and how far it is from where it wants to be. Indicators are necessary in all steps of the policy cycle: to describe the current situation/problem; to analyse the causes; to identify possible solutions and analyse, select and implement policy proposals; to monitor and evaluate the policies and to communicate the outcomes at all steps of the policy cycle.

Economic performance is generally being measured through GDP (Gross Domestic Product), a variable that has also become the de facto universal metric for 'standards of living'. However, GDP does not properly account for social and environmental costs and benefits. It is also difficult to achieve sustainable decision-making aiming at sustainable progress and well-being if welfare is being considered from a purely financial point of view. Sustainable development can be defined as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Therefore, in order to effectively measure 'progress, wealth and well-being', one must go beyond GDP. This requires clear and at the same time multidimensional indicators showing the links among a community's economy, environment, and society.

The study highlights the benefits and some of the shortcomings of GDP. It serves a crucial and helpful role in macroeconomic policy, both monetary and fiscal policies. GDP is also fairly unique in that it combines simplicity, linearity and universality, as well as carries the objectivity of the 'observable market price' as its guiding principle. Attempting to abolish GDP, therefore, would be neither feasible nor recommendable. The real problem presumably is that GDP growth is too often confused with (sustainable) welfare growth in people's, and policy-makers' minds. While there certainly is a correlation between the two, this study shows that this is a highly conditional correlation, void of substantial causality for GDP levels observable in the European Union.

Failing the discovery of a perfect substitute, GDP can continued to be used for (economic) reform assessments and particular questions of economic policy (such as fiscal and monetary policy), but beware of interpreting it as a general sustainable development and welfare measure giving any substantial and universally valid idea about people's well-being. For these purposes, it is better to turn to alternative measures going beyond GDP, some of which were analysed in this study.

Using so called SWOT analyses, several alternative progress indicators have been assessed in the context of this study. This allows for an assessment of the internal Strengths and Weaknesses and the externally-driven Opportunities and Threats of each indicator for going beyond GDP[1]. To do so, the selected indicators have been divided in three categories: those replacing, adjusting and supplementing GDP (the latter being divided into two subcategories).

The first category contains indicators **adjusting GDP**. In this approach, traditional economic performance measures like GDP or national saving rates have been adjusted by including monetised environmental and social factors. Such indicators can serve as a valuable communication tool whereby the end result sends out a positive or negative signal to the audience. However, difficulties arise when trying to monetise environmental and social factors.

The category **replacing GDP** contains indicators that try to assess well-being more directly than GDP, e.g. by assessing average satisfaction or the achievement of basic human functions. By replacing GDP, these indicators might not appropriately consider the advantages of GDP which is not always a realistic option for decision-making. Nevertheless, these indicators can serve as valuable instruments to improve public participation and to assess and communicate several aspects of sustainability and well-being.

The category **supplementing GDP** seems to be the most realistic and acceptable option for going beyond GDP. Within this approach, GDP is being complemented with additional environmental and/or social information. A first group are the 'satellite account systems' which complement the conventional statistical national accounts with environmental and/or social information. A second group sets social and environmental information in relation to GDP. For the first group, a good deal of statistical data is already available and best practices of its use and its potential for decision-making exist. However, in comparison to the GDP itself these approaches often lack public perception and political support. The establishment of an overarching, transparent and popular reference indicators system for EU policies might therefore be the next step for improving decision-making in support of sustainable development.

1 A summary of the SWOT analyses can be found in Table 7 at the end of the study.

1 Introduction

Economic performance is generally being measured through GDP (Gross Domestic Product), a variable that has also become the de facto universal metric for 'standards of living'. It is universally applied according to common standards, and has some undeniable benefits mainly due to its simplicity. Unfortunately, this indicator grossly counts all transactions with a market price and thus bluntly adds up benefits and costs in its accounting. It thus converts (welfare-reducing) costs to perceived benefits. The indicator also fails to include non-market transactions, such as family work.

Sustainable development and sustainable decision-making are difficult to achieve if welfare is being considered from a purely financial point of view. GDP does not adequately take into account human and social welfare. Furthermore, environmental costs such as the depletion of resources and the damage to the environment are also neglected. It is a valuable exercise to assess in how far environmental and social costs and benefits could be incorporated in the measures used to define 'development, wealth and well-being'.

The European Parliament Committee on Environment, Public Health and Food Safety requested a first version of this study from the EP Policy Department A on "Alternative progress indicators to GDP as a means towards sustainable development". The study provided the Members of the European Parliament with useful information in preparation of the Conference on "Beyond GDP" being held in Parliament in November 2007. The conference was hosted by the European Commission, Club of Rome, OECD and WWF. In the light of the current developments on the national, the EU and the international scene, it was decided to republish this study as a Wuppertal Spezial.

Chapter 2 gives a brief overview of sustainable development, how to measure it and its relevance within policy-making. Chapter 3 explains the concept of GDP and the main shortcomings and benefits of this indicator. Chapter 4 explores a selected list of alternative 'progress indicators' for which the SWOT analyses done by the Wuppertal Institute (2007)[2] assess the Strengths, Weaknesses, Opportunities and Threats to be taken into account for a strategic management. Chapter 5 summarises the indicators and gives some conclusions and recommendations.

2 Study by Wuppertal Institute, 2007 — Commissioned by Policy Dept. A, European Parliament.

2 Sustainable development and implications for policy-making

2.1 What is sustainable development?

The concepts 'growth' and 'development' are not necessarily the same. Herman Daly[3] highlights this difference in his book "Beyond Growth: The Economics of Sustainable Development":

> *"To grow means to increase naturally in size through the addition of material through assimilation or accreditation. To develop means to expand or realise the potentialities of; bringing gradually to a fuller, greater or better state. In short, growth is the quantitative increase in physical scale while development is qualitative improvement or the unfolding of potentiality. An economy can grow without developing, or develop without growing, or do both, or neither."*[4]

Furthermore, Daly defines uneconomic growth as "*Uneconomic growth occurs when increases in production come at an expense in resources and well-being that is worth more than the items made*". 'Local economic growth' for example, may result in 'global uneconomic growth': a boost in car production may result in higher income for people working in a car factory, but may lead to more air pollution and greenhouse gas emissions, resulting in an increase of global warming.

> *"In order for development to be sustainable, it has to be comprehensive — it has to successfully balance economic goals with social and environmental."*[5]

The Brundtland report "*Our Common Future*"[6] defines sustainable development as "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Development involves economic as well as social and environmental changes, thus requiring an interdisciplinary approach.

2.2 How to measure sustainable development?

It is not easy to assess 'progress and development', as these concepts are not purely objective. 'Development' should aim at improving the quality of people's lives; the goals of development and the means to achieving them will be prioritized differently according to the persons involved. Basic needs for development include amongst others food, shelter, health, safety and education. Poverty alleviation is therefore essential for human development. Beyond these basic needs, 'development' may involve many other dimensions which are to some extent a question of values and preferences and which are therefore not easy to define using objective empirical methods.

'Progress, wealth and well-being' of a country, a region or an individual may be affected by (net) income, economic degradation, employment, education and literacy, knowledge and human capital, poverty, availability and allocation of resources and products, health, life expectancy and (child) mortality, safety, crime, quality of life, happiness, leisure, cultural identity, democracy, human rights, equity, environmental pollution, water and air quality, overconsumption and depletion of (natural) resources, value of ecosystems, biodiversity loss, deforestation,etc.

In order to assess whether development is sustainable, the abovementioned issues, and possibly many others should be incorporated into the assessment. It is interesting to see in which way, and by using which indicators, (aspects of) 'sustainable development, wealth and well-being' can be defined.

Sustainability requires multidimensional indicators showing the links among a community's economy, environment, and society. Indicators have been developed to measure identifiable economic, social and environmental conditions. However, at the same time moving towards 'sustainability indicators' means moving towards less objective and tangible indicators such as 'quality of life' and 'ecological integrity'.

Indicators are being used to understand where you are, which way you are going and how far you are from where you want to be. Reference bases, thresholds and/or targets for indicators are to be set up to guide political and social action.

3 Herman Daly, ecological economist and former senior economist in the environmental department of the World Bank.

4 Extract from *Toward Sustainable Development: An Ecological Economics Approach*, page 29, by Philip Andrew Lawn, 2000

5 Extract from *Beyond Economic Growth*, Student Book by World Bank, 2004.

6 Published in 1987 and named after the former Norwegian Prime Minister Gro Harlem Brundtland who chaired the World Commission on Environment and Development (set up in 1983).

2.2.1 Different approaches to sustainable development

Since the Brundtland report, three main approaches to Sustainable Development (SD) emerged (UN *et al.*, 2003):

- The *three-pillar approach* views SD as referring simultaneously to economic, social and environmental systems, all of which must be simultaneously sustainable, because each of the three pillars is independently crucial and because the three pillars are interconnected.
- The *ecosystem health approach* considers the economic and social systems as sub-systems of the global environment. The key property to be sustained is the capacity of ecosystems to respond with resilience to external perturbations and changes. The 'health' of ecosystems must be protected and enhanced. This approach implies focusing on:
  - The 'pressures' placed on ecosystems by human activities (material and energy extraction, physical restructuring, pollutant emissions, human appropriation of space and ecosystem productivity, etc.). These pressures are often the cause of reduced ecosystem health as manifested in degraded service flows and/or reduced management options.
  - The 'responses' of ecosystems to these pressures. This can include e.g. measures that describe the state of ecosystems and measures of the capability of ecosystems to deal with imposed pressures.
- The *resources or capital approach* views sustainable development as development that ensures non-declining per capita national wealth by replacing or conserving the stocks of produced, human, social and natural capital. It broadens the concept of economic capital by integrating concepts from physical and social sciences to include measures of (or indicators for) human, social, natural and environmental capital.

2.2.2 Use of indicators to measure (sustainable) progress

➤ *Characteristics and criteria for selecting indicators*

It is not easy to specify which requirements indicators have to meet in order to be viable indicators for measuring sustainable progress. The necessary conditions are in most cases dependent of the situation one wants to use the indicators for. The selection of (a set of) indicators requires a 'fitness-for-purpose' approach.

Table 1: Criteria to take into account for the selection of indicators

Analytical soundness
An indicator should preferably:

- be transparent and be based on a theoretical framework (both in technical and scientific terms);
- be based on international standards and international consensus about its validity;
- lend itself to being linked to economic models, forecasting and information systems;
- allow for being broken down into its underlying components;
- be as objective in its construction as possible.

Measurability
The data required to support the indicator should preferably be:

- readily available or made available at a reasonable cost/benefit ratio;
- adequately documented and of known quality;
- available in homogeneous and coherent databases allowing to assess interdependencies between the indicators;
- updated at regular intervals in accordance with reliable procedures.

Policy relevance and utility for users
An indicator should preferably:

- provide a representative picture of economic conditions, social aspects and environmental conditions, pressures on the environment or society's responses;
- be simple, easy to interpret and able to show trends over time;
- allow for communicating the result and the direction a policy should head to;
- be responsive (sensitive and specific) to changes in the environment and related human activities;
- take into account side-effects (e.g. sustainability at the expense of another community) and reflect local sustainability that enhances global sustainability;
- be universal and provide a basis for international comparisons;
- be either national in scope or applicable to regional environmental issues of national significance;
- be scalable over space;
- be available rather shortly after gathering the data it is based on (timeliness);
- have a threshold or reference value against which to compare it, so that users can assess the significance of the values associated with it.

The main characteristics and conditions to take into account when selecting indicators can be found in Table 1[7]. Trade-offs between several characteristics may be necessary depending on the priority areas to be assessed.

Many governments and organisations are already in the progress of gathering data on all three areas (economy, society, and environment). It is therefore not always necessary to start measuring new data. The OECD for example annually publishes a factbook[8] with 100 indicators, providing a global overview of economic, social and environmental trends of any OECD country. The UN Development Programme publishes annually a Human Development Report[9], focussing on economic and social indicators. Furthermore, the UN Statistics Division[10] gathers global data related to economy, society and environment.

➤ *Presentation of the indicator*

As mentioned above, the communication and analytical value of an indicator, and thus the way it is being presented, determine the influence an indicator will have on its audience. An indicator must not only be attractive and understandable, it must also be of good quality. Interpretation of the indicator value may be improved using visual presentations such as graphs, 'development diamonds', 'dashboards' (cfr vehicle dashboards, displaying the relative performance of the index), and presentation on geographic maps.

An important question to ask is whether the end-result of an indicator needs to be expressed in monetary units. An indicator value may also be expressed as a score, as a ranking such as 'excellent', 'good', 'bad' or 'very bad'.

Following its complex and multidimensional nature, indicators assessing 'progress' will always be composed of several indicators/data sets. There are three main ways of combining these indicators and come to a global picture: using 1 single composite measure, using a framework accounting approach, or using a suite-of-indicators approach. More information on this can be found in Annex 6.1.

2.2.3 Limitations and shortcomings of using indicators

Indicators are useful for policy analysis on condition that it is possible to use and compare indicator results on different scales (international, national, regional, local). However, these indicators are very often based on data gathered following different methods as no methodological international standard has been developed. Furthermore, data availability differs on local, regional and national scale.

A second problem relates to the normativity and the subjectivity of the concept 'welfare'. Assessing different regions and countries will imply encountering different ranking and prioritisation of indicators. Even on individual basis, welfare may be perceived differently from one individual to another. A lot of regional/local issues contribute to welfare, making it difficult to come up with uniform international indicators (see also Chapter 3.4).

Thirdly, average values across a national level may hide regional and local trends, giving a distorted picture of reality.

Furthermore, trends are not always easy to measure as reference values for indicators or long-term data series are not always available.

2.3 Using indicators in the decision-making process

Indicators can help policy-makers during several steps of the policy cycle. Table 2 gives an overview of the different steps in the policy cycle and the potential use of indicators to go beyond GDP. Where applicable, it is mentioned which indicators are most suitable:

(1) indicators adjusting GDP, replacing GDP or setting social and environmental information in relation to GDP (see Chapters 4.1, 4.2 and 4.4 respectively); or

(2) indicators based on accounting systems — 'accounting matrices' (see Chapter 4.3).

Throughout all steps outlined in Table 2, communication plays a critical role. The information and the insights need to be presented to the public in a comprehensive way. It needs to be visualized where appropriate, and simplified where deemed necessary. The popular embracement of a new indicator is very important in order to make it part of the new routine and expectations of people. Indicators can be used for (Canoy, 2007):

7 Based on and inspired by the work done by the OECD (2003) on this topic.

8 Latest publication: Factbook 2007, by OECD, http://www.sourceoecd.org/rpsv/factbook/

9 UN Human Development Report , http://hdr.undp.org/hdr2006/statistics/

10 UN Statistics Division, http://unstats.un.org

Table 2: Policy cycle[1]

1. Problem description
Problem recognition:
- Evaluation of the current situation; defining the problem
- Sending out a strong signal to policy-makers about the occurring problem (1)
- Description of a system or relationships between systems (2)

2. Diagnosis
Analysis of causes of problem:
- Analysis of the underlying mechanisms and independencies requiring detailed disaggregated information (2)
- Investigation of future developments of the problem

3. Measures
- Identification of possible solutions: formulate political measures, requiring analytical instruments (2)
- Analysis of policy proposals:
  - Cost-benefit analysis
  - Impact Assessment (IA) of policy proposals (new initiatives, new regulations/directives, new amendments, etc.)
  - Analysing if the goals for certain indicators can be achieved; consideration of interdependencies and thus the simultaneous achievement of other economic, environmental and social goals (2)
  - Modelling: comparing 'business-as-usual GDP' to 'sustainable GDP'
- Selection of a policy option
- Implementation

4. Performance control
Monitoring
- Monitoring policies
- Cost-benefit analysis
- Score-keeping for individual indicators (1): measuring the gap between the observed and the target values

Evaluation
- Evaluation of progress of policies
- Delivering short-term (1) and long-term (2) information

1 Source: inspired by Schoer, 2006; conference website EC, 2007

- **Backward-looking:** to evaluate what works and what does not work and for making international comparisons and time series.
- **Forward-looking:** to put focus on new policy proposals and to forecast and do ex-ante assessments.
- **Practical politics:** to provide a common language in a debate, consistency in a policy package and accountability.

2.4 Policies and policy-making based on GDP and other 'progress indicators'

GDP growth is enshrined in most economic policies and objectives both on EU level as well as on national and regional levels, for a good reason. GDP growth effectively determines levels of employment, tax revenues and subsidies paid even to the greenest of technologies. Modern economies and welfare systems are heavily dependent on GDP growth (see also Chapter 3).

GDP growth, through consumption and investment, bears positive feedback mechanisms that make more of it always necessary. However, while not getting rid of GDP, it would certainly be desirable to reduce some of this dependency on it. The problem with the opposite of growth, degrowth, is that it is most likely unstable. Declining consumption would lead to rising unemployment, falling competitiveness and a spiral of recession. This turns out to be a real dilemma — modern economies are simply driven towards growth, as less of it is unstable, but more of it is increasingly unsustainable.[11]

A lot of EU/international policies are based on a GDP-outcome. The **EU Regional Policies** for example use a GDP threshold for regions to be eligible for EU funding: regions are entitled to the European Regional Development Fund and the European Social Fund if they have a regional GDP which is less than 75% of the Union average; the Cohesion Fund is restricted to Member States whose living standards are less than 90% of the EU average. Contributions of Member States to the **EU budget** are currently based on GNI outcome. The **Stability and Growth Pact** and the **convergence criteria** in the Economic and Monetary Union indirectly use GDP over their calculation of governments' debt and deficit as a proportion of GDP.

11 See e.g. Booth, Douglas (2004): Hooked on Growth — economic addictions and the environment. New York: Rowman and Littlefield.

The EU Sustainable Development Strategy and the EU Lisbon Strategy use the Sustainable Development Indicators and the Structural Indicators respectively to measure progress in achieving the targets set by the Strategies.

When proposing new legislation or amendments to existing legislation, **Impact Assessments** could make use of various 'sustainable progress indicators' in order to assess impacts on all three pillars of sustainable development (economic, ecological and social pillar).

2.5 National, European and international initiatives aimed at going beyond GDP

The European Commission has been relatively active in developing indicators to go beyond GDP. Its roadmap for moving beyond GDP was published in the summer of 2009 (COM(2009)433).

In addition, currently, at least three Member States have seriously started to tackle the problem of unsustainable GDP growth by establishing scientific councils of differing kinds to aid governmental decision-making. This had been the case with the project on "What kind of growth is sustainable?" in Austria[12], the "Sustainable Development Commission" in the UK[13], and most recently and most prominently the "Commission on the measurement of economic performance and social progress", also known as the Stiglitz-Sen-Fitoussi-Commission, in France[14].

Furthermore, the OECD launched a Global Project on "Measuring the Progress of Societies" to strengthen citizens' capacity to understand the social and economic context in which they live.[15]

12 Austrian Ministry of Agriculture, Forestry, Environment and Water Management in cooperation with SERI, 'What kind of growth is sustainable?' report published in 2009.

13 UK Government Sustainable Development Commission, report on 'Redefining Prosperity', published 2009.

14 See the final report at ww.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf

15 OECD, http://www.oecd.org/pages/0,3417,en_40033426_40033828_1_1_1_1_1,00.html

3 GDP as an indicator for sustainable progress?

The importance of modern national accounting aggregates such as GDP in economic policy-making today is crucial. The success story of GDP is, it may be argued, fairly surprising. By its "developers", GDP was never meant to become a universal measure for economic welfare. Yet it can be said to having implicitly become that in subsequent years. Why and how that was the case will be reviewed in this chapter followed by an assessment of the benefits and drawbacks of GDP.

3.1 Definition of GDP

The Gross Domestic Product is the market value of all final goods and services produced within a geographical entity within a given period of time. It is:

- **"Gross**" because the depreciation of the value of capital used in the production of goods and services has not been deducted from the total value of GDP;
- "**Domestic**" because it relates only to activities within a domestic economy regardless of ownership (alternatively: **"national"** if based on nationality);
- **"Product**" refers to what is being produced, i.e. the goods and services, otherwise known as the output of the economy. This product/output is the end result of the economic activities within an economy. The GDP is the value of this output.

Value is **made up of prices and quantity**. An economy can increase the value of its GDP either by increasing the price that will be paid (e.g. by raising quality) for its goods and services, or by increasing the amount of goods or services that it produces.

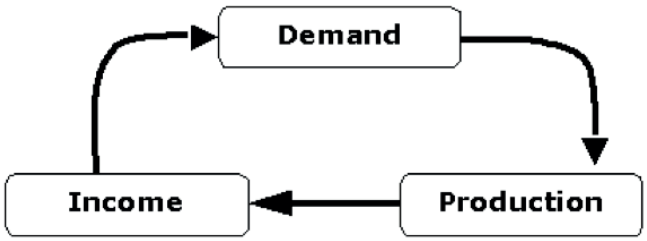

Figure 1: GDP

In order to avoid double-counting, it is important that GDP measures each product or service only once, i.e. the "**final value**".

Gross Domestic Product is the **crossing point** of three sides of the economy: **demand, production** and **income** (Figure 1).

The three different crossing points in the economy also translate into three approaches to measuring GDP. Each should theoretically yield the same result, but as different data sources are used to estimate them, they will in practice contain small differences, attributable to statistical measurement discrepancies.[16] Table 3 exemplifies how the three concepts interrelate:

The (effective) demand side decomposes the expenditure into consumption and investment. The production approach measures the value added each sector of the economy contributes to the final output, and finally the income approach breaks down the remuneration of production factors different people of institutions receive. Annex 6.2 looks deeper into these different methods to calculate GDP.

When speaking of GDP in this study, we do so in a general and fundamental way. In general, and for welfare measurement in particular, the notion of "per capita" measurement is implicit in the argument. Moreover, we do not distinguish between nominal and real GDP, as the difference bears little relevance for the argument and the knowledge of standard inflation corrections is taken for granted. Furthermore, we abstract from other interesting comparative inter-temporal considerations such as concepts of constant vs. market prices.[17]

16 In terminology, we follow the Eurostat definitions as laid down in the ESA95.

17 Inflation is, of course, a further component influencing GDP. The market value of final production or income will vary according to the value of money. Identifying the real component of income and production net of inflation is what is needed for a real wealth measure. This is known as *real GDP*, which is calculated either by correcting GDP with a CPI inflation index or a more broad GDP deflator. When the literature and statistics speak of e.g. GDP at *constant* prices (as opposed to *market* prices), it means that the price level of a certain base year is employed to compare the production in different years with each other.

Table 3: Three identical approaches to measure GDP

Effective Demand			**Value Added**			**Remuneration of Production Factors**	
	in 1000 euros			in 1000 euros			in 1000 euros
Consumption	1.101.172		Agriculture	52.514		Labour income	808.807
Public expenditure	352.019		Manufacturing	594.619		Capital income	635.469
Investment	348.848		Services	1.147.762		State revenue	200.100
Export	491.126						
Import	–397.307						
Inventory Change	6.417		VAT	107.380		Amortization	257.899
GDP	**1.902.275**			**1.902.275**			**1.902.275**

(Source: example for Italy (1996) taken from Piana,2001)

3.2 History of GDP

By looking at the history of national accounting, some issues on how we have arrived at the present situation may become clearer.

3.2.1 The birth of national accounting[18]

The first estimates of national accounts were made in 1665 by Thomas Petty in England, whose aim was to estimate the taxation capacity of the nation. The "father" of modern economics, Adam Smith (1723–1790), established the idea that the "wealth of nations" was not grounded in agriculture, gold and silver alone, as had been previously thought, but in "national production" thus including also e.g. the manufacturers. However, Smith did not consider the industry that would today be called "services" in its broader sense, e.g. lawyers, entertainment, finance and government to be part of national production. Smith called those functions, useful or not, ultimately "unproductive of any value" as they do not give rise to a tangible product. Even though conceptually advancing, Smith did not provide too many valuable insights on how to *measure* the wealth (or production) of a nation.

Skipping over a century of economic thinking, it was not until the 20th century that measurement of production gained relevance. (Welfare) economics, especially through the work of Alfred Marshall (1842–1924), discovered in the beginning of the 20th century that production could not be effectively measured without taking into account the valuation by individual consumers for the goods being produced. Marshall also rigorously introduced the notion of utility into economic thinking. That led to the notion of the market value (i.e. price) of production being the best measure and central metric.

The implications of this are carried until today. Everything that has a price and is commercially traded adds to GDP. This happens by the mere fact alone that it is produced and bought. Through this, at least two large realms where money does not "change hands" were left outside "recorded welfare": the social sphere of the family/community, as well as the environmental habitat.

3.2.2 Simon Kuznets and the Keynesians

The breakthrough in terms of measurement of national production came in the US in the 1930s, with the work led by Simon Kuznets. Cobb *et al.* (1995) describe this as follows:

18 This section largely draws on Cobb *et al.* (1995).

> *"In 1931 a group of government and private experts were summoned to a congressional hearing to answer basic questions about the economy. It turned out they couldn't: the most recent data were for 1929, and they were rudimentary at that. In 1932, the last year of the Hoover Administration, the Senate asked the Commerce Department to prepare comprehensive estimates of the national income. Soon after, the department set a young economist by the name of Simon Kuznets to the task of developing a uniform set of national accounts. These became the prototype for what we now call the GDP."*

The thirties of the last century also brought with it a new economic thinking with the work of John Maynard Keynes, advocating (among many other things) government's active role in demand management. Since this Keynesian management worked through money flows rather than bureaucratic programmes, the new national accounting tools were essential for it. In the words of Robert Solow, Kuznets provided the "*anatomy*" for Keynes' "*physiology*".[19]

The real breakthrough with the establishment of the national accounts and their contribution to welfare came after the Second World War, as prominent economists such as (Nobel prize winner) John Kenneth Galbraith declared that "*one good reason for expecting prosperity after the war is that we can lay down its specifications. For this we can thank a little-observed but spectacular improvements in the statistical measures of the current output of the U.S. plant.*"

Before the war, economists had been rarely quoted or consulted for public policy. After the war, Cobb *et al.* (1995) observe that they became the "*ultimate authority of policy*". Also, as Keynesian thinking lifted consumption to a primary role in its economic management, policy-makers no longer saw the "people" as workers, farmers and business people etc., but simply as consumers.

Soon enough the very fathers of the new accounting woke up to criticize the extent and scope to which GDP had been used. Simon Kuznets wrote in 1962:

> *"Distinctions must be kept in mind between quantity and quality of growth, between its costs and return, and between the short and the long run. Goals for more growth should specify more growth of what and for what."*

It was not as if Kuznets had woken up to this only in the 1960s. Already in 1934, while advocating its use, he had warned that "the welfare of a nation can scarcely be inferred from a measurement of national income as defined above". The critique of Kuznets has since been seconded by many prominent economists, including a number of Nobel laureates (Daniel Kahneman, Robert Solow, Joseph Stiglitz, Amartya Sen and Muhammad Yunus). Notwithstanding its obvious deficiencies in this regard, GDP is the measure globally accepted and followed.

3.3 Common adjustments to GDP

Despite the conceptual unsuitability of GDP as a measure of (sustainable) welfare, through some common adjustments to it some limited insights can be gained. Two methods are selectively presented here: firstly, the role of depreciations in welfare is discussed leading to the NDP (Net Domestic Product), and secondly the modification of GDP in PPP (Purchasing Power Parities) is presented which enhances the welfare-relevant comparability of GDP across countries.

3.3.1 Sustainable Income Definition — Net Domestic Product

A number of authors have propagated the added value of deleting the depreciation of the capital from the GDP measure, thus yielding Net Domestic Product (NDP); or alternatively and with slightly different implications, to make GNP (or GNI in Eurostat ESA95 definition) to NNP (see also Annex 6.2).

The theoretical foundation for NDP in terms of welfare was already worked out very early by Hicks (1939) and Weitzman (1976). Hicks (1939), argued that "*the purpose of income calculations in practical affairs is to give people an indication of the amount which they can consume [in the present] without impoverishing themselves in the future*". This notion of income is one where consumption today does not degenerate the capital stock of the economy (in its widest sense), thus providing for adequate consumption possibilities tomorrow. Thus, the "true" income is the income minus the depreciation of capital. Weitzman (1976) argued that this income measure was a good proxy for sustainable national income as it is proportional to the present discounted value of all future consumption.

Empirically, the difference between GDP and NDP has been roughly of the order of magnitude of 15% in the last decade for most European countries.[20] The figure has been higher for high-technology countries, and the growth rate of NDP has almost exclusively been lower than that of GDP. A convincing point in this regard is made by Spant (2003). He specifies the importance of the new technologies bring-

19 Moreover, GDP played a critical role as a war-planning tool during the Second World War. The accounts enabled both the US and, in a slightly different setting, also the UK, to locate unused capacity in the economy and to exceed conventional production levels by far.

20 See e.g. Spant (2003) for the data.

ing about a significantly accelerated capital depreciation. This development increases the difference between gross and net in the aggregates. The composition of contemporary investment is shifting towards higher rates of depreciation (e.g. hard- and software) and shorter-lived assets, thus overestimating real rates of economic growth and productivity in the gross measures. This serves as the main legitimation to use net, rather than gross measures when measuring welfare.

3.3.2 Purchasing Power Parity

The notion of welfare-relevant real value of GDP can be further expanded. It can be argued that the real value of GDP is what it can actually buy in order for individuals to fulfil their basic (and advanced) needs, a requirement going beyond mere inflation corrections. For this reason, when a cross-country comparison of standards of living is intended, there is a need to adjust the basic GDP figures. This problem of comparability arises due to the exchange rate and relative price levels.

As we convert e.g. the Chinese GDP into euros, we use market exchange rates. In theory, market exchange rates should adjust perfectly so that the same good and service have the same price in different countries. However, market exchange rates will inherently only consider "tradable" goods, and almost completely exclude "non-tradable" goods, such as services. Furthermore, imperfect capital mobility (currency controls in the extreme case) will also prevent the exchange markets from working perfectly.

The Purchasing Power Parities (PPP) attempt to solve this problem by defining a set of comparable goods across countries and asking how many units of the local currency are needed to buy this in relation to a base currency (usually USD) to buy the same set in an average country. When GDP is adjusted by this recalculated exchange rate, the figure is effectively adjusted to mirror the real purchasing power.[21]

To take a real life example: the 2006 GDP per capita of Germany in USD market prices is 17 times as that of China (35000 vs. 2000 USD). However, taking proper account of the fact that the products and services people need to sustain their standard of living are substantially cheaper in China than they are in Germany and adjusting the GDP figures by this we find that the PPP adjusted per capita GDP in Germany is only 4 times that of China (31000 vs. 7600 USD).[22] Indeed empirically, the result of a PPP adjustment will most commonly be a reduction of the spread between rich and poor countries in terms of GDP levels.

3.4 Benefits and shortcomings of GDP as a wealth/welfare measure

3.4.1 The welfare perspective

The concept of "sustainable development" was defined in Chapter 2 of this study. It may be useful to briefly address the notions of "welfare" or "well-being"[23], often associated with GDP and how they relate. After all, most misconceptions concerning GDP stem from its overt abuse as an indicator of welfare.

An aggregation of individual welfare functions is implicitly done in all aggregate measures. There is a wide consensus that aggregation of information always leads to information loss. Even if accepting a certain type of measure for individual welfare, the aggregation to a societal welfare function may be too ambitious. There has been a long debate in economics whether a social welfare function can be meaningfully constructed in the real world, and the widely recognized Arrow's Impossibility Theorem teaches that this cannot be done.[24] In that regard, the notion of GDP as a social welfare function is on shaky ground from the very beginning.

As in terms of welfare we are interested in welfare enhancing elements of GDP, how can good elements in GDP be separated from bad elements? Basically, GDP (or any other relative aggregate) can be broken down to its different parts (see Annex 6.2). For example, decomposing GDP from the income side to wages and profits will already give an idea about the purpose of the transaction. Similarly, decomposing it from the expenditure side to consumption and investment can also yield interesting welfare-relevant insights. However in general all transactions in GDP are monetary income for someone, whether it is the fireman cleaning up the havoc of a hurricane, or the divorce lawyer making money out of a human relationship tragedy.

21 However, PPP's are also not free of problems, especially in terms of assessing and defining the underlying basket, the utility that people draw from those goods, or the quality of the goods, just to mention a few flaws.

22 A rather entertaining example of a simple PPP based comparison is the Big Mac Index published by the Economist, comparing the price of Big Mac hamburgers in different countries and inferring an exchange rate from that relation. It is potentially useful as the ingredients of the Big Mac are basic needs of humans all around the world, i.e. bread, meet, salad etc. However, it is highly questionable whether the subjective utility and welfare effect of a McDonalds visit is the same in Nepal as it is in London or New York.

23 The terms welfare and well-being are used rather interchangeably in this study.

24 For the entire argument: see Arrow (1951).

Given that everything is income on some level, this implies that further criteria need to be introduced before being able to assess the good and the bad elements in GDP. Cost-benefit analysis (CBA) provides some tools in this regard, the discussion of which is beyond the scope of this paper.[25] However, the basic yardstick used in this analysis is the marginal benefit vs. cost. Essentially, the marginal social benefit of a certain GDP component should be higher or equal to its marginal social costs. As an important element, this implies taking adequate account of the all externalities included in these GDP components, not measured by market transactions.

Taking a related perspective, one important principle of good bookkeeping is violated in GDP: the division between assets (benefits) and liabilities (costs). Joseph Stiglitz (2005) wrote in comparing a country to a firm that "*no one would look just at a firm's revenues to assess how well it was doing. Far more relevant is the balance sheet, which shows assets and liabilities. That is also true for a country.*" Jeroen van den Bergh (2007) argued that "*Economists are happy to argue in favour of cost-benefit analysis as a general method for policy evaluation and support. When it comes to direction of the economy as a whole, many of them suddenly are satisfied with only information about costs, that is, GDP information.*"

3.4.2 Elements of well-being

It is insightful to place and structure some elements contributing to our well-being in Figure 2:

The notion of "economic well-being" above is a broader concept than GDP, however can still be captured with standard economic measures. The living conditions include a number of non-material aspects of well-being, and it may be argued that it is the last sphere that is reachable to economic policy (counted from the right side). The final sphere, happiness, may be in part and indirectly influenced by elements of public policy, but this link should be relatively weak.

The extensive recent research on economics of happiness, especially through the work of Bruno Frey (2000; 2002), can be used to illustrate the effectiveness of economic policies in influencing happiness and life satisfaction. Human well-being and happiness have manifold sources, with economic indicators and policies influencing them to a certain extent, but under conditional circumstances. An interesting empirical evidence in this regard is the comparison of the US and France. shown in Figure 3. As a rule, subjective happiness or satisfaction seems to be fairly constant throughout time in all Western countries despite GDP per capita levels growing steadily.

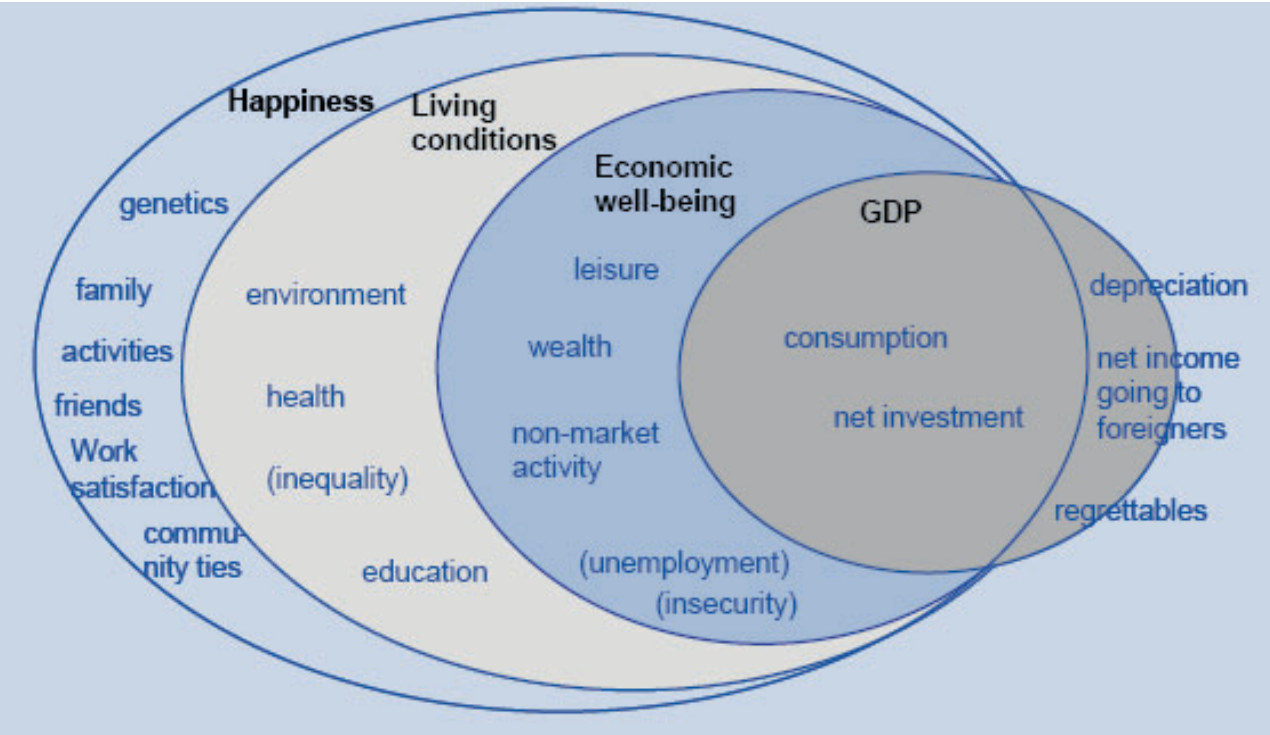

Figure 2: The many elements of happiness and well-being (Source: Deutsche Bank Research, 2006)

25 See e.g. Edward J. Mishan, Euston Quah (2007): Cost-Benefit Analysis, Routledge.

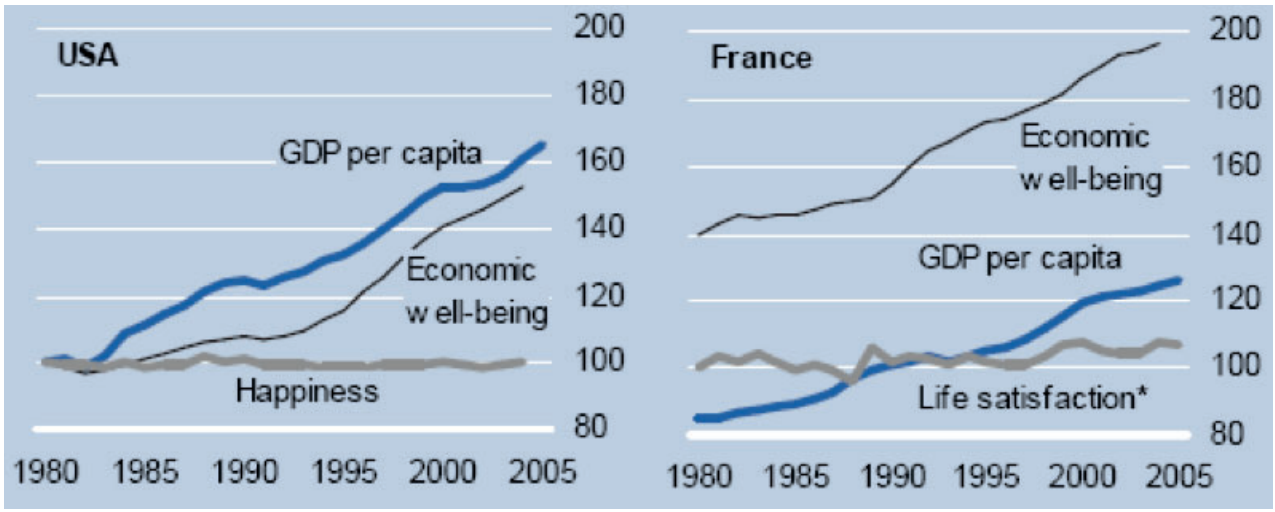

Figure 3: Income, economic well-being and happiness in the USA vs. France,USA 1980 = 100
(Sources: Deutsche Bank Research (2006), from GGDC, CSLS, GSS, Eurobarometer)

3.4.3 Benefits of GDP

Given that microeconomic theory, as well as many prominent economists, objected to GDP being (implicitly or explicitly) used to measure well-being, the question remains how it could be that its use and importance has been sustained until today to such great extent?

Part of the answer is probably that GDP is a sufficiently simple, straightforward and linear measure. It can be elegantly used to calculate many relevant (macro-)economic measures: it will produce decent accuracy in measuring tax revenues and productivity, and it will help macro-management through estimations of output gaps and inflation. In short, it has a legitimate and strong role in modern economic management.

Analysing the usefulness of an imperfect measure like a national accounting aggregate to represent welfare, Dasgupta and Mäler (1999) argue as follows:

> *"It can be argued, of course, that if we seek a welfare index, we should measure welfare directly and not look for a surrogate and give it a different name, NNP or whatever. There is something in this. On the other hand, as there are several reasons for seeking a welfare measure, for many purposes the most convenient index could be something other than the thing itself. For example, we could be interested in some object X, but X may prove especially hard to measure (e.g. because it involves estimating non-linear functions of observable quantities). Suppose now that for some purposes X is known to correlate perfectly with Y and that Y is easier to measure than X (e.g. because Y is a linear function of observable quantities). Then we would wish to rely on Y for those purposes.*
>
> *As is well known, NNP is linear in quantities, with the weights being at least in part revealed by observable market prices. Therein lies its attraction."*[26]

Dasgupta and Mäler (1999) also theoretically evaluate the NNP (roughly equally applying to GDP) aggregates in terms of their usefulness for policy-making. They conclude that they can well be used to evaluate individual reforms in economic policy. This is because individual reform impacts can be quite effectively identified in NNP/GDP.

In fact, there is an undeniably strong correlation between GDP levels and components of basic welfare such as high literacy rates, better nutrition and health care, communications technology, life expectancy, all important factors contributing to people's welfare. However, there is also some evidence that the above mentioned positive correlation between welfare and GDP is conditional in that it does not seem to hold for all "levels" of GDP. Helliwell (2003) estimates a delinking of GDP and (subjective) social welfare at a per capita GDP of approx. 15.000 USD.[27] This means that below that threshold, there is a strong positive correlation between the two which disappears above it. Max-Neef (1995) calls this phenomenon the threshold hypothesis:

26 Dasgupta and Mäler (1999), p.2. Their argument takes NNP as an example, but here the same practically applies to GDP also.

27 This is true not only across countries, but also for individual countries on a longer time scale. Richard Layard (2005) presents a long time series for the US where since the 1960s a de-linking of economic growth and subjective happiness of the people has occurred.

"For every society there seems to be a period in which economic growth (as conventionally measured) brings about an improvement in the quality of life, but only up to a point — the threshold point — beyond which, if there is more economic growth, quality of life may begin to deteriorate."[28]

These observations support the evidence that there indeed is a correlation between subjective welfare and GDP, but it is a somewhat conditional one. It could be argued that people's preferences are "lexicographic" (van den Bergh, 2007). The Maslowian pyramid, or hierarchy of needs, clearly plays a role here. Maslow (1943) argued that people place certain bundles of goods before others: that is, people have basic needs for air, water, food and shelter, to mention a few. These cannot be traded away for luxury goods, or "higher" needs such as recreation or self-fulfilment. The implication of this hierarchy of needs for the argument made in terms of GDP is that at some point, income growth will just stop playing an objective and observable role in people's basic welfare.

3.4.4 Shortcomings of GDP

"By the curious standard of the GDP, the nation's economic hero is a terminal cancer patient that is going through a costly divorce. The happiest event is an earthquake or a hurricane. The most desirable habitat is a multibillion-dollar Superfund site. All these add to GDP, because they cause money to change hands. It is as if a business kept a balance sheet by merely adding up all 'transactions', without distinguishing between income and expenses, or between assets and liabilities."[29]

The above quote, while ironical in tone, elegantly makes the point on how GDP should not be confused with human welfare. Following the conceptual division in Figure 2, in the following we first set out some of the more economic deficiencies in GDP, followed by a wider realm of deficiencies related to living conditions. As most of these points will be picked up again during the following chapters of this study, their discussion here will be left to a minimum.[30]

➤ *Shortcomings of GDP — Economic Measures*

Some elements in GDP, like depreciations, were above identified not to be useful for welfare in any respect. The same could be said to the net difference between GDP and GNI/GNP, i.e. the impact of the net income going to foreigners. Simplifying a complex argument, often an income that does not stay in the country is not welfare enhancing for domestic people (although some indirect positive externalities of that income may accrue domestically).[31] Some further central shortcomings of GDP from an economic perspective include, yet certainly are not limited to the following:

Informal economy — the informal/underground economy goes uncounted in GDP as it only covers transactions with a (formal) market price. Even within Europe substantial differences remain as to the size of the informal economy, but this problem is obviously less pronounced in the EU than in some parts of the developing world.[32]

Output oriented government production — the role of government is also relevant. There is a difference as to whether one measures the inputs (as GDP does) or the outputs of government services, i.e. the impact and the results. Also, a number of government services in-kind go uncounted in GDP as the Stiglitz-Sen-Fitoussi-Commission in France noted in its final report. While GDP only measures the input price, policies need to be able to be broken into a price and an output in order to assess their impact.

Household and volunteer work — the contribution of "non-market production" such as housework, childcare, care for the elderly and the ill, subsistence farming and other forms of volunteer work have an impact on welfare, however no money changes hands. If volunteer work were to be paid for, and thus included in GDP, it would mean a higher GDP but no change in welfare. But in essence it would only mean higher costs, as all this work would have been done for free anyway (for other motivations than money).

Leisure — in healthy proportions, leisure can certainly be said to contribute to people's welfare. However, from the GDP perspective, there is a clear "opportunity cost" of leisure. Each unit of leisure is a potential but "lost" increase of GDP.

28 Max-Neef (1995), p. 117.

29 Cobb et al (1995), p. 5. A Superfund site is an uncontrolled or abandoned place where hazardous waste is located, possibly affecting local ecosystems or people.

30 Also, it is important to note that the discussion and choice of the shortcomings relates strictly to the notion of "GDP as a sustainable welfare measure", rather than a value judgement by the authors that any of the elements discussed should be included or excluded in GDP.

31 See Annex 6.2 for further details on the differences and calculation. Most countries' rank by GNI per head is similar to that by GDP. One exception is Ireland: its GDP per head is one of the highest in the OECD, but because of large net outflows of investment income, its GNI per head is merely around the OECD average. Its average GNI growth rate over the past decade has also been about one percentage point less than on a GDP basis.

32 See e.g. Schneider (2002).

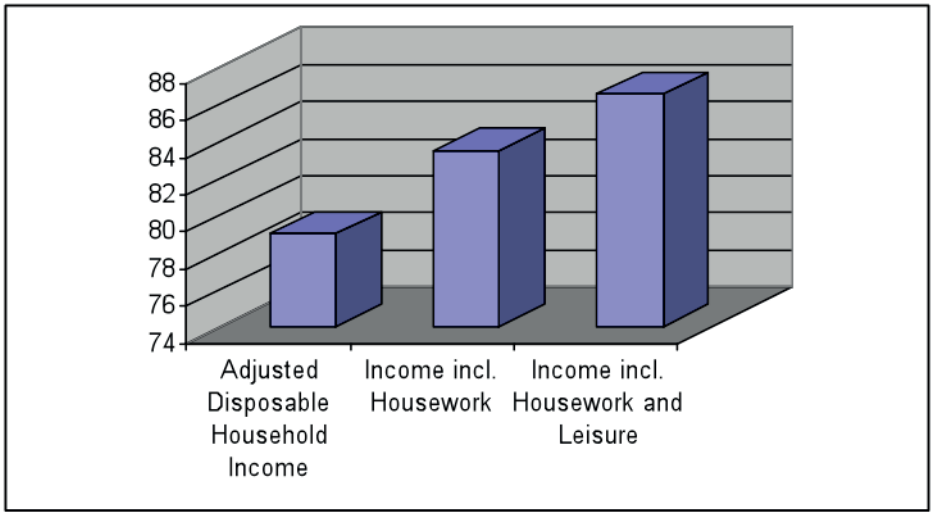

Table 4: Real Income per capita in France vs. USA, 2005, USA=100

Indeed, there is clear evidence of a higher share of government production, leisure and household production in the EU than in the US. The table above, taken from the Stiglitz-Sen-Fitoussi-Commission draft conclusions (p. 34), exemplifies the importance of these elements in welfare, and gives indicative evidence on how real income could change if the impact of household production and leisure was better accounted for. Adjusted disposable household income considers government services in-kind. The next two columns to the right measure the impact of housework and leisure. These calculations are based on the invariance principle, meaning that an imputation is made for the monetary value of the service provided, whether money changes hands or not. Essentially, by including these non-market elements the French Disposable Income levels converge towards the US levels.

Technology — GDP only reflects the value of the end product. It abstracts from changes in technology (e.g. innovative and thus more efficient and environment friendly techniques being used) and from dynamics in capital accumulation, to name a few.

Human Capital — investments in education and health is mostly treated as consumption in GDP, rather than investment. Also, the output from this expenditure is routinely underestimated in GDP.

➤ *Shortcomings of GDP — Living Conditions*[33]

Environmental — Pollution and Resource Depletion — from a sustainable development perspective the presumably single most important "unpriced" realm in GDP are the natural resources.

The former World Bank senior economist Herman Daly (2005) stated that the current national accounting system treats the Earth as if it were a business in liquidation. As GDP records only the transactions but does not capture the changes in the underlying capital the deterioration of this capital will go unnoticed for a long time.[34]

Daly also speaks of 'local economic growth' and 'global uneconomic growth' in this regard. This implies that the externalities encountered are increased consumption of non-renewable resources beyond sustainable yields which increases GDP and current 'growth', while jeopardising future 'growth'.

33 For most of the elements in this sub-chapter, a very insightful "visualization" of the state of the world, especially also with regard to the relationship between GDP and the various factors of well-being, is provided by an institution called Gapminder — www.gapminder.org. For technical and copyright reasons as well as considerations of scope, they cannot be directly presented here.

34 To understand this, consider the following simple analogy of a bank account: imagine you have 1 million euros on your bank account, and you live off the interest payments on these savings, say 5% each period. At some point, you wish to consume more in the present and start withdrawing 10% of the total capital each period. Your current consumption possibilities will rise in the short term (albeit with diminishing returns to scale), but the underlying capital will be deteriorating as you are consuming more than the interest value of 5%. At the end, your capital will converge to zero, and so will your withdrawings.

Health — changes in the health conditions of a society are only reflected in GDP in so far as they increase the costs of the health system. In this regard, a more expensive health care system increases GDP although the basis of this cost growth can be in more advanced techniques, increased life-expectancy, inefficiency, lifestyles, prevention or other reasons for more diseases. The costs and benefits are again not easily identifiable.

Inequality — GDP emphasises average income and in fact implicitly puts higher weight on the expenditures of the wealthy (simply through their bigger share in consumption and investment) rather than focusing on income development of the poor. This was also one of the main criticisms of Amartya Sen (1976) with the measure. One solution currently brought forward by the Stiglitz-Sen-Fitoussi-Commission in France[35] is to start measuring median income rather than average income, which is somewhat better at capturing distributional aspects. However, it is much more cumbersome to implement this since it implies collecting micro-data at household levels, something which the mere averaging out of total GDP escapes.

Crime and Family Breakdown — all forms of social breakdown that involve the input of additional police force (crime), damages to property or lawyers who manage divorces add to GDP as they involve monetary transactions at some point.

This chapter has not pretended to present a complete and holistic discussion of all the possible benefits and shortcomings of GDP. It has merely attempted to mention and depict the main problems and challenges as much as is necessary for the comprehension and presentation of the alternative indicators presented in the following chapter.

35 See final report at ww.stiglitz-sen-fitoussi.fr/documents/rapport_anglais.pdf

4 Assessing alternative 'progress indicators'

This chapter describes best practice of indicators, indices or indicators systems that have the potential to go beyond GDP. They have been selected to cover a wide variety of approaches applied by different actors, including international organisations (World Bank, UNDP), statistical offices (Eurostat, Destatis), civil-society organisations and campaigns (Sbilanciamoci!) or independent think-tanks (new economics foundation, Redefining Progress).

In doing so, the different indicators, indices or indicator systems have been grouped into three different categories: adjusting, replacing and supplementing GDP as the dominant measure of development and societal progress.

1. The category **adjusting GDP** includes those approaches where traditional economic performance measures like GDP or national saving rates have been adjusted by including monetised environmental and social factors.
2. The category **replacing GDP** on the other hand contains indicators that try to assess well-being more directly than GDP, e.g. by assessing average satisfaction (like the Happy Planet Index) or the achievement of basic human functions (like the Human Development Index).
3. The category **supplementing GDP** consists of approaches, which have been designed to supplement GDP. Here GDP is not adjusted or replaced by constructing new indices but complemented with additional environmental and/or social information.

Among the different approaches some, like the Sustainable Development Indicator system, are already established in the EU, while others are not yet officially recognised.

Wuppertal Institute has analysed several indicators through a SWOT analysis. The results of this assessment can be found in the 'boxes' in the text, giving a brief overview including a description of strength and weaknesses inherent to the respective indicator or its application[36]. The profiles also include a description of opportunities and threats, which would arise by applying them at EU level (Wuppertal, 2007). Table 7 at the end of the study gives an overview of the main outcomes of the SWOT analyses in a more schematic way.

36 All text boxes on SWOT analysis are provided by Wuppertal Institute, 2007.

Table 5: SWOT Analysis

SWOT analysis (by Wuppertal, 2007)
SWOT analysis is a pragmatic tool of strategic analysis developed by Albert Humphrey at Stanford University in the 1960s and 1970s. Next to the corporate world it is also used for evaluation and programming (e.g. in EU Structural Funds programmes).

SWOT analysis is a handy and flexible tool which helps to assess internal strengths and weaknesses, but also externally-driven opportunities and threats to development. The combination of strengths, weaknesses, opportunities and threats offers all necessary components for strategic planning. The information generated and sorted in a SWOT analysis is relative, therefore it can only be assessed in a comparison. For a targeted strategic use a SWOT analysis needs to be orientated to an objective, which is in this case the objective of going beyond GDP for a better assessment of sustainability impacts. Thus, SWOTs are:

- Strengths: attributes of a tool that are helpful for going beyond GDP.
- Weaknesses: attributes of a tool that are harmful for going beyond GDP.
- Opportunities: external conditions that are helpful for going beyond GDP.
- Threats: external conditions that are harmful for going beyond GDP.

SWOT analysis groups the analysis into two main categories:

- Internal factors — The strengths and weaknesses of the tool itself (e.g. robustness, validity & reliability, easy or difficult application, intelligibility of concept, data needs, costs)
- External factors — The opportunities and threats presented by the assumed intention to go beyond GDP (e.g. potential benefits for social or economic development, scientific progress, policy-making, popularity, political importance of the concept or tool).

The internal factors may be viewed as strengths or weaknesses depending upon their usefulness for assessing the sustainability. The external factors may include macroeconomic factors, technological change, legislation, and socio-cultural changes, as well as changes in the research landscape.

For the purpose for going beyond GDP correct identification of SWOTs are essential, because subsequent steps in the process of planning for going beyond GDP are to be derived from the SWOTs. For this purpose the following four questions need to be answered:

1. How can EU policy take advantage of the specific strong point of existing tools?
2. How can EU policy design help to overcome the specific weaknesses of existing tools?
3. How can EU policy exploit opportunities for going beyond GDP?
4. How can EU policy reduce threats (risks) for going beyond GDP?

4.1 Indicators 'adjusting' GDP

Indicators 'adjusting GDP' adjust GDP to incorporate a variety of economic, social or environmental factors which are not included in the conventional measure (Jackson *et al.*, 2005). These indicators can better capture living standards and welfare.

4.1.1 Measure of Economic Welfare (MEW) by Nordhaus and Tobin

In their article '*Is Growth Obsolete?*' James Tobin and William Nordhaus called for an *index reflecting consumption rather than production* as this comes closer to representing welfare. They propose to calculate the Measure of Economic Welfare (or Net Economic Welfare) as follows:

MEW = GNP
- – economic 'bads' (pollution control, repairs)
- – regrettable necessities (police services to combat crime, defence)
- + household, illegal production, unreported activities and leisure

Thus, the MEW includes for one a 'reclassification' of GNP to reflect consumption. Secondly, it makes adjustments for some of the 'bads' and 'regrettables' as well as adds some non-market activities into the measure in return. However, Tobin and Nordhaus realized that it is hard to estimate how well individual and collective happiness are correlated with consumption. Therefore, the authors themselves call MEW a 'primitive and experimental' measure of welfare.

However, MEW is worth mentioning, as some important measures (ISEW, GPI) followed shortly were conceptually based on MEW.

4.1.2 The Index of Sustainable Economic Welfare (ISEW) and the Genuine Progress Indicator (GPI)

➤ *Daly-Cobb Index of Sustainable Economic Welfare (ISEW)*

The ISEW was originally developed in the 1980s by Herman Daly and John Cobb and takes into account the links between environment, economy and society.

The adjustments made to GDP are explained in detail in the Annex 6.3. The resulting equation for ISEW[37] is:

ISEW = Personal consumer expenditure
- – adjustment for income inequlity
- + services from domestic labour
- – costs of environmental degradation
- – defensive private expenditures
- + non-defensive public expenditures
- + economic adjustments
- – depreciation of natural capital

Published as an appendix to its book "*For the Common Good*", Cobb calculated the ISEW (omitting leisure) for the US for the period 1950–1986. The results showed that in the fifties GDP and ISEW rose together; in the sixties and seventies, GDP rose rapidly while ISEW rose slowly; and in the eighties, GDP continued to rise rapidly while ISEW declined. When including leisure into the index, the gap between GDP and ISEW increased considerably. Cobb therefore argued that continued orientation of policy to increasing the GDP might damage economic welfare (Cobb, 1998).

37 More detailed information on ISEW, as well as a tool for calculating your own ISEW based on the value one attaches to the several adjustments to GDP, can be found on the Website of Friends of the Earth — http://www.foe.co.uk/campaigns/sustainable_development/progress/

Box 1 Measuring a regional ISEW in Siena, Italy

Pulselli *et al.* (2005) have calculated the ISEW for the province of Siena (Central Italy). After taking adjusted private consumption (which is GDP adjusted for income distribution) as the starting point, positive and negative items were added or subtracted. Doing so, a monetary value was assigned to variables increasing and decreasing economic welfare. The variables used were: services of household labour, consumer durables services, services from public infrastructure, public expenditure on health and education, expenditure on consumer durables, defensive private expenditure on health and education, local advertising expenditure, cost of commuting, cost of urbanisation, cost of car accidents, cost of water and air pollution, cost of noise pollution, loss/increase of wetlands and agricultural land, exhaustible resources depreciation, long-term environmental damage, and net capital growth.

Although this region is known to have a prosperous economy and good environmental conditions, the final ISEW (for the year 1999) was only 63% of the local GDP. This shows that, if applied separately, a good set of economic and environmental indicators is not sufficient to reflect sustainability of human activity.

Using the ISEW, local authorities can evaluate decisions, plans and projects to be implemented in economic terms while considering social and environmental aspects.

➤ *Genuine Progress Indicator (GPI) by Redefining Progress*

The Genuine Progress Indicator, as developed by Clifford Cobb[38], is similar to the ISEW, but incorporates additional elements such as crime, divorce, unemployment and changes in leisure time. Furthermore, it is considered as less complex and more accessible to all people.

It balances the costs and benefits of economic activity and growth and can be calculated as follows:

GPI = personal/household consumption expenditures
- \+ value of household work not counted in GDP
- \+ value of volunteer contribution work
- – crime factor
- – environmental degradation factor (resource depletion, ozone depletion, pollution, etc.)
- – family breakdown factor
- – overextended worker stress factor
- – exploding consumer debt
- – inequality of distribution of wealth and income

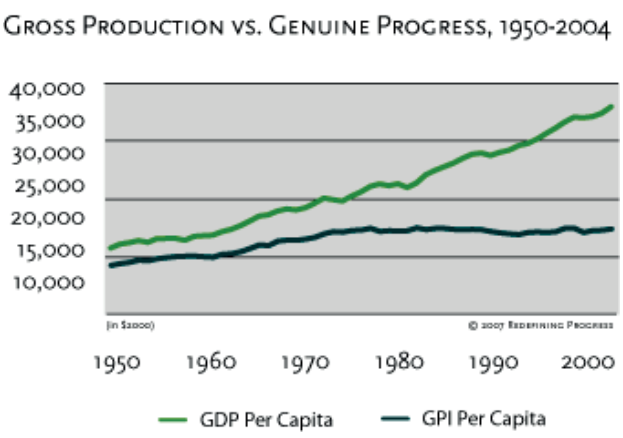

Figure 4: Real GDP vs. GPI (per capita) in US for 1950–2004
This Figure shows how the GDP per capita in the US has grown from 11,672 USD in 1950 to 36,596 USD in 2004, which corresponds to an average annual growth rate of 3.81%. On the other hand, GPI per capita remained near 15,000 USD over the period 1950–2004, growing at a rate of only 1.33%, showing the impact of social and environmental costs on economic growth.
(Source: Talberth *et al.*, 2007)

38 Senior Fellow of the think-tank *Redefining Progress*.

Box 2 SWOT Analysis for ISEW and GPI

Strengths

As a single, monetary measure similar to the GDP, it is comprehensible to the general public, and can easily be related to and compared with traditional GDP data. The GPI provides a more robust measure for assessing Genuine Progress by addressing a series of shortcomings of traditional GDP calculation, although monetarisation is a debated method towards aggregating data into a single indicator. The GPI methodology offers a flexible framework that can and has been extended to incorporate additional aspects over time, reflecting growing data availability or new societal concerns. The GPI has been calculated backwards based on existing data for significant time spans (see Figure 4), allowing to track long-term trends. Comparability across nations is generally possible, but depends heavily on the selection of issues factored into the GPI, and the quality of the basic data.

Weaknesses/Limitations

The selection of criteria and the methods of assigning monetary values to them show a certain degree of arbitrariness, and have indeed varied over time and across studies. Other authors have questioned the mere possibility and merits of quantifying sustainability factors in a single (monetary) unit. Additionally, calculations of GPI rest on estimates and interpolations. This limits the validity of GPI, its comparability across studies and ultimately its policy relevance. While the GPI has successfully been used in civil society campaigns (Talberth *et al.*, 2007), its usefulness for evaluating policy decisions is debated. Its arbitrariness might make the GPI methodology vulnerable for political intervention and biased selection of factors to be included.

Opportunities and threats for successfully going beyond GDP

So far, no systematic attempt has been made for measuring GPI across European countries or on the European level. The GPI addresses several of the key objectives of the EU Sustainable Development Strategy (EU SDS), with a potential to support 'policy coherence' and 'policy integration'. By providing an integrated measure of economic progress and 'social equity and a healthy environment', it could also promote synergies between the EU SDS and the EU Lisbon Strategy.

Developing a measurement methodology for GPI at the European level based on a broad scoping and expert consultation process, potentially including sample calculations, could help to reduce the arbitrariness of the indicator and increase its policy relevance. The structural similarity to the GDP would offer the opportunity to create public awareness for the indicator, especially when linked to policy agendas like the Lisbon Strategy or the EU SDS. The GPI could complement both the Structural Indicators as well as the Sustainable Development Indicators as a single, integrative, top-level indicator.

Box 3 Measuring GPI in Alberta, Canada [1]

Measuring both GDP and GPI shows that a country may rise in GDP while its GPI is declining. In the province of Alberta, Canada, GPI is being measured using 51 indicators covering economic, environmental and social issues[2]. The raw data is converted to indices where for each indicator, 100 is set equal to the benchmark (best) year over the study period and change from that benchmark year is measured as movement towards zero. In a next step, the indicators are combined into three indicators to demonstrate overall trends for economic, societal and environmental well-being, followed by summing them to form one overall Genuine Progress Indicator. Furthermore, the GPI framework also allows the results to be presented in monetary terms by adjusting the GDP.

According to the results of the study, a continuous GDP growth may be coming at the expense of environmental, social and even some economic conditions. Between 1961 and 2003, Alberta's composite GPI indicator declined from a score of 76 to 61 at the same time that the GDP index increased from a score of 17 to 100.

Assessing the current conditions and trends in living and monetary capital through measuring GPI, allows for informing the public and for guiding public policy and strategic planning and budgeting within the province of Alberta. Furthermore, on a broader scale, the 'Environment and Sustainable Development Indicators Initiative' (ESDI) of the Government of Canada, which justifies state services in GPI terms, assigns the Commissioner for the Environment and Sustainable Development to perform the analysis and report to the House of Commons. The ESDI has produced a set of six indicators to track whether Canada's current economic activities threaten the way of life for future generations.

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1 Sources: Taylor, 2005; Taylor, 2006.

2 GPI in Alberta, Canada. http://www.fiscallygreen.ca/gpi/index.php

4.1.3 Green GDP or Green National Accounting

Green GDP is an index of economic growth incorporating the environmental consequences of that growth, including the depletion of natural resources and degradation of the environment. However, ecological or health damage caused by industrial pollution may take years to appear. Furthermore, pollution may not harm locally, close to the enterprise causing the pollution, but may damage more distant areas. Besides, pollution impacts may be aggravated by externalities such as wind or rain (Xiaoqiang, 2004).

As seen from the viewpoint of Boyd (2006), Green GDP is to account for the non-market benefits of nature. However, the practicality and validity of Green GDP are being complicated by the need of putting prices and values on the nature aspects that society benefits from and by the need of calculating the 'units/quantities consumed'. Boyd therefore calls for accounting 'ecosystem services' rather than ecosystem components or processes. In most cases however, the Green GDP is calculated based on the user costs of exploiting natural resources and on the value for the social costs of pollution emissions (IPCC, 2000).

Box 4 Personnel decisions in China are being influenced by Green GDP[1]

In China, point systems tend to determine the careers of (local government) officials, based on targets to be met. Failing these targets is often being considered as "underperformance", even if the official is scoring well in other areas. Important categories are GDP growth, population control and social order.

In 2004, Wen Jiabao[2] announced that the Green GDP index would replace the GDP index itself in personnel decisions of the Communist Party of China. A change from rapid economic growth to a slower (more environment friendly) economic growth might however encounter some resistance from local governments which have benefited from a rapid local economic growth.

According to Ma Zhong[3], calculating pollution costs, and thus Green GDP, implies (1) defining the available pollution capacity of the area/country; (2) putting a price tag on resources and the environment by clarifying the ownership of property rights (in this way land, forest and/or water receives a specific value through lease or trade); (3) divide the maximum permissible pollutants discharge into a certain number of discharge rights which can be sold or auctioned. A market for pollution discharge rights may be established so that these rights could be traded legally. The market, in turn, will determine the price of the environment. GDP is expected to become greener and greener as the resource and environment market are built and improvements to the economic system are being made. A Green GDP target should help to focus official minds on the price of reckless development and environment damaging building projects (Xiaoqiang, 2004).

A first report on Green GDP, released in September 2006 by the State Environmental Protection Administration (SEPA) and the National Bureau of Statistics (NBS), indicates that environmental pollution cost China 64 billion USD in economic losses in 2004, amounting to 3.05% of total economic output that year. In the northern province of Shanxi, a centre of coal production, the environmental costs and natural-resource losses would even be up to 33.4% of its GDP in 2002.

1 Sources: Xiaoqiang, 2004; The Economist, 2005b; Terra Daily, 2006; Zheng *et al.*, 2006.
2 Wen Jiabao, Premier of the State Council of the People's Republic of China.
3 Ma Zhong, deputy director of the Environment and Natural Resources School of Renmin University of China.

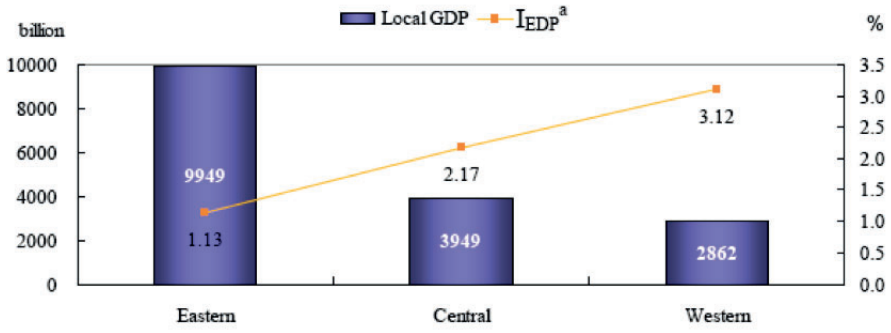

Figure 5: GDP and 'Index of Pollution Adjusted Index to GDP' in three Chinese regions. The percentage of imputed abatement cost to GDP is lowest in the relatively rich Eastern (1.13%) regions, and highest in the relative poor Western regions (3.12%) (Source: Wang *et al.* 2006 — provided by Wuppertal, 2007)

Box 5 SWOT Analysis of Green GDP

The innovative feature of the Green GDP is the envisaged degree of implementation within China's governmental policy framework. So far, no other country has implemented a similarly adjusted GDP as official policy guidance (Jiang, 2004). Civil society expressed positive views about the government's approach to Green GDP calculations. A great number of civil disputes and appeals concerning the environmental situation show that the public is sensitive about the subject and demands action by the government (Jiang, 2007).

Strengths
Green GDP calculations can contribute to raise awareness for sustainability concerns among local officials, who tend to concentrate on their provinces' fast economic development.

Weaknesses/Limitations
The Green GDP faces the usual problems when addressing environmental damage in monetary terms. Due to estimating problems and data availability, the 2004 Green GDP report only focussed on environmental pollution and was not able to take into account depletion cost for mines, forests land, water and wild life and damage to ecosystems (Jiang, 2007). Social and economic issues, e.g. those covered by the Genuine Progress Indicator (like cost of congestion), are not taken into account by the Green GDP.

As no internationally recognised standards for calculating Green GDP exists, the comparability to other indices is low. The SEEA Handbook (UN, 2003) concludes that "there is no consensus on how Green GDP could be calculated and, in fact, still less consensus on whether it should be attempted at all."

China has started to calculate Green GDP with the beginning of 2004, thus data cannot be traced back for many years. The sensitivity of environmental topics in China and the discussion on using Green GDP to evaluate the work of local government officials has led to local resistance towards the release of the report for 2005 (that has indeed been postponed). Discussions also exist between SEPA and NBS, as the NBS doubts the possibility to accurately calculate Green GDP.

The Chinese Government finds itself in another conflict of interests as it realises that the information about natural capital depletion and environmental degradation fuels a critical debate about China's development path (Jiang, 2007). Green GDP is thus still far away from replacing traditional GDP in China as economic growth is still the major focus. This especially holds true for provinces at an early stage of development, here the environmental pollution in relation to the economic growth rate is higher than in further developed regions (see Figure 5).

Opportunities and threats for successfully going beyond GDP
The Chinese experience illustrates the opportunities and threats of institutionally embedding an alternative to GDP. The Chinese Green GDP has received widespread attention. Its envisioned implementation could lead to strong incentives for taking regional and local actions for reducing negative environmental impacts, especially in the Chinese system relying on top-down performance assessment and reward schemes. There is a considerable internal discussion about the methodology and the interpretation of the results is debated. A European Green GDP should thus rest on a tested, established methodology that is transparent and widely accepted.

A focus on selected environmental factors could exclude important issues from the index, and thus reduce their relevance for political decision-making. This concerns both environmental (e.g. biodiversity) and social issues.

4.1.4 Genuine Savings (Adjusted Net Savings) by World Bank

Gross National Savings measures how much the country is investing in future consumption. Genuine Savings (or Adjusted Net Savings) measures net investment ('true savings') in produced, natural and human capital. As it is built on the concepts of green national accounts, it recalculates national savings figures by accounting for depreciation of produced assets, depletion of natural resources, the value of global environmental pollution (including loss of welfare in the form of human sickness and health), and investments in human capital (spending on education is seen as saving rather than consumption as it increases human capital); see Figure 6. Although saving rates do not describe a nation's income, they are important indicators for the development of the national capital stocks determining long-term growth potential (Wuppertal, 2007).

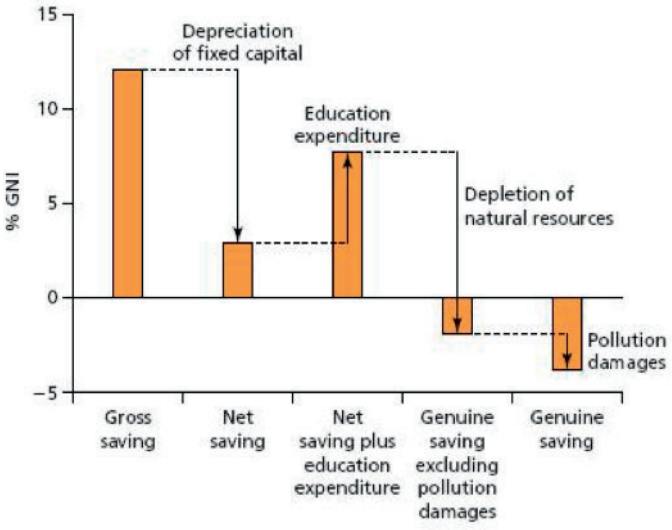

Figure 6: Calculation of Genuine Savings
(Source: World Bank, 2007)

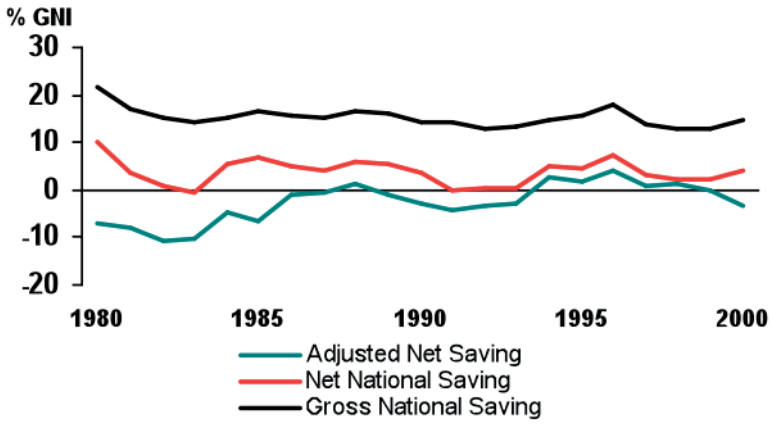

Figure 7: Adjusted Net Saving (ANS) for Sub-Saharan Africa
If ANS > 0, then the country is investing in future consumption. If ANS < 0, then the country is dis-investing its total capital base. If ANS<0 for several years, theory shows that the consumption path declines over time.
(Source: Hamilton, 2004)

The World Bank calculates this figure as a percentage of Gross National Income[39]. The advantage of using this indicator is that it gives a single, clear, positive or negative figure. Persistently negative results are interpreted to mean that a country is pursuing an unsustainable path that will have negative effects on welfare and development in the long run (World Bank, 1997; Everett *et al.*, 1999). Another advantage is that it presents resource and environmental issues within a framework that finance and development planning ministries can understand. Furthermore, it makes the growth-environment trade-off more explicit as negative results occur when a country plans to grow today and to protect the environment tomorrow (World Bank, 2007). Using Genuine Savings measures suggests and makes it possible to explore a series of policy questions that are key to sustaining development. For example the extent to which monetary and fiscal policies, exports of exhaustible resources, stronger resource policies, and pollution abatement measures can boost Genuine Savings rates (Hamilton *et al.*, 1999).

Empirical evidence has shown negative Genuine Savings[40] in a wide range of countries, particularly in Sub-Saharan Africa (see Figure 7). Furthermore, these countries seem to impoverish progressively.

39 Time series for 140 countries for Genuine Savings can be downloaded from the World Bank website: http://go.worldbank.org/8CWDARYMB0

40 The calculations used accounts for resource depletion and CO_2 emissions, for the period 1970-1993.

Box 6 SWOT Analysis for Genuine Savings

Strengths

Genuine Savings is a forward-looking indicator, accounting for changes in capital stocks that will lead to future changes in income. As it takes into account human and natural capital, it provides a more solid picture than traditional saving rates, although a range of factors are missing (see weaknesses). Another advantage is the Genuine Savings' comprehensiveness, as a single, positive or negative figure is providing information of the country's economic, social and environmental development (Everett and Wilks, 1999). Data concerning investment in produced capital, net foreign borrowing and net official transfers can in part directly be obtained from national accounts.

The Genuine Savings approach can be usefully applied as a policy tool, e.g. to encourage resource-rich countries to invest their resource rents in other capital in order to secure a sustainable path, represented by positive Genuine Saving rates (Dietz *et al*., 2006). It also draws attention to investments in human capital and good governance that have emerged as important factors as part of a nation's capital, and consequently income (World Bank, 2006, p. 87).

Weaknesses/Limitations

Certain elements of natural and intangible capital are excluded today due to data availability, including the resources water, fish, local air and soil (World Bank, 2006). While investments into human capital are taken into account, loss of human capital through death or knowledge obsolescence is not considered. Furthermore, Genuine Saving rates do not account for the efficiency of investments made, but merely assess their amounts.

The methodologies for converting environmental and social indicators into monetary variables are debated, e.g. for estimating the damage costs of CO_2 emissions (Everett and Wilks, 1999). As resource depletion is currently valued as 'market prices minus costs of production', the results depend strongly on the various factors affecting market prices, limiting the validity of the results yielded.

Within the context of the European Union, the Genuine Savings rate (also referred to as 'Adjusted Net Savings') is higher compared to the Net Savings (see Figure 8), which may lead to wrong conclusions: as water and local air pollution are not part of it and calculations of CO_2 damage costs are controversial, the amount of industrial pollution generated by EU Member States might not be sufficiently reflected. The estimated saving rates, particularly for developed countries, might thus be too high (Dietz and Neumayer, 2005).

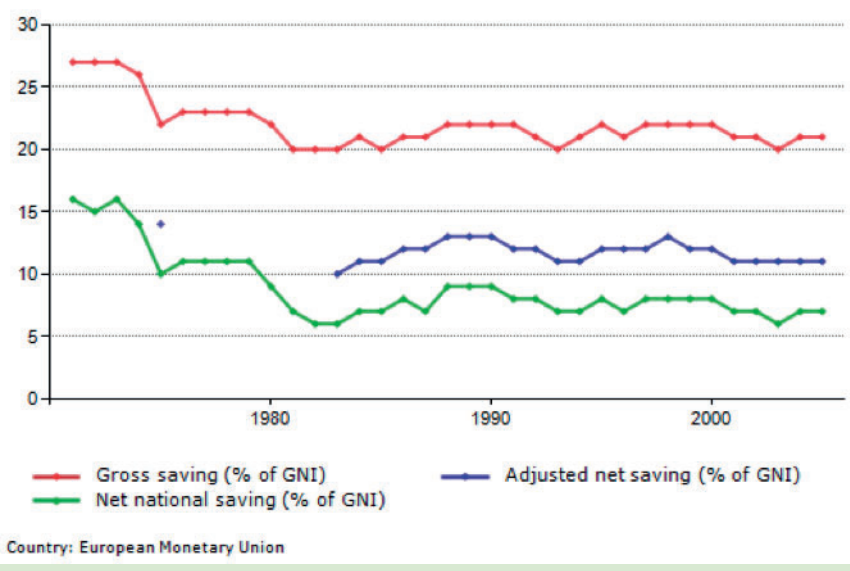

Figure 8: Genuine Savings rates in the countries of the European Monetary Union (Source: World Bank, 2006)

Aggregation into one single indicator is also debated as it assumes 'perfect substitutability', implying that different capital stocks (man-made, natural, intangible) can substitute each other. It can also divert attention from single sustainability challenges by masking complex socio-economic and ecological interlinkages.

Continuation: Box 6 SWOT Analysis for Genuine Savings

Due to these problems, the policy relevance of Genuine Savings might be limited: negative saving rates certainly call for a more sustainable path, but "a positive Genuine Savings score may conceal and distract attention from unsustainable trends" (Everett and Wilks, 1999).

Opportunities and threats for successfully going beyond GDP

The Genuine Saving estimates for countries worldwide in World Bank (2006) include EU Member States, but no further specific calculations seem to have been made. These could be compiled with a refined methodology, reflecting regional specifics and better data availability. Alternatively, collaboration with World Bank could help to arrive at refined, but still internationally comparable Genuine Savings rates.

As human capital investments are included in the Genuine Savings, the indicator could support the Lisbon Agenda of the EU of creating a competitive 'knowledge based economy'. Its integrative treatment of economic, social and environmental factors could foster synergies between the indicators devised for the Lisbon and the Sustainable Development Strategies, working as an integrative headline indicator . As it is forward-looking, it supports long-term thinking and planning as envisioned by these strategies. Genuine Savings data could also be used for country-level assessment of economic, social and environmental progress.

As stated above, a single indicator poses the threat to mask specific, underlying issues. Genuine Savings should thus be supplemented by indicator systems like the structural or sustainable development indicators.

4.2 Indicators 'replacing' GDP

4.2.1 Human Development index (HDI) and Gender-related Development Index (GDI) — UNDP

➤ *Human Development Index (HDI)*

The Human Development Index (HDI) is a composite index measuring the average achievements of a country in three basic dimensions of human development (UNDP, 2004):

- a long and healthy life, measured by life expectancy at birth;
- knowledge as measured by the adult literacy rate (with 2/3 weight) and the combined primary, secondary and tertiary gross enrolment ratio (with 1/3 weight); and
- living standard, as measured by GDP per capita and adjusted for the local cost of living (PPP USD).

Performance in each dimension is expressed as a value between 0 and 1 by applying the following general formula:

$$\text{Dimension index} = \frac{\text{(actual value – minimum target value)}}{\text{(maximum target value – minimum target value)}}$$

The HDI is then calculated as a simple average of the dimension indices. The HDI was created to re-emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth. The HDI is annually reported for 177 countries and relies on international data agencies with the resources and expertise to collect and compile international data on specific statistical indicators.

The HDI can be used to assess national policy choices, to stimulate debate on government policies on health and education, asking why what is achieved in one country is far from the reach of another (for example in case of two countries with a similar level of income but yet with very different human development outcomes, or vice versa). Furthermore, it can also be used to highlight internal disparities within countries, between provinces or states, across gender, ethnicity, and other socioeconomic groupings (UNDP, 2006b).

Box 7 SWOT Analysis for Human Development Index

Strengths

As GDP is one of the indicators considered, the HDI methodology recognises the importance of economic dimensions that might not be sufficiently reflected in indices which do not consider GDP. At the same time, it integrates supplementary information with GDP data.

The HDI is promoted through the annual flagship report of the UN Development Programme (UNDP). It is highly recognised and visible worldwide. Its 'ranking' mechanism is a tool that is easily understood by the public. The indicator has significantly raised awareness for the concept of 'human development' (Bagolin, 2004).

Data for calculating the HDI is widely available. It can thus be calculated for a large range of regions and countries alike, and the results are roughly comparable across different countries.

Weaknesses/Limitations

The HDI does not cover ecological aspects of sustainability, and it is being criticised for not appropriately considering other aspects of human development, e.g. neglecting political and civil issues (Bagolin, 2004). The topics included might also not be assessed properly, e.g. literacy or enrolment in formal education is only one dimension of 'knowledge'. By relying on traditional GDP data, the limitations of this indicator are also present in the HDI.

Data reliability is a challenge for many developing countries, as the required data suffers from incomplete coverage, measurement errors and biases (Bagolin, 2004).

As the Human Development Index has been designed for assessing development in developing countries, the explanatory power on EU level will be limited. For capturing differences on a higher level of development, there is a need for a more complex indicator (Bagolin, 2004). Additionally, the selectiveness of issues included and its methodological weaknesses reduce its policy relevance.

Opportunities and threats for successfully going beyond GDP

Initiated by the UNDP to increase discussion about human development in developing countries, the HDI might be best suited for application in EU cooperation and trade policy. This would also add to the index' credibility and increase its public perception. The EU and the UNDP could also work together to further develop the index and address its main shortcomings. The index also broadly corresponds with the UN Millennium Development Goals.

However, due to its lack of complexity and completeness, e.g. regarding environmental aspects, the HDI cannot replace other measurements of sustainable development. It could still provide an example for constructing and establishing a composite indicator that attracts widespread public attention for an issue, responding more specifically to European challenges and policy agendas.

➤ *Gender-related Development Index (GDI)*

Despite the fact that the HDI incorporates social issues such as longevity and knowledge, it does not take into account gender equity. The Gender-related Development Index (GDI) takes note of inequalities between any two groups. The two groups considered can in this case be 'male' and 'female'. The indicator can be seen as an adjustment of the HDI components in the following way (Saith *et al.*, 1998):

- Longevity: use of an indicator reflecting mortality rates in younger age groups is preferred. Therefore, the indicators 'female male ratio' for different age groups (0-4 years and 5-9 years) can be used as a more appropriate gender-sensitive indicator of 'being healthy'.
- Knowledge: Since the majority of the population in developing countries is under 15, a reversal of weights — so that adult literacy accounts for 1/3 and the average enrolment for 2/3 — might be more appropriate.
- Income: the share of income earned by men and women is derived by calculating their wage as a ratio to the average national wage and multiplying this ratio by their shares of the labour force. Therefore, its result is based both on the ratio of female wages to male wages and on the female to male ratio of the labour force. However, it does not aim to reflect women's access to income for consumption or other uses: women earning money may not have any control over it within the household, or women not earning any money could, in principle, control what is earned by male members

of the household. Furthermore, the indicator could be replaced by an indicator reflecting time allocation by using an indicator which captures the differential in the number of hours (paid and unpaid) that males and females work.

Saith *et al.* highlight the importance of comparing HDI and GDI to assess the extent of gender inequality. This can be done using the following formula, as used by the UNDP:

$$\text{Gender Inequality Value (GIV)} = \frac{\text{HDI} - \text{GDI}}{\text{HDI}} \times 100$$

A low GDI does not necessarily mean a high GIV. Ireland for example, despite its high overall development (a high GDI and a high HDI), has a much higher gender differential (GDI) than Tanzania, which scores low on both HDI and GDI.

4.2.2 Ecological Footprint (EF) and Happy Planet Index (HPI)

➤ *Ecological Footprint (EF) — WWF and the Global Footprint Network*

The **Ecological Footprint** (EF) is a resource accounting tool which measures the extent to which the *ecological demand* of human economies stays within or exceeds the capacity of the biosphere to supply goods and services. The EF measures how much land area (*'how many planets?'*) is required to sustain a given population at present levels of consumption, technological development and resource efficiency.

The main components of the EF are land used for crops, animal products, fisheries, forest products, built-up land and the land needed to absorb and sequester CO_2 emissions from fossil fuels. The EF measures the final consumption attributable to the residents of a country/region, whether or not the impacts of that consumption occur inside or outside the boundaries of that country/region. The footprint of a country should be understood as a measure of its consumption, and its worldwide environmental impact. For this reason, a country's EF can be significantly larger than its actual biocapacity. According to a report from WWF, global EF has more than tripled between 1961 and 2003.

In a similar way, the **Earth's biocapacity**, its biologically productive area — its *resource-supply*, can be calculated. In 2001, Earth's biocapacity was around 11.2 billion hectares or 1.8 global hectares per person (assuming that no capacity is set aside for non-human species). However, humanity's global EF was 13.7 billion global hectares, or over 2.2 global hectares per person (gha). Therefore, the EF was exceeding the biocapacity by 0.4 global hectares per person, or 23%. This means that the planet's living stocks are being depleted faster than nature can regenerate them. Some graphs illustrating these numbers are to be found in Annex 6.4. For Europe, these numbers are: an EF of 4.8 global hectares per person versus a biocapacity of 2.2 global hectares per person for 2003 (Global Footprint Network, 2006; WWF, 2006).

Countries with ecological deficits (or 'ecological debt') use more biocapacity than they control within their own territories. Ecological creditor countries have footprints smaller than their own biocapacity. Taking a typical calendar year, the *nef* [41] has calculated that the world has gone into 'ecological debt' on 23 October 2007, causing long-term environmental degradation.

The concept of EF is useful for developing and assessing future scenarios related to different policy options. It provides a tool for evaluating success or failure of policies and gearing them into a more sustainable direction. Possible scenarios have been brought forward by WWF in their '*Living Planet Report 2006*'.

As can be seen in Figure 9, the **carbon component of the EF** — indicating the amount of nature's limited regenerative capacity required to sequester and absorb CO_2 — has grown much faster than any other EF component, increasing more than nine fold since 1961 and now comprising about half the total ecological demand.

Subtracting from total Earth's biocapacity (which is about 1.8 gha per person) all what is required to support our dietary needs and built-up land use, only 1.0 gha per person is available for carbon sequestration. Looking at the per capita Carbon Footprint of Europe, only Latvia is living within its global fair share with 0.45 gha. The highest per capita Carbon Footprint is found in Luxemburg (6.88 gha) (Thomson *et al.*, 2007).

For practical reasons, it is easier to measure the Carbon Footprint than the total Ecological Footprint (due to data availability and reliable measuring techniques). At this stage, the Carbon Footprint might therefore be a more appropriate tool to use within policy-making than the EF.

41 nef, The new economics foundation, http://www.neweconomics.org/gen/

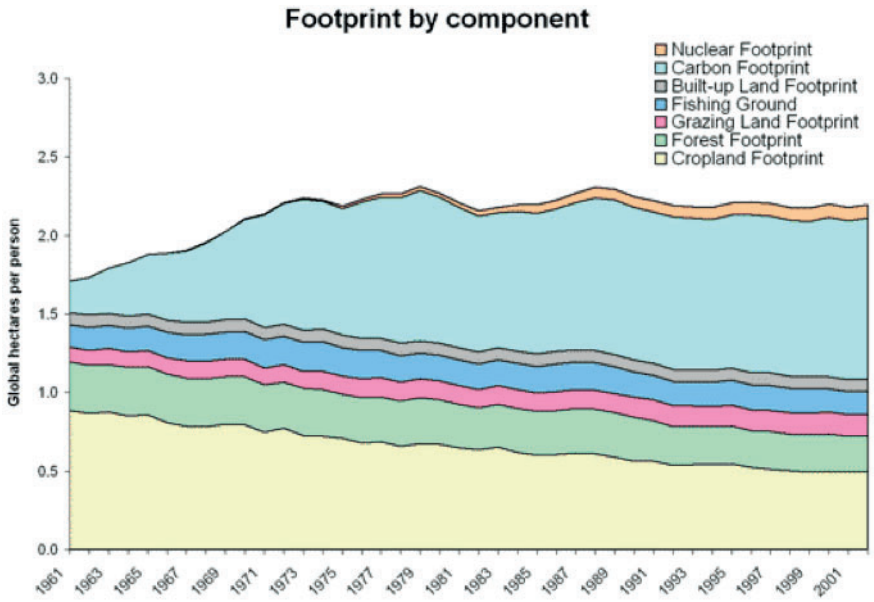

Figure 9: The components of the world's average EF per person
(Source: Global Footprint Network, 2006)

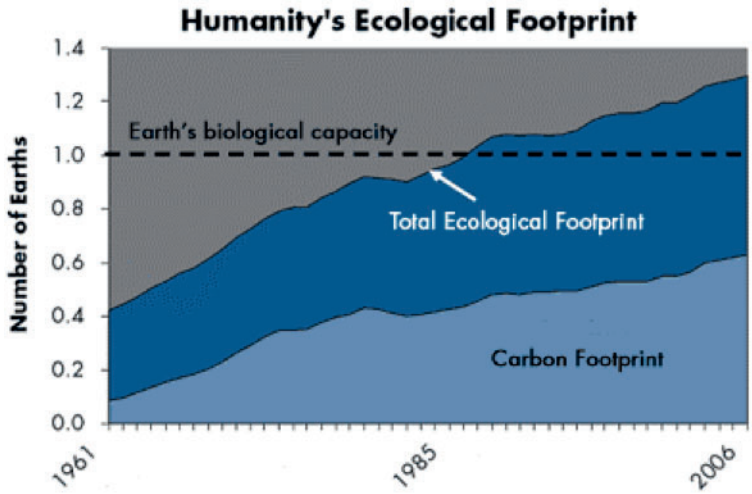

Figure 10: Ecological Footprint, carbon component and Earth's biocapacity
(Source: Global Footprint Network, 2006)

Figure 10 shows that the biosphere does not have sufficient capacity to sequester all the carbon we are currently emitting. Reducing the Carbon Footprint is therefore an important policy direction to follow. However, this must be done in a careful, footprint-neutral manner, and not simply by transferring demand from one EF component to another.

Box 8 Ecological Footprint as a 'real progress indicator' in Wales[1]

In January 2000, the Wales Government launched a consultation document, including a proposal for developing a set of headline indicators for sustainable development. The EF, as brought forward by WWF Cymru, was formally adopted as one of the headline (and only global) indicator for the National Assembly's overarching Sustainable Development Scheme '*Learning to Live Differently*' in March 2001, making the Assembly the first administration in the world to use EF as an indicator of 'real progress'.

The total EF of Wales was found to be 15,468,887 area units, which equates to 5.25 area units per capita, far exceeding the average sustainable 'earthshare' of 1.9 area units. If everyone on the planet consumed as much as the Welsh, around 1.75 additional Earths would be needed to support global demand. The Welsh per capita EF is then compared to the available biocapacity of Wales, which is 6,729,313 area units in total or 2.29 area units per capita. Assuming only minimal space is set aside for other species, then an area about 2.5 times bigger than Wales would be needed to sustainably support current Welsh lifestyles.

In a next step, the EF was used to develop scenarios on a 10 year time frame based on predicted or estimated consumption patterns, illustrating the potential effects of current National Assembly policies and proposals. Areas covered are: electricity consumption and generation; rail and road modes of transport; and waste materials production and management options.

Results for the 2010 scenario targets[2]:

- Electricity: although consumption is expected to rise by 5%, the change in generation methods will reduce the EF of Wales' electricity supply by 4%.
- Passenger and freight transport: although a shift away from car travel and road freight towards more environment friendly transport modes are expected, the predicted increase in the demand for personal travel and freight transportation will increase the EF for passenger and freight transport by 16% and 42% respectively.
- Waste: in a first scenario, recycling and composting targets are achieved, but household waste continues to rise. However, the landfill volume decrease allows for a total 13% decrease in EF for waste management. In a second scenario, recycling and composting targets are met and household waste production decreases, resulting in a total reduction of the waste EF by 40%.

The scenarios presented illustrate how EF analysis can be used to assist in the development and monitoring of sustainability strategies.

1 Source: WWF Cymru, 2002.
2 See Report on The Footprint of Wales. http://www.wwf.org.uk/filelibrary/pdf/walesfootprint.pdf

➤ *Happy Planet Index (HPI) — new economics foundation*

The Happy Planet Index, introduced in July 2006 by the new economics foundation (*nef*) and measured for 178 countries, is an index of human well-being and environmental impact. The indicator shows the ecological efficiency with which the well-being is delivered. It is based on two objective indicators, life expectancy and Ecological Footprint per capita, and one subjective indicator 'life satisfaction'. Multiplying longevity and the subjective life satisfaction, you get the 'degree to which people live long and happily in a certain country at a given time', also called *Happy Life Years (HLY)*. The Ecological Footprint (EF, see also Chapter 4.2.2) measures the extent to which the ecological demand of human economies stays within or exceeds the capacity of the biosphere to supply goods and services. The data sources for this indicator are:

- UN Human Development Reports for 'life expectancy';
- the World Database for Happiness for 'life satisfaction' by R. Veenhoven; and
- the Global Footprint Network for the 'Ecological Footprint'. [42]

The formula for calculating the final HPI is[43]:

$$\text{Happy Planet Index} = \frac{\text{Life expectancy} \times \text{Life satisfaction}}{\text{Ecological Footprint}}$$

42 Sources: http://hdr.undp.org/, http://www.worlddatabaseofhappiness.eur.nl/ and http://www.footprintnetwork.org/
43 Standard statistical transformations due to variations in the variables Happy Life Years and Ecological Footprint need to be added. See "The Happy Planet Index report" for more info.

The HPI is *not* a measure of which is the happiest country in the world; it is a measure of *the environmental efficiency of supporting well-being* in a given country. It strips the view of the economy back to its absolute basics: what we put in (resources), and what comes out (human lives of different length and happiness). It reflects the average years of happy life produced by a given society, nation or group of nations, per unit of planetary resources consumed. The highest average score is being achieved in Central America; the G8 countries generally score badly in the index (Marks *et al.*, 2006).

The (global) target for HPI was set by the *nef* at 83.5 (on a scale from 0 to 100), based on attainable levels of life expectancy and well-being and a reasonably sized EF.

Box 9 SWOT Analysis for Happy Planet Index

Strengths

The HPI considers the actual 'ends' of economic activity in the form of life satisfaction/happiness and longevity. It thereby goes beyond GDP, which includes a variety of factors that might increase as well as decrease well-being, and thus provides only limited information about the well-being of citizens in a given country. The HPI is also innovative as it combines well-being and environmental aspects.

The scheme for calculating the index is simple and easily understandable by both political actors and the public. The indicators 'Ecological Footprint' and 'Life Expectancy' can be applied to different countries; hence a comparability of results is given regarding these inputs. Data for life satisfaction, life expectancy and EF (partially) is online available[1], although some data gaps remain, especially related to the environmental footprint.

As the index is a mixture of 'soft' (life satisfaction) and 'hard' (life expectancy, Ecological Footprint) criteria, it accounts for individual circumstances affecting people's well-being, while at the same time assessing the overall state as well as the resource use of countries.

Weaknesses/Limitations

'Happiness' or 'life satisfaction' are very subjective and personal issues, leading to three main implications:

1. Measuring 'happiness' is a complex issue and thus debated among social scientists (Lord Layard, 2006). Regional specifics, e.g. the low happiness ratings in Eastern Europe, might also be explained by cultural factors, e.g. a tendency of the national 'psyche' to be more melancholic. However, self-declarations on satisfaction levels seem to be reasonably stable (Frey and Stutzer, 2006).
2. The policy relevance of targeting 'happiness' can be debated. The impact of political actions on happiness is complex, and many other factors contribute, some outside of the scope of political actions. This limits the usefulness of happiness as a measure for evaluating policy measures. The HPI does not consider social and economic criteria that could shed light on the direct relationship between political action and happiness (e.g. health, education).
3. The title of the index has led to misunderstandings. The index has been misunderstood by the media as well as by other think-tanks as being an index to measure pure happiness of nations. However, the index also includes longevity and environmental factors[2].

Opportunities and threats for successfully going beyond GDP

The HPI could be a tool to measure progress on the European Sustainable Development Strategy (EU SDS), as it integrates the target of "improvement of quality of life" and the challenge to "manage and use resources efficiently". As a direct measure of well-being, it could complement the Sustainable Development Indicators (SDI). This would imply that indicators for life expectancy, happiness and resource use would have to be chosen that are compatible with the SDI. The index would thus allow an assessment regarding the 'quality of life' goal in the EU SDS. The HPI also relates to the social cohesion dimension of the Lisbon agenda.

The EU has recognized the need for a mental health strategy (European Commission, 2006). In a survey published in 2006, 40% of citizens declare social or work problems, a problem field directly linked to the HPI. The European Union Foundation for the Improvement of Living and Working Conditions is currently releasing its first study on quality of life, and provides an online collection of related indicators[3]. Approaches linked to the HPI could be used in this context to link satisfaction with resource use as an integrated measure of sustainable well-being.

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1 See: World Database of Happiness and the 'Global Footprint Network'.
2 http://www.cato-at-liberty.org/2006/07/13/vanuatu-islands-of-fire-or-heaven-on-earth/
3 http://www.eurofound.europa.eu/areas/qualityoflife/eurlife/index.php

The Pacific archipelago of Vanuatu scored the highest HPI with 68.2; while the lowest HPI is 16.6 for Zimbabwe. No country achieved an overall high score and no country does well on all three indicators. More results and graphs can be found in Annex 6.5.

The *nef* have also compared HPI with Gross Domestic Product per capita (GDP)[44]. Initially, HPI rises sharply as GDP rises, with a peak at a GDP of 5000 USD (± 14 USD per day). Afterwards, HPI declines further and further as GDP increases.

➤ *Quality of life index*

The Economist Intelligence Unit has developed a new 'quality of life' index based on a unique methodology that links the results of subjective life-satisfaction surveys to the objective determinants of quality of life across countries. The index has been calculated for 111 countries for 2005.

The nine quality-of-life factors and the indicators used in the survey are: material well-being (PPP GDP per capita), health (life expectancy at birth), political stability, family life (divorce rate), community life, climate and geography, job security (unemployment rate), political freedom, and gender equality. The results indicated that Ireland, Switzerland and Norway had the highest quality of life while Tanzania, Haiti and Zimbabwe had the lowest. The EU15 average score was around 15th place in the list of countries (The Economist, 2005a).

➤ *Gross National Happiness*

Box 10 Gross National Happiness in Bhutan

The Gross National Happiness indicator (GNH), similar to the HPI, was brought forward by the King of Bhutan, Mr. Jigme Singye Wangchuck. The concept of GNH considers economic development not to be an end in itself but as one of the many means to achieve Gross National Happiness. Happiness should not be seen as a purely individual responsibility; collective happiness should be addressed directly through public policies in which happiness becomes an explicit criterion in development projects and programmes. (Thinley, 2005).

Therefore, Bhutan has set up four policy-bundle priority areas: sustainable and equitable socio-economic development; conservation of environment; preservation and promotion of culture; and promotion of good governance.

Continuation: Box 10 Gross National Happiness in Bhutan

The concept of GNH has become a guiding force for day-to-day economic and political decision-making in Bhutan. Its commitment to GNH has allowed Bhutan to both expand its network of roads and increase its forest cover. Furthermore, moral and ethical values were placed at the core of its economic strategies for ensuring better food, housing and health.

Research is currently being done to create GNH indicators in the following fields: living standard, health, education, ecosystem health (diversity and resilience), community vitality, time use and balance (leisure vs. work), cultural vitality and diversity, emotional well-being (depression, psychiatric condition, alcoholism, etc.) and good governance.

4.2.3 Environmental Sustainability Index (ESI) and the pilot Environmental Performance Index (EPI)

The **Environmental Sustainability Index (ESI)**[45] is a composite index tracking a diverse set of socioeconomic, environmental, and institutional indicators that characterize and influence environmental sustainability at the national scale. The ESI covers natural resource endowments, past and present pollution levels, environmental management efforts, contributions to protection of the global commons, and a society's capacity to improve its environmental performance over time. The ESI is based on 5 building blocks — environmental systems, reducing environmental stress, reducing human vulnerability, social and institutional capacity and global stewardship — comprising in total 21 underlying indicators (Esty *et al.*, 2005).

Commitment to environmental indicators and greater emphasis on statistical analysis might strengthen environmental problem solving at the national policy level. The same approach could enhance decision-making at the global scale, the local level, in corporations, and even within households. Although imperfect, the ESI helps to fill a long-existing gap in environmental performance evaluation. The ESI also provides a way for ranking countries and identifying those governments that are at the leading edge with regard to any particular issue. This information is useful in identifying 'best practices' and may help to guide thinking on what it will take to make policy progress. The ESI can also serve as a tool for achieving global-scale policy goals, such as the 7th MDG aiming at "Ensuring Environmental Sustainability".

44 Graphs: see "The Happy Planet Index report", p22.

45 The ESI was released in Davos, Switzerland, at the 2005 annual meeting of the World Economic Forum.

The pilot **Environmental Performance Index (EPI)** provides benchmarks for current national pollution control and natural resource management results by identifying specific targets for environmental performance and measuring countries' achievements to these goals. Cross-country comparisons are facilitated through the issue-by-issue and aggregate rankings. The EPI thus provides a powerful tool for improving policy-making and shifting environmental decision-making onto firmer analytic foundations.

The EPI focuses on 2 broad objectives: reducing environmental stresses on human health and protecting ecosystem vitality. To do so, the EPI tracks 16 indicators in 6 policy categories: environmental health, air quality, water resources, biodiversity and habitat, productive natural resources and sustainable energy. In June 2007, the report "the Pilot 2006 Environmental Performance Index" was released by Yale University. The top three countries were New Zealand, Sweden and Finland (Esty *et al.*, 2006) [46].

4.2.4 Regional Quality of Development Index (QUARS) — Sbilanciamoci!, Italy47

In the year 2000 the campaign Sbilanciamoci! published the first report on regional development quality (QUARS). The report challenged established indicators, first of all the GDP. Meanwhile 5 reports applying the QUARS methodology have been published.

Unlike GDP, QUARS does not only represent a single quantitative dimension of development, but it is an index of variables that represent quality of development. QUARS consists of 45 environmental, social and economic variables in seven groups:

1. **Environment**: assessment of the environmental impact of production, distribution and consumption and proper steps taken to mitigate negative impacts.
2. **Economy and labour**: working conditions and income guaranteed by the economic system and redistribution policies.
3. **Rights and citizenship**: social inclusion of young people, the elderly, underprivileged people and immigrants.
4. **Equal opportunities**: absence of gender-based discrimination in economic, political and social life.
5. **Education and culture**: participation in the school system, quality of the service, education of the population, cultural demand and supply.
6. **Health**: quality and efficiency of the service, proximity and general health of the population.
7. **Participation**: political and social participation of citizens.

The aggregation method starts with a normalization of values. This method has also been used to construct other composite indicators. The composite indicator is based on the normalized scores for each indicator which equal the difference for each region in relation to the mean value, divided by the standard error. This method is more robust when dealing with outliers than the building of a linear scale, but it does not entirely solve the problem (see text Box: weaknesses). After normalisation the mean values of each indicator are aggregated to "macro-indicators". The mean value of the "macro-indicators" is the final QUARS. The choice of the variables, decided after a consultation process, assigns implicitly the weights given to the different aspects of sustainability. An illustration of the results can be found in Annex 6.6.

The Italian campaign Sbilanciamoci! is supported by 46 associations and networks of Italian civil society. It has proposed alternatives to the Italian budgetary policies, promoting alternative social and environmental priorities. During six years, the campaign has elaborated research tools and critical analysis that are the basis of its information, lobbying and mobilisation activities.

Meanwhile, Sbilanciamoci! has published 20 national reports, has organised 19 congresses and conventions, has promoted 180 local initiatives, such as seminars or debates, has collected more than 30,000 signatures supporting state budget proposals and introduced 57 amendments to the budgetary legislation through Italian Members of Parliament.

46 More information on ESI and EPI can be found n the websites of Yale university http://www.yale.edu/esi/ and http://www.yale.edu/epi/

47 Source: Wuppertal, 2007.

Box 11 SWOT Analysis for QUARS

Strengths

QUARS is probably best practice in representing and encouraging public participation. In official indicator-based reporting this is an aspect which is often neglected. QUARS is also a tool for awareness-raising on environmental and social implications of development models taking into account knowledge and values of the participating individuals and organisations.

QUARS has been adopted by regional governments in Lazio (the region of Rome) and Tuscany in their documents for economic planning (DPEFR — *Documento di Programmazione Economica e Finanziaria Regionale*) demonstrating the possibility of applying QUARS for public regional reporting.

QUARS is based on open source data, mostly available online. Database and worksheets are published on the Sbilanciamoci! website.

Weaknesses/Limitations

QUARS has not been designed to indicate quality of life. For this purpose it would have to measure the happiness of an individual or a group, which can be influenced by factors beyond the quality of regional development.

A considerable restraint is the limited availability of non-conventional data e.g. on public participation or a fair economy. In some cases there is a gap between the development model defined by civil society and the available data.

The lack of an explicit weighting methodology during the aggregation process might appear as being somewhat arbitrary.

Like other aggregated indices, QUARS does not directly indicate in which domain (social, economic or environmental) a region is doing well or not so well. Only the disaggregated analysis can reveal whether good or bad performance is due to the social, economic or environmental situation of a region.

QUARS does not identify distance-to-target. Therefore, QUARS does not permit to determine a region's performance in absolute terms, but only in relation to the other regions taken into consideration. As a consequence, it is not possible to build QUARS time series of a region. Only the rank position of a certain region can be followed over time.

Another problem that can be remedied, however, is linked to the possible presence of outliers[1]. As mentioned above the method adopted is more robust when dealing with outliers than the applying a linear scale, but it does not entirely solve the problem, because the range between the minimum and maximum scores varies for each indicator.

Opportunities and threats for successfully going beyond GDP

The political impact of QUARS depends highly on the process for its definition. A vision of development emerges from the choice of the variables and from the weights implicitly assigned. The vision is validated by a participatory process setting the development priorities: the wider the network and the consultation process, the stronger the definition of quality of development borne by the index. A similar process of a "democratic validation" might also be considered for the development of the EU sustainability indicators.

Sbilanciamoci! expects from local authorities to intervene on all aspects addressed by QUARS. In this way the QUARS is meant to support decision-making on each "macro-indicator" as well as each of the 45 variables. During the coming years it remains to be seen to which degree QUARS will guide the decision-making of the regional government of Lazio and Tuscany, which have adopted the index.

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1 Outliers are values that stand out since they are a far way away from the rest of the data.

4.3 Indicators 'supplementing' GDP based on national accounts systems — *Greening the national accounts*

National accounts are a coherent, consistent and integrated set of macroeconomic accounts; balance sheets and tables based on a set of internationally agreed concepts, definitions, classifications and accounting rules. They provide a comprehensive accounting framework within which economic data can be compiled and presented in a format that is designed for purposes of economic analysis, decision-taking and policy-making. In practice data is compiled for a succession of time periods, thus providing a continuous flow of information[48].

Recent revisions of the System of National Accounts (SNA) have tried to widen the scope of the conventional national accounts to incorporate data and indicators relating to environmental and social factors. In its *Handbook of National Accounting* of 1993, the UN proposed that countries should adopt integrated environmental and economic accounting, aiming at setting up 'satellite accounts' to complement the collection of conventional economic data (Jackson *et al.*, 2005)[49].

Environmental Accounts (EA) are a tool to analyse the links between the environment and the economy at EU, national, regional and industry level. EA can be used to link current production and consumption patterns with the degradation of natural resources; and to analyse the effects of economic policy measures (environment-related taxes, subsidies, current expenditures and investment at industry level). The different modules of the EA system can be broken down by industry at country level to allow for a more in-depth analysis (see further Chapter 4.3.2 "NAMEA").

Within the EU, Eurostat — together with the European Environment Agency (EEA), the European Commission and other international institutions — encourages and co-ordinates the compilation of EAs in the different Member States in the following areas:

- Asset accounts: forests, subsoil assets, land and water.
- Emission accounts (NAMEA): air emissions and energy use, water use and pollution, waste and other aspects such as expenditures, taxes, land, etc.
- Material flows: economy-wide material flow accounts and physical input-output tables.
- Environmental economics: environmental expenditure, environment industry and environment taxes.

Together with the interested Member States, Eurostat has undertaken a lot of environmental accounts development work and has established specialised Task Forces. The Eurostat Task Force on Forest Accounting, for example, developed a framework for Integrated Environmental and Economic Accounting for Forests (IEEAF) and a set of tables covering monetary and physical balance sheets for land and standing timber, economic accounts for forestry, monetary and physical supply-use tables, material balances and tables describing non-market environmental functions of forests (Eurostat, 2000).

The new **System of Integrated Environment and Economic Accounting (SEEA)** is a hybrid accounting system which integrates environmental pressures and economic activities. These accounts are intended to be an adjunct to rather than a modification of the core SNA. An increasing number of countries have implemented the revised *Handbook of National Accounting: Integrated Environmental and Economic Accounting 2003* as a satellite system of the SNA[50].

An overview of the main accounting systems and their characteristics can be found in the Annex 6.8.

4.3.1 System of integrated Economic Environmental Accounts (SEEA)

The System for integrated Environmental and Economic Accounting (SEEA) is a satellite system of the SNA and comprises 4 categories of accounts[51]:

1. Data relating to flows of pollutants and materials (resources and energy). Data in physical and monetary terms is combined to produce so-called "hybrid" flow accounts. For example: emissions accounts for greenhouse gases (see further: NAMEA).
2. Environmental protection and resource management accounts. For example: an account of expenditures made by businesses, governments and households to protect the environment.
3. Natural resource assets measured in physical and monetary terms which allow monitoring stock changes over time. The changes that occur during the period are divided into those that are the result of economic activity and those that are the result of natural processes. For example: timber stock accounts.

48 Source: OECD Glossary of statistical terms, http://stats.oecd.org/glossary/index.htm

49 The term "satellite accounts" was introduced to describe accounts "orbiting" the standard System of National Accounts (SNA) (Wuppertal, 2007).

50 This Handbook was published in 2003 by the United Nations, European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development and World Bank (UN *et al.*, 2003).

51 Source: OECD Glossary of statistical terms, http://stats.oecd.org/glossary/index.htm

4. Environmentally adjusted macroeconomic aggregates (following valuation of the environmental damage and resource depletion arising from economic activities). For example: 'defensive' expenditures.

Figure 21 in Annex 6.7 shows how the SEEA introduces nature's environmental and economic assets and the 'environmental cost' of their degradation and depletion into the SNA.

The hybrid accounting framework allows for a more compatible and transparent indicator selection. **Monetary indicators** — such as environmentally-adjusted Net Domestic Product, capital formation or value added — measure sustainable economic activity and growth. Within this 'capital approach' the costs of produced and natural capital consumption is being deducted from conventional economic indicators. The **physical indicators** present material flows and stocks, notably natural resource inputs and outputs of pollutants and wastes. They measure environmental pressure and refer, therefore, to environmental performance. They can be linked to economic performance indicators, notably GDP, as ratios of material intensity or resource productivity. Time series of these ratios indicate the linkage or delinkage ('decoupling') of environmental impact from economic growth. The material flow accounts do not capture ecological concerns such as biodiversity loss and changes in environmental quality of ecosystems, but these can be compiled in additional indicators. Furthermore, the SEEA does not (yet) incorporate social and/or institutional issues (Pinter *et al.*, 2005).

➤ *Applications of environmental accounts*[52]

UN *et al.*, (2003) have identified two main applications of environmental accounts to support policy-making. **Development of sets of indicators and descriptive statistics**, for example, can be used:

- to monitor material and energy flows throughout the economy over time;
- to identify the most important sources of pollution and the causes for change;
- to monitor the amount environmental protection expenditure and the use of economic instruments over time and relate them to specific economic sectors; or
- to monitor the physical stock of natural resources over time and relate them to the economic value.

It is thus important to monitor the performance of environmental management and policy, even without fully accounting for damage costs.

More **specific analysis** might include the use of economic models to e.g. analyse the influence on certain taxes on the environment as well as the economy as a whole. These are just some examples and the potential for policy-making is thus large. The best practice examples below will give some more specific examples on how the different types of accounts and analysis are used for policy-making.

➤ *SEEA — Best practice*[53]

Although work on SEEA has proceeded well in the past 15 years, there is still a lack of a UN statistical standard. However, the UN statistical commission has recently (2005) established a committee of experts on environmental-economic accounting to foster work towards this end to further advance the implementation of SEEA in countries.

Within Europe a number of statistical offices, including Eurostat, have established environmental account units and have started to implement the SEEA. There are, however, differences in the extent to which the various forms of environmental accounts of the SEEA have been implemented at the country level. In Germany the systems of environmental-economic accounts (GEEA — see further) established by the Federal Statistical Office is relatively well advanced. Among the different types of environmental accounts which are used in frameworks such as the GEEA, the NAMEA type tables for air emissions and energy use, as well as economy-wide material flow accounts and environmental expenditure accounts are the most advanced at the European level. A more elaborated assessment of GEEA (and as such also of SEEA) can be found in paragraph 4.3.3.

4.3.2 National Accounting Matrix including Environmental Accounts (NAMEA)[54]

The National Accounts Matrix including Environmental Accounts (NAMEA) serves as a framework for presenting the contribution of industries and households to a variety of environmental concerns (emissions to air, waste water, and waste) compared to their economic performance. Some Member States have included environmental expenditure, environment taxes, the use of natural resources (e.g. energy or water use) and land use in their NAMEA framework.

52 Source: Wuppertal, 2007.

53 Source: Wuppertal, 2007

54 http://reports.eea.europa.eu/brochure_2007_1/en/NAMEA%20flyer.pdf

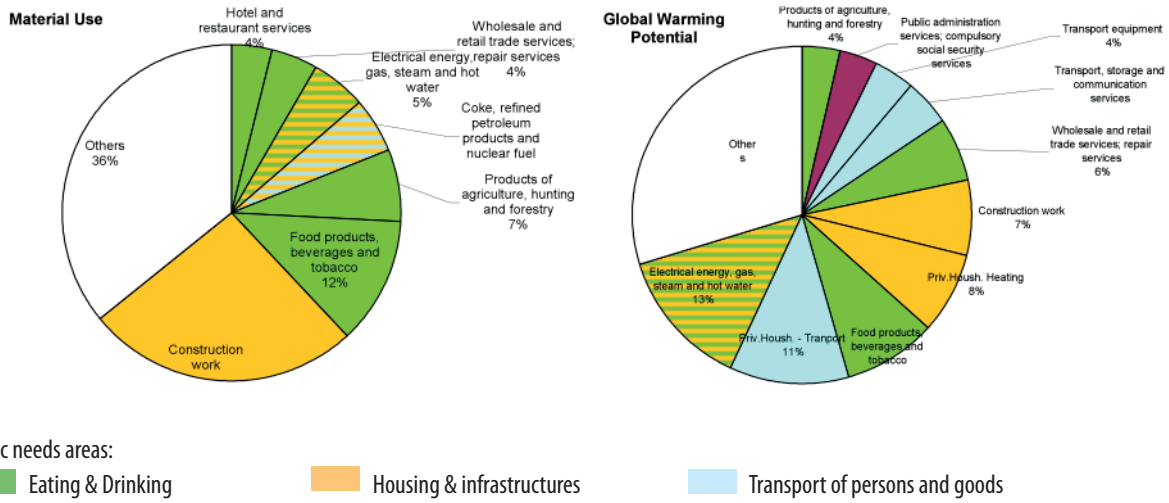

Figure 11: Material Use and Global Warming Potential caused by European Consumption (Source: EEA forthcoming)

The NAMEA accounting system was developed by Statistics Netherlands at the end of the 1990s and has since then been applied in various EU countries. The framework is based on conventional economic input-output matrices (national inventories of monetary flows between economic sectors and final consumers). These inventories are then extended by adding information on material resource inputs to each sector and the pollutants they release back into the environment (EEA, 2007). This allows to trace environmentally relevant flows throughout the production-consumption system and to identify environmental hotspots within the system (Wuppertal, 2007).

➤ *Application of NAMEA: EU level* [55]

The European Environment Agency (EEA) and its European Topic Centre on Resource and Waste Management have recently completed a project using NAMEA for a number of European countries which addresses questions such as:

- Which are the economic sectors in the EU contributing most to environmental pressures?
- Which goods and services in the EU cause the main direct and indirect environmental pressures?
- Are some countries better than others at providing goods and services efficiently?
- Is international trade leading to a shift of environmental pressures from the EU to the rest of the world?
- Have recent development in production and consumption helped to decouple environmental pressures from economic growth?

The analysis revealed that out of a total of 31 economic sectors only a few are directly responsible for the majority of environmental pressures. In terms of Global Warming Potential, for example, the electricity, gas and water supply sector, the agricultural sector and the transport, storage and communication sector account for over half of the total emissions by all economic sectors.

Analysis on the consumption side revealed that it is the demand for products meeting basic needs (eating and drinking, housing and infrastructure, and transport) which is causing the majority of environmental pressures (see also Figure 11).

➤ *Application of NAMEA: national level*

To show as an example of their practical use on national level, Statistics Norway has set up NAMEA accounts to calculate, amongst others, the *emission intensity* of various specific industries[56]. This is being done through dividing the specific emissions from an industry by its respective value added (production less intermediate consumption), measured as emissions in tonnes per NOK value added. Lower emission intensity means more emissions efficient. This can be achieved through a decrease in air emissions and/or an increase in economic value added.

55 Source: Wuppertal, 2007

56 Statistics Norway, http://www.ssb.no/english/subjects/09/01/nrmiljo_en/

Box 12 SWOT Analysis for NAMEA

Strengths

NAMEA is especially useful to support policy design and analysis in the area of sustainable consumption and production (SCP). It allows to gain detailed insights into the environmental implications of production as well as consumption and to identify environmental hotspots in the system.

The methodology usually used in NAMEA-based analysis is environmental input-output analysis, which goes back to Leontief´s work of the late 1960s. The methodology is well established, sound, transparent and replicable and is enshrined in the SEEA handbook on integrated environmental and economic accounting.

NAMEA-based analysis is comprehensive covering the production and consumption system. It allows approaching environmental issues both from the production side (e.g. environmental pressure generated by industries) as well as the consumption side (e.g. focussing on the life cycle wide environmental pressures generated by the consumption of certain products).
NAMEA is fully compatible to the System of National Accounts (SNA), which provides the basis for calculating GDP. This compatibility allows for integrated analysis of monetary and physical flows. As environmental input-output analysis is well established, it is a well-documented and a replicable methodology.

Weaknesses/Limitations

The methodology focuses on the environment-economic aspects of sustainable development, but does not include social aspects. Data requirements are large and currently data availability is limited, both in terms of regional scope (countries for which NAMEA-type tables are available) and in terms of time series data (most recent year available is 2000). The methodology employed is not necessarily easy to understand for those unfamiliar with environmental input-output analysis.

Opportunities and threats for successfully going beyond GDP

The methodology could be used in support of European and national policy-making in the area of SCP. Data availability, however, is a serious constraint and needs to be improved.

4.3.3 German Environmental Economic Accounting (GEEA)

Environmental-economic accounting shows in statistical terms which natural resources are used, consumed, depleted, or destroyed by economic activities (production/consumption), and what expenditure is done or necessary for countermeasures. Statistical data have to be provided for the main categories: sources of pressures on the environment, state of the environment and environmental protection measures (Destatis, 2002).

The GEEA focuses on three aspects of the relationship between the environment and the economy: pressures, states and responses. The modules of the GEEA are structured accordingly; in addition, they also include more sector specific modules (see Figure 12).

The modules are organized in form of satellite accounts and are implemented on the basis of the conceptual proposals of the SEEA (Wuppertal, 2007).

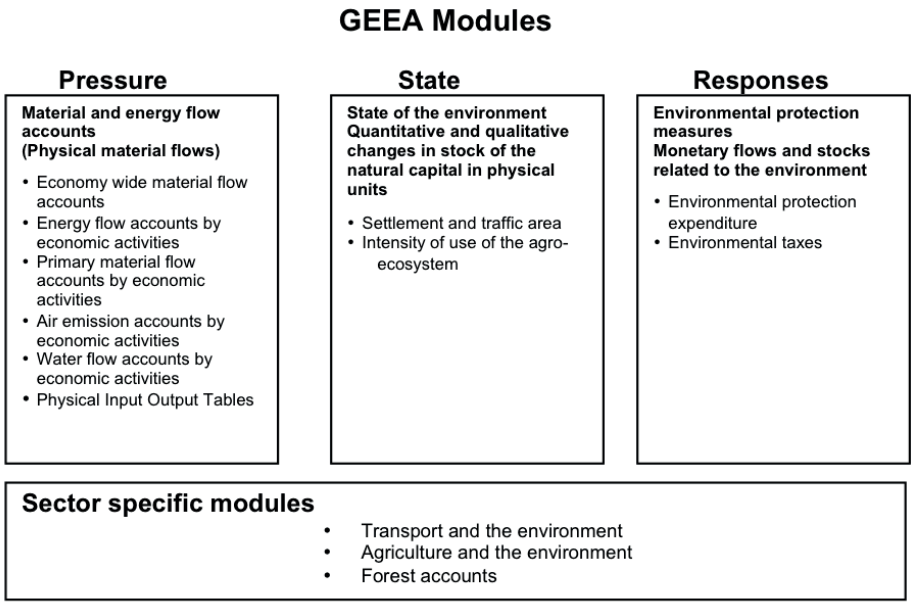

Figure 12: Modules of the GEEA (Source: Destatis, 2006)

➤ *NAMEA breakdown*

All, but one, indicators within the GEEA system are available in a NAMEA-type breakdown by economic branches and private households (production and consumption). The data in the module on Primary Material Flow Accounts (PMFA) for example can be used to analyse the relationship between the development of the indicators and the causing economic activities (*diagnosis*). Furthermore, on the basis of such an analysis macroeconomic measures can be developed to improve the efficiency of the use of raw material (*measures*) (FSO, 2005).

4.3.4 System of Economic and Social Accounting Matrices and Extensions (SESAME)

The System of Economic and Social Accounting Matrices and Extensions (SESAME)[57] is an information system that integrates economic, social and environmental data. It is a statistical information system in matrix format, from which a set of core economic, environmental and social macro-indicators can be derived. It is achieved through coupling of Social Accounting Matrix (SAM) and NAMEA.

57 SESAME, developed by Statistics Netherlands.

Box 13 SWOT Analysis for GEEA

Strengths

The GEEA is product of considerable, long-term pioneering efforts at the Federal Statistical Office of Germany (Destatis). The GEEA provides some of the most comprehensive data sets on the interaction between the environment and the economy at the national level (Destatis, 2007). It is based on the SEEA, fully compatible with the German National Accounts and is already used to support policy advice in the area of sustainable development.

With regards to sustainable development, the GEEA is highly policy relevant. It can be used at all stages of the policy cycle. It has been instrumental in the development, design and monitoring of the German sustainable development policies. GEEA indicators have been developed in support of the German Strategy for Sustainable Development e.g. on energy productivity, raw materials productivity, greenhouse gas emissions, housing and transport and air pollution (Destatis ,2006).

The data availability is quite high. Annual statistics are available for the whole of Germany from 1991 onwards for energy, emissions, water and wastewater and environmental taxes; and for materials, raw materials and land use from 1994 onwards. For material and energy flows data is also available at the Länder-level from 1994 onwards. Results of the GEEA are published annually in a comprehensive report, which is available at the Destatis website.

The reliability of the data is also relatively high. The GEEA is based on available environmental and economic statistics, which are supplemented in certain cases by estimates.

Weaknesses/Limitations

While the SEEA integrate the environmental and economic aspects of sustainable development, they do not consider the social aspects and are thus to some extent limited in providing encompassing sustainability information.

Although they have considerable potential for policy-use, the SEEA are still primarily a system for experts with interest in statistics. They are not very popular and rather complex. There might be a tendency of developments which are primarily guided by interest in perfection rather than policy demand. This indicates a need of more popular processing and application of the information generated. The complexity of the systems might have also contributed to the fact that SEEA systems have only been developed by a few countries. All in all, the practical application and dissemination could be improved.

Opportunities and threats for successfully going beyond GDP

The GEEA is organized as a satellite accounting system in accordance with the SEEA. It is thus supplementing rather than replacing the conventional system of national accounts.

Due to its focus on the environment-economy linkages, the GEEA does not include social aspects. However, for this purpose the Federal Statistical Office of Germany has established a separate satellite accounting system.

The Federal Statistical Office of Germany advocates the use of the data provided by GEEA for modelling. It is not engaging in modelling exercises itself, but providing the data for scientific institutions. Data of the GEEA have, for example been used in conjunction with economic models for forecasting and the modelling of sustainability scenarios (e.g. introduction of an eco-tax in Germany) (Schoer, 2006).

The values are broken down into monetary changes and volume changes to allow linking monetary and non-monetary data. Furthermore, SESAME can be expanded with a range of supplementary tables which are not incorporated into SAM and NAMEA, e.g. time accounts, labour accounts, socio-demographic accounts, etc.

The SESAME can for example be used to evaluate environmental performance across different household types (grouping the households according to income, age and housing and measuring environmental performance as emissions and repercussions for the greenhouse effect). Using a modelling framework by combining family budget statistics, input-output tables, energy flow matrices, various types of emissions and associated environmental effects, differences in household types can be related to differences in household consumption pattern and to differences in environmental performance.

SESAME datasets allow deriving summary indicators (such as GDP, population size, inflation, income inequality, environmental indicators, social indicators, socio-economic indicators, etc.). These indicators will always be computed from a single, fully consistent statistical system; and use the most suitable measurement unit of the phenomenon it describes.

Furthermore, the indicators derived from SESAME can be disaggregated in order to get an insight into the reasons for the development of the specific indicator and the interrelationships to other topics of the set. However, SESAME does not say anything about sustainability goals, or whether one country is on the sustainable path or not (Mulalic, 2004).

4.4 Indicators 'supplementing' GDP setting social and environmental information in relation to GDP

4.4.1 Sustainable Development Indicators (SDI)

The EU Sustainable Development Strategy (SDS) — which was adopted by the European Council in June 2001 and renewed in June 2006 — aims to reconcile economic development, social cohesion and protection of the environment. Monitoring progress towards this overarching goal is an essential part of the Strategy. Eurostat is currently revising the set of indicators to be used.

➤ *European Parliament resolution on the revised SDS*

In its resolution[58] of 15 June 2006 on the revised SDS, The European Parliament asked for balancing the emphasis placed on GDP in measuring progress in society by an equal concern about the qualitative aspects of growth. Parliament therefore called for a limited set of key sustainability indicators that would allow quantitative and prompt assessments of health (quality and distribution of health care, life expectancy, child mortality, etc.), awareness (education and culture, ICT access, etc.), inclusion (participation in society's decisions and social capital, etc.) and environmental quality (air and water pollution, etc.).

➤ *The SD Indicators[59]*

The SDIs are based largely on the work of a group of national experts within a so-called SDI Task Force. "*With a view to harmonisation and rationalisation, the SDI Task Force made maximum use of existing indicator initiatives, such as those of the UN Commission on Sustainable Development and OECD, the Structural Indicators, the Laeken indicators, indicators monitoring the Cardiff integration process (agriculture, energy, transport), and the core set of indicators of the European Environment Agency*" (CEC, 2005).

Based on the policy priorities of the SDS, a hierarchical theme framework was developed. Table 6 shows an evaluation of recent changes in several headline indicators. For grouping the altogether about 155 SDIs, Eurostat has proposed a multi-layer system with 3 levels:

- The 1st level contains headline indicators for initial policy analysis and monitoring progress towards headline policy objectives. It is meant for high-level policy-makers and the general public and includes the GDP. The 10 themes used are: economic development, poverty and social exclusion, ageing society, public health, climate change and energy, production and consumption patterns, management of natural resources, transport, good governance and global partnership[60].
- The 2nd level indicators support evaluation of core policy areas and more detailed monitoring of progress in achieving headline objectives. They are constructed for policy-makers and the general public.

58 http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2006-0272+0+DOC+XML+V0//EN

59 Source: Wuppertal, 2007.

60 More information can be found on the Eurostat website http://epp.eurostat.ec.europa.eu/

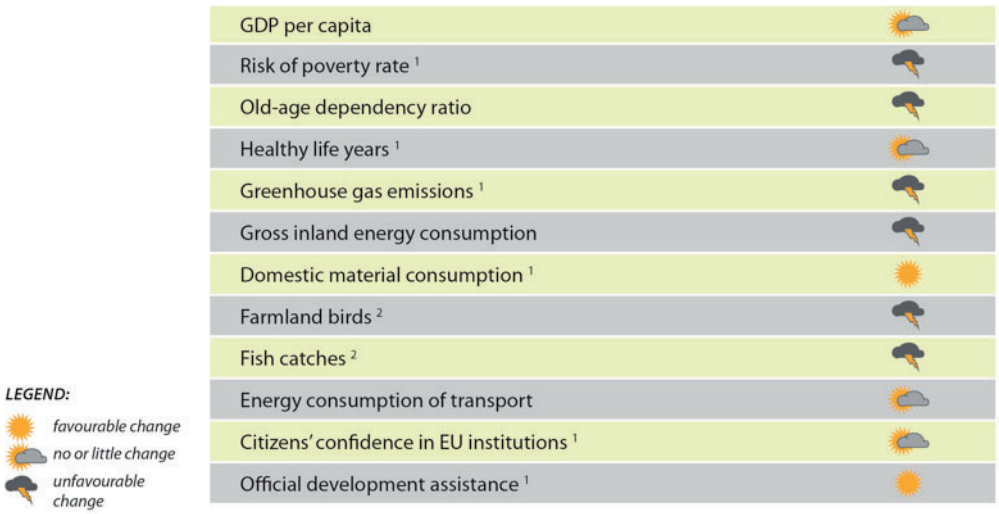

Table 6: Summary evaluation of recent changes in headline indicators (EU25)
(Source: Eurostat, 2005)

- Finally, the 3rd level is supposed to be used by a more specialized audience (e.g. academic community) in further policy analysis and better understanding of the trends and complexity of issues associated with the themes or interlinkages with other themes in the SDI framework.

Box 14 SWOT Analysis for SDI

Strengths
The Eurostat SDI and the publication "Measuring progress towards sustainable development" (Eurostat, 2005) represent best practice in sustainable development reporting. It is comprehensive, well-structured, intelligible and illustrated with many graphs.

In the report Eurostat assessed trends against policy objectives to inform the general public and decision-makers about achievements, trade-offs and failures in attaining the objectives of the strategy. The SDI framework is supposed to provide a clear and easily communicable structure for assessing policies: "Tight policy linkages assure strong user relevance and effective utilisation of indicators in decision-making" (Eurostat, 2005, p. 9).

Weaknesses/Limitations
In contrast to indices like the HDI or the GPI, the SDI are not aggregated in order to provide general direction in a single comprehensible measure. With more than 150 indicators it is quite difficult to get an overview.

As 'GDP per capita' is accepted as a headline indicator, the shortcomings of the GDP are carried into the SDI.

Opportunities and threats for successfully going beyond GDP
For the general public is not clear why the European Union has developed both the Lisbon and the Sustainable Development Strategies with indicator systems (the Structural Indicators and the SDIs respectively) for monitoring social, environmental and economic developments. For improving policy coherence there are three options:

- the relation of both strategies and corresponding indicator system needs better and transparent justification; or
- one strategy and indicator system needs to be abolished; or
- both systems merge into a comprehensive overarching strategy and indicator system for (sustainable) social, economic and environmental development.

4.4.2 Decoupling indicators[61]

The term decoupling refers to breaking the link between "environmental bads" and "economic goods". This is usually expressed by relating GDP ("economic goods") to indicators of environmental pressure ("environmental bads") (see Figure 13).

Decoupling occurs when the growth rate of an environmental pressure is less than that of its economic driving force (e.g. GDP) over a given period. Decoupling can either be absolute or relative. Absolute decoupling occurs when the environmental pressure is stable or decreasing while the economic driving force is growing. Decoupling is relative when the environmental pressure is still increasing, but less than the economic variable.

The decoupling concept has however *no automatic link* to the environment's capacity to sustain, absorb or resist pressures of various kinds (deposition, discharges, harvests). A meaningful *interpretation* of the relationship of environmental pressures to economic driving forces will require additional information (OECD, 2003).

Decoupling can be measured by decoupling indicators that have an environmental pressure variable for numerator and an economic variable as denominator. In addition, decoupling indicators can also be constructed to examine other relations, for example between environmental pressures and population depending on the focus of interest.

Many of the variables that feature in decoupling indicators also appear in the concepts of resource efficiency, resource intensity, and resource productivity. For example, resource efficiency and resource intensity are calculated as ratios of resource use to economic value-added, while resource productivity is the inverse ratio (OECD, 2003).

Decoupling environmental pressures from economic growth is one of the main objectives of the EU Sustainable Consumption and Production policies (SCP), which are supposed to "promote sustainable consumption and production by addressing social and economic development within the carrying capacity of ecosystems and decoupling economic growth from environmental degradation". For this purpose the Commission proposed in 2008 a European action plan on SCP. It built upon ongoing initiatives and instruments both at EU and international level. Decoupling was also at the heart of the OECD Environmental Strategy for the First Decade of the 21st Century, adopted by OECD Environment Ministers in 2001.

61 Source: Wuppertal, 2007.

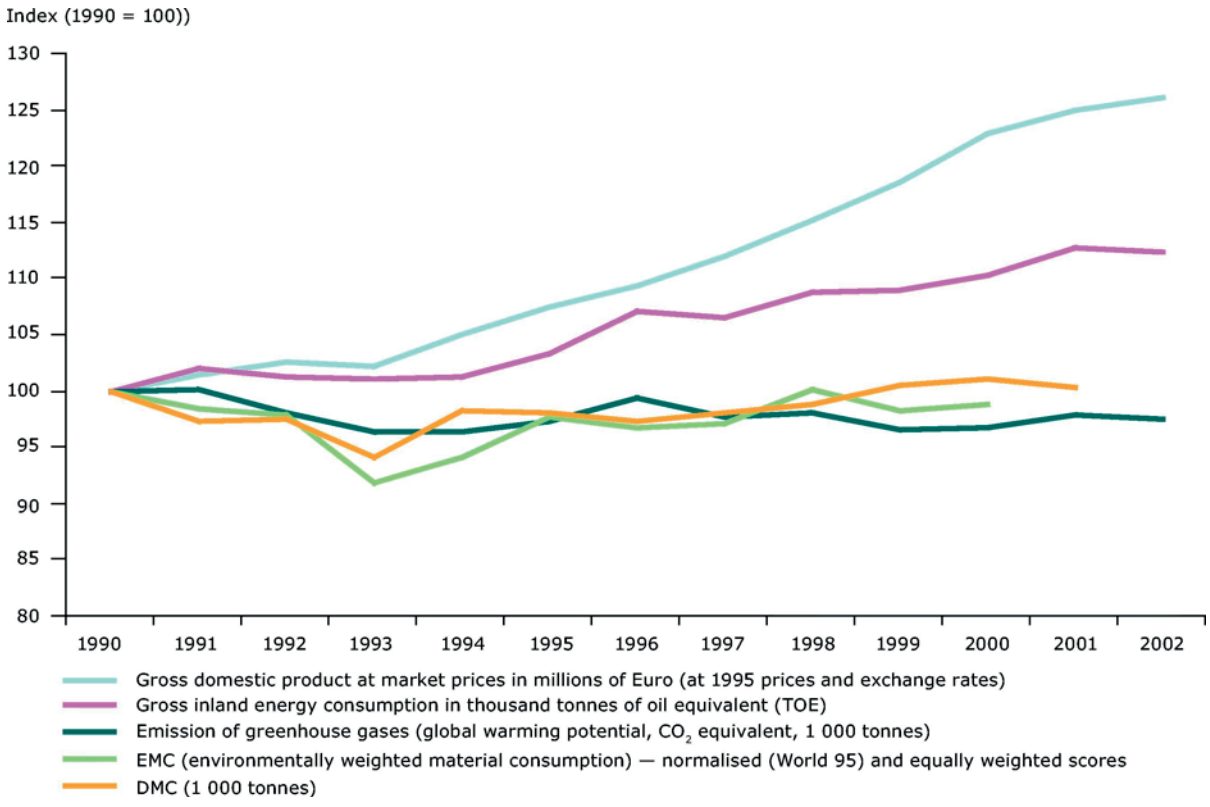

Figure 13: Relative decoupling of resource use and economic growth in the EU15

Box 15 SWOT Analysis for decoupling indicators

Strengths

Visualizing decoupling usually means putting the development of GDP and pressure indicators in one figure. It is therefore a simple and straightforward methodology. It can be applied to different kinds of environmental pressures and also to social indicators (e.g. by relating GDP growth and employment). Decoupling also sheds empirical light on the often fuzzy concept of qualifying the growth of an economy. For example, decoupling of Domestic Material Consumption (DMC) and GDP (see figure above) indicates that it is possible to generate economic growth by consuming less natural resources, in other words a (relative) dematerialization of the economy is already taking place in the EU15[1]. The same can be said about the emission of greenhouse gases.

Some indicators can be decomposed to highlight the extent to which various factors (e.g. technological factors, structural changes) have contributed to reducing or adding to environmental pressures in recent years. They can thus be used to analyse past developments to inform future decision-making. Modelling the decoupling concept can also be used to assess whether or not different measures can lead to a desired qualified growth.

Weaknesses/Limitations

Decoupling indicators show whether a specific environmental pressure is linked to economic development. They do however not explain the reason for a coupling or decoupling of indicators. Coupling and decoupling can depend on a variety of environmental, social or economic reasons, which require careful analysis.

Opportunities and threats for successfully going beyond GDP

A decisive choice for successful application of the decoupling concept is the choice of the pressure indicators and a correct interpretation of how (relative or absolute) and why decoupling takes place. Substitution effects and a shifting of environmental burden also need to be considered. In the EU, for example, overall material consumption of natural resources is (relatively) decoupled from economic growth (see figure above). This positive development cannot only be explained by an increase of resource efficiency, but is also due to the fact that material intensive extraction and production processes are increasingly shifted towards regions outside of the EU.

1 For more detail see Schepelmann *et al,*. 2006.

4.4.3 Political and civil freedom indicators — Freedom House, US[62]

The latest 'Freedom in the World' survey deals with the year 2006 and was developed and conducted by the US-based NGO Freedom House Inc. It assesses the situation in 193 countries and 15 related and disputed territories. Each country report provides information about population, capital, political rights (numerical rating), civil liberties (numerical rating), status (free, partly free, or not free), and a ten-year ratings timeline (no longer included in this section is data on Gross National Income (GNI) per capita, life expectancy, religious and ethnic groups). The territory reports leave out capital. The political rights and civil liberties categories contain numerical ratings between 1 and 7 for each country or territory, with 1 representing the most free and 7 the least free. The research and ratings process involved 29 analysts and 16 senior-level academic advisors, the indicator is being generated annually (Freedom House, 2007).

The sub-themes covered within the categories 'political rights' and 'civil liberties' are:

- Political rights: electoral process, political pluralism and participation, and functioning of government.
- Civil liberties: freedom of expression and belief, associational and organisational rights, rule of law, and personal autonomy and individual rights.

62 Source: Wuppertal, 2007.

Box 16 SWOT Analysis for political and civil freedom indicators

Strengths

The impact of political rights and civil liberties on a person's well-being is often neglected by indicators. The qualitative reports of the Freedom House Indicator provide a complex insight into a country's or territory's development. To secure a high degree of objectivity, the indicator is not a government performance rating but is based on individual opportunities according to the Universal Declaration of Human Rights (Freedom House, 2007). A qualitative approach can distinguish between causes and symptoms much better than a quantitative one. Additionally, the indicator includes a numerical ranking that is suitable for a quick assessment of and comparison between different countries. The publication of sub-scores, introduced with the survey for 2005, offers further information on the numerical level. By dividing the world's countries into three categories concerning their status of freedom a very comprehensive classification is being used. Still this method can be criticised (see weaknesses). The ten-year-ratings timeline offers a long-term development surveillance not all indicators can provide (World Bank, 2007).

Weaknesses/Limitations

The political and civil spheres covered by the Freedom House Indicator represent only part of a nation's development. Although correlations between political and civil issues with economic variables exists (World Bank, 2007), economic, social and environmental outcomes themselves are not included in the index.

While the criteria applied are based on the Human Rights Declaration, the scores for political rights and civil liberties are based on expert judgements, and subjectivity can thus not be excluded.

Due to the fact that only three different categories of freedom status are used (free, partly free, not free), a differentiation between countries on this level of the evaluation is difficult. The indicator cannot be used on a supranational level as its methodology can only be applied to political territories.

To deduce policy guidance from the indicator is neither its purpose nor easily manageable as individual freedom can be restricted by governmental as well as non-governmental influences. If there is any policy guidance it is that of a general promotion of democracy (Freedom House, 2007).

Opportunities and threats for successfully going beyond GDP

While being referenced by studies such as the UN Human Development Report (UNDP, 2002) the Freedom House Indicator is relatively unknown in the public. An integration of the tool in EU indicator frameworks would have to be preceded by a discussion of its relevance.

As all EU Member States rank similarly (all assessed as being 'free'), an evaluation of differences between states is difficult and could only be undertaken on sub-category levels. In this context the 'Freedom of Press' indicator, equally provided by The Freedom House, shows more differentiation, judging some European countries being only 'partly free'. Information given by the Freedom House Indicator might be linked to the process for evaluating possible new EU accession candidates.

4.4.4 Millennium Development Goals (MDGs)

The Millennium Development Goals (MDGs) were officially established at the Millennium Summit in 2000 where 189 world leaders adopted the UN Millennium Declaration[63], agreeing to act to halve global poverty by 2015. Out of this Declaration, eight MDGs were highlighted which provide a framework for development planning for countries around the world, and time-bound targets by which progress can be measured (UN MDG, 2007a).

These eight MDGs to be met by 2015 are (UN MDG, 2007b):

- Eradicate extreme poverty and hunger.
- Achieve universal primary education.
- Promote gender equality and empower women.
- Reduce child mortality.
- Improve maternal health.
- Combat HIV/AIDS, malaria, and other diseases.
- Ensure environmental sustainability.
- Develop a global partnership for development.

To help track progress on the commitment made, international and national statistical experts selected relevant indicators[64] to be used to assess progress over the period from 1990 to 2015, when targets are expected to be met.

63 United Nations Millennium Declaration, 18 Sept. 2000, http://mdgs.un.org/unsd/mdg/Resources/Static/Products/GAResolutions/55_2/a_res55_2e.pdf

64 A list of the 48 selected indicators can be found on http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Indicators/OfficialList.htm

Goals and Targets	Africa		Asia				Oceania	Latin America & Caribbean	Commonwealth of Independent States	
	Northern	Sub-Saharan	Eastern	South-Eastern	Southern	Western			Europe	Asia
GOAL 1 | Eradicate extreme poverty and hunger										
Reduce extreme poverty by half	low poverty	very high poverty	moderate poverty	moderate poverty	very high poverty	low poverty	---	moderate poverty	low poverty	low poverty
Reduce hunger by half	very low hunger	very high hunger	moderate hunger	moderate hunger	high hunger	moderate hunger	moderate hunger	moderate hunger	very low hunger	high hunger

Figure 14: MDG Progress Chart 2007 (Source: Provided by Wuppertal, 2007)

Each year, the Secretary-General presents a report[65] to the UN General Assembly on progress achieved towards implementing the Declaration, based on data on the 48 selected indicators, aggregated at global, national and regional levels.

Monitoring is exemplified in the MDG Progress Chart for 2007 (see Figure 14) where also the probability of meeting the goal by region is identified by colours (green to red from high to low probability). A series of UN activities support the implementation of the MDGs, e.g. the 'Millennium Campaign' or the 'Millennium Villages'. For policy guidance UN Country Teams support the implementation of MDG-based agendas on a national level (Wuppertal, 2007).

The indicators can immediately be linked to policy targets and the required development assistance. However, a limitation to the MDG indicators is that they cover only issues of concern to a set of developing countries, but not the entire global community. In addition, they are rather weak in environmental issues and do not say anything about the sustainability of global ecological support systems (Pinter *et al.*, 2005).

65 The last report "Millennium Development Goals Report 2009" is available on http://mdgs.un.org/unsd/mdg/Host.aspx?Content=Products/ProgressReports.htm

Box 17 SWOT Analysis for Millennium Development Goals

Strengths

The MDGs are backed up by an official consensus of the UN member states, thus providing high international recognition. As they are based on the solidarity principle, they underline the necessity of a global commitment to solving the world's development problems. They are conceptualised for a 15-years time frame and thus underline that development issues can only be tackled in a mid- to long-term engagement. They are sufficiently clear and comprehensible, and the data situation is rather good.

Weaknesses/Limitations

The MDGs tend to be rather general. In some cases this weakness is remedied by clear numerical targets within the sub-targets, but in other cases they remain imprecise. This weakness concerns especially Goal 7 on environmental sustainability and Goal 8 on global partnerships. Responsibilities are not clearly allocated to different countries, neither stating where the global goals should be achieved, nor who is responsible for taking action. Under the assumption that the goals will be achieved this still leaves the risk of national and regional disparities, which is indicated by the Progress Chart. There is a strong focus on problems prevailing in developing countries. It is being criticised that the goals follow a top-down approach, which does not necessarily involve local authorities and stakeholders (UNDP, 2005). The MDGs are limited to the time frame of 2000-2015. Data within the framework is neither compared with earlier situations nor is it planned to evaluate the data after 2015.

Opportunities and threats for successfully going beyond GDP

The MDGs might be of limited direct relevance for evaluating progress in the EU as they are mainly related to development issues. They might present an opportunity in two ways. EU governments have subscribed to the MDG agenda. In order to overcome the often criticised lack of commitment to the MDGs, tasks and responsibilities could be specified within the EU and agreements towards specific responsibilities among Member States and EU institutions could be promoted. Tools such as the Commitment to Development Index — calculated by the Centre for Global Development — show that development assistance with different EU Member States varies in extent and kind. Thus, the MDGs could support coordination of EU policies in areas such as donor cooperation, trade policy, migration policy etc. by providing a common reference and assessment framework (EU, 2005).

5 Conclusions and recommendations

In order to achieve sustainable development, human wealth and well-being, multidimensional indicators are needed, showing economic, environmental and social development aspects of a community.

Using 'GDP' has clear advantages. It serves crucial and helpful roles in macroeconomic policy, in both monetary and fiscal terms. GDP is also fairly unique in that it combines simplicity, linearity and universality, as well as carries the objectivity of the 'observable market price' as its guiding principle. Attempting to abolish GDP, therefore, would be neither feasible nor recommendable. Indeed, lacking better akternatives, GDP can be used for particular questions of economic policy, but as a general sustainable development and welfare measure. The real problem presumably is that GDP growth is too often confused with (sustainable) welfare growth in people's, and policy-makers' minds. While there certainly is a correlation between the two, Chapter 3.4 showed that this is a highly conditional correlation, void of substantial causality for GDP levels observable in the European Union.

However, if alternative measures should be even nearly as successful, they would have to match GDP in terms of many of its advantages (more detailed in Chapter 3.4). More fundamentally, the purpose and object of measurement should be clearly set out when assessing alternatives. An important benchmark in this context of finding alternatives is the establishment of a well-designed fit-for-purpose analysis which has to precede all policy implementation in order to see whether the proposed tools are effective. This analysis should be followed by rigorous cost-benefit calculation to see whether the proposed solution is efficient in attaining this goal. Basically, the path set out above in Chapter 2.3 should be followed as closely as possible.

Looking at GDP under the umbrella of 'fit-for-purpose' and cost-benefit analysis, it can be said that GDP makes a clear division line between market activity, which it measures, and non-market activity, which it does not measure. This division in itself admittedly is not entirely neutral.[66] However, given this basic division, GDP does not limit or select anything, but simply counts all transactions. Everything that is traded and has an observable market price will be included in it. Its beauty simply lies in its simplicity.

If the measurement goal is sustainable development and welfare, it could be stated that non-market activity is also relevant. A number of components of sustainable development and welfare will not be included in market activities, or to put it differently, some aspects of economic policies need alternative answers and a more broad-based cost-benefit analysis. Non-economic research in economic issues can bring new insights and often opposing views into realms that have until now been under the monopoly of economic analysis. For example, reducing unemployment may be even more important than it is considered now due to its more psychological impacts. Free-time and social interaction may also be badly underestimated from a welfare perspective. This may lead to new insights into optimal taxation policies (see Layard, 2005), as reducing the incentive to work is found to have a positive impact on well-being (given of course that it strengthens family and social interaction). Mobility for employment on the other hand may well be a largely detrimental development, as it destroys social networks. These are just a few examples.

Therefore, when trying to achieve sustainable development rather than only 'economic growth', the use of alternative measures — going beyond GDP — is necessary. Chapter 4 in this study has attempted to present a non-exhaustive selection of such measures.

This study presented three categories of indices: those adjusting, replacing and supplementing GDP. Table 7 summarises the SWOT analyses assessing the Strengths, Weaknesses and Opportunities and Threats for going beyond GDP for a selected list of alternative progress indicators.

For going beyond GDP, the option of **adjusting GDP** offers the subtraction of defensive social and environmental costs and the addition of factors which are usually not accounted for in traditional GDP calculations (e.g. housework). It has also the advantages of comprehensive indices that it can be used as a valuable communication tool, as the end result can easily be used to send out a positive or negative signal. Furthermore, it has the advantage of applying monetary coding compatible to GDP. Nevertheless, in the short and medium term it seems to be unlikely that a consensus about monetary valuation of external costs and other factors can be reached.

66 In this regard, GDP will of course also not be free of value judgements, as it places a zero price on e.g. environmental damages. In fact, also Simon Kuznets noted that the creation of GDP implicitly and necessarily involved a number of value judgements, implicit or explicit.

The option of **replacing GDP** by an index which combines different aspects of development is the most radical of the three presented approaches. Replacing GDP might not appropriately consider the advantages of GDP. Therefore, replacing GDP cannot be recommended as being an accepted and realistic option for EU decision-making. Nevertheless, the presented best practice in alternative composite index development has virtues which could be further explored to improve indicator-based decision-making in Europe (e.g. public participation, communication, etc.).

The remaining option of **supplementing GDP** seems to be the most realistic and acceptable option for going beyond GDP. The best practice presented is to a large extent based on approaches developed by EU Member States. Especially in the context of indicators based on national accounting systems, EU services could build on a considerable knowledge base of official statistical services. In these approaches GDP as such remains intact with all its shortcomings, but the best practice of supplementing GDP shows that there are established approaches of setting GDP in an appropriate socio-ecological context. However, in comparison to the GDP these approaches often lack public perception and political support. The establishment of an overarching, transparent and popular reference indicators system for EU policies might therefore be the next step for improving decision-making in support of sustainable development.

For a better overview, the following pages show all indicators assessed in this study in a comprehensive table format summarizing their qualities.

Table 7: Summary table of the most relevant alternative indicators

Indicator	Main features	Assessment
Adjusting GDP		
Genuine Progress Indicator (GPI) and Index of Sustainable Economic Welfare (ISEW) *(Redefining Progress, US)*	Corrects GDP by a series of monetised environmental and social factors	▲ Comprehensible to general public ▲ Flexible framework; can be extended to incorporate additional elements ▲ Allows tracking long-term trends and backward-looking ▲ Allows for international comparisons ▼ Difficulties with monetising environmental and social aspects ▼ Calculation based on estimates and interpolations; therefore limited validity, comparability and policy relevance ▼ Arbitrary selection of factors to be included may lead to biased results ■ Addresses key issues of the EU SDS; and potentially supports 'policy coherence and integration' ■ Can promote synergies between EU SDS and EU Lisbon Strategy ■ Development of measurement methodology at EU level may increase its policy relevance and reduce its arbitrariness ■ Opportunity to create public awareness due to structural similarity to GDP ■ Potential to the Structural Indicators and the SDIs as a single, integrative, top-level indicator
Green GDP in China *(State Environmental Protection Agency, China)*	Corrects GDP by monetised environmental factors	▲ Institutionally embedded in China's governmental policy framework ▲ Potential for awareness-raising for sustainability concerns among e.g. local officials ▼ Difficulties monetising environmental damage and data availability ▼ Only focuses on environmental pollution; no other environmental degradation aspects ▼ Exclusion of all social and economic issues ▼ No internationally recognised calculation standards; low comparability to other indices ▼ Recent index; thus data cannot be traced back for many years ▼ Results 'question' China's development path, resulting in a lot of resistance of using the concept as economic growth is still the major focus in China ■ Could lead to strong incentives for reducing negative environmental impacts ■ Methodology and interpretation of results are debated ■ Concept should rest on a tested, established transparent and widely accepted methodology ■ Focus on selected environmental factors reduces policy relevance

▲ Strengths ▼ Weaknesses ■ Opportunities and threats for going beyond GDP

Indicator	Main features	Assessment
Genuine Savings *(World Bank)*	Provides estimates for savings (and wealth stocks) by considering environmental and social factors.	▲ Forward-looking; accounts for capital stock changes that will lead to future income changes; supports long-term thinking and planning ▲ Comprehensive: a single, positive or negative figure is providing information of the country's economic, social and environmental development ▲ Part of data can directly be obtained from national accounts ▲ Potential for encouraging resource-rich countries to invest their resource rents in other capital in order to secure a sustainable path (represented by positive Genuine Saving rates) ▲ Draws attention to investments in human capital and good governance ▼ Data unavailability has led to exclusion of natural and intangible capital ▼ Exclusion loss of human capital through death or knowledge obsolescence ▼ Does not account for the efficiency of investments made ▼ Debated methodology for monetising environmental and social aspects ▼ Potential for wrong conclusions: positive Genuine Saving rates may distract attention from unsustainable trends ▼ Aggregation into 1 single indicator assumes 'perfect substitutability' of capital stocks and masks complex socio-economic and ecological interlinkages ■ Refined methodology and better data availability could lead to more specific calculations for EU which are still internationally comparable ■ Potential to support Lisbon Agenda: creating a competitive 'knowledge based economy' ■ Can promote synergies between EU SDS and EU Lisbon Strategy ■ Could also be used for country-level assessment of economic, social and environmental progress ■ Should be supplemented by e.g. the SDIs to reflect underlying issues
Replacing GDP		
Human Development Index (HDI) *(United Nations Development Programme)*	Combines traditional GDP data with social indicators.	▲ Recognises the importance of economic dimensions and it integrates supplementary information with GDP data ▲ Highly recognised and visible worldwide ▲ Easily understandable 'ranking' mechanism ▲ Awareness-raising tool for concept of 'human development' ▲ Required data is widely available; can thus be calculated for large range of regions/countries ▲ Results roughly comparable across different countries ▼ Same limitations as those of GDP ▼ Excludes ecological aspects of sustainability; neglects other human development aspects e.g. political and civil issues ▼ Incomplete data, measurement errors and biases possible in many developing countries ▼ Limited explanatory power on EU level ▼ Reduced policy relevance due to selectiveness of issues included ■ Suited for application in EU cooperation and trade policy ■ EU and UNDP could work together to further develop HDI and address its main shortcomings ■ Related with the MDGs ■ Cannot replace other measurements of SD due to its lack of complexity and completeness ■ Can provide an example for constructing and establishing other composite indicators
Ecological Footprint (EF) or Carbon Footprint *(WWF and Carbon Footprint Network)*	Measures the ecological pressure of humanity on the biosphere.	▲ Measure of a region's consumption and its worldwide environmental impact ▲ Identification ecological 'creditors' and 'debitors' ▲ Carbon Footprint easier to measure than EF ▲ Can be calculated for a region, an activity, one person... ▲ Understandable concept of 'how many planet Earths it would take to support humanity if everybody lived a given lifestyle' ▲ Related to Life Cycle Assessment methodology ▼ Problems with data availability and reliable measuring techniques for EF ▼ Carbon Footprint calculates amount of land needed to sequester CO_2 emissions; although this might not be the way to stop global warming ▼ Puts densely populated areas in a bad light as they have a little intrinsic biological productive area ■ Useful for developing and assessing future scenarios and policy options ■ Tool for evaluating success or failure of policies and gearing them into a more sustainable direction ■ Should be complemented with other indicators to prevent misinterpretations of the results

Indicator	Main features	Assessment
Happy Planet Index (HPI) *(New economics foundation (nef), UK)*	Aggregates data on life satisfaction and expectancy with environmental footprint data in one index.	▲ Considers the actual 'ends' of economic activity in the form of life satisfaction and longevity ▲ Combines well-being and environmental aspects ▲ Simple and easily understandable scheme for calculating the index ▲ Comparability of results ('EF' and 'life expectancy' can be applied to different countries) ▲ Data online available, although some data gaps remain ▲ Mixture of 'soft' and 'hard' criteria; takes into account people's well-being and resource use of countries ▼ 'Happiness' or 'life satisfaction' are very subjective and personal: cultural influences and complex impact of policies on happiness ▼ Confusion of name: index is not a measure of happiness but rather measure of environmental efficiency of supporting well-being in a given country ■ Could be a tool to measure progress on the EU SDS: integrates target of "improvement of quality of life" and challenge "to manage and use resources efficiently"; could complement the SDIs ■ Relates to the social cohesion dimension of the Lisbon agenda and to well-being at work
Environmental Sustainability Index (ESI) and Environmental Performance Index (EPI) *(Yale University, World Economic Forum)*	Tracks environmental sustainability and a society's capacity to improve its environmental performance over time.	ESI ▲ Composite index tracking diverse set of socioeconomic, environmental, and institutional indicators ▲ Strong weight to social and institutional capacity measures ▲ Considers society's capacity to improve its environmental performance ▲ Helps to fill a long-existing gap in environmental performance evaluation EPI ▲ Provides benchmarks by identifying targets and measuring countries' achievements towards them ▲ Allows for cross-country comparisons ▲ Focus: reducing environmental stresses on human health and protecting ecosystem vitality ESI and EPI ▼ Multi-dimensionality and aggregation can be confusing ▼ Aggregates not grounded in theory; not subject to testing. Weights are ultimately arbitrary ▼ No adequate measurement infrastructure (e.g. not regularly updated) ■ ESI provides a way for ranking countries and identifying 'leading' governments; identification of best practices ■ EPI assesses key environmental policy outcomes using trend analysis and performance targets ■ Some attributes of high capacity are linked to patterns of high environmental stress (e.g. resource consumption)– might send wrong signal ■ EPI is a tool for achieving global-scale policy goals; tool for shifting towards environmental decision-making ■ EPI focuses only on measures subject to policy intervention
Regional Quality of Development Index (QUARS) *(Sbilanciamoci!, Italy)*	Aggregates social, economic and environmental data in one index.	▲ Represents and encourages public participation ▲ Tool for awareness-raising on environmental and social implications of development models taking into account knowledge and values of the participating individuals and organisations ▲ Supported by Italian civil society ▲ Adopted by regional governments for economic planning ▲ Based on open source data, mostly available online ▼ Not designed to indicate quality of life ▼ Limited availability of non-conventional data e.g. public participation or a fair economy ▼ Lack of an explicit weighting methodology ▼ Aggregated index: does not directly indicate in which domain (social, economic or environmental) a region is doing well or not so well ▼ Does not identify distance-to-target; no absolute performance — therefore no QUARS time series of a region; only rank position over time ■ Participatory process influences the definition of QUARS ('democratic validation') ■ Supports decision-making as local authorities are expected to intervene on all aspects addressed by QUARS

Indicator	Main features	Assessment
Supplementing GDP based on national accounts systems		
System of Economic Environmental Accounts (SEEA) *(UN, various statistical offices)*	Integrated environmental-economic 'satellite' accounts	See 'GEEA '
National Accounting Matrix including Environmental Accounts (NAMEA) *(Various statistical offices)*	Satellite accounting matrix to conventional economic input-output tables	▲ Useful to support policy-making in the area of SCP ▲ Allows to gain detailed insights into environmental implications of consumption and production, and to identify environmental hotspots in the system ▲ Well established, sound, transparent and replicable methodology (cfr SEEA handbook) ▲ Comprehensive: covers production and consumption ▲ Fully compatible to the SNA, allowing for integrated analysis of monetary and physical flows ▼ Focus on environment-economic aspects; neglects social aspects ▼ Large data requirements and limited (regional/time series) data availability ▼ Methodology not per se easily understandable ■ Could be used in support of EU and national policy-making in the area of SCP ■ Data availability needs to be improved
German Environmental Economic Accounting (GEEA) *(Federal Statistical Office of Germany, Destatis)*	SEEA satellite accounts to conventional economic input-output tables.	▲ Comprehensive data set on interaction between environment and economy at national level ▲ Fully compatible with the German National Accounts; supporting policy advice in the area of sustainable development ▲ Can be used at all stages of the policy cycle ▲ High data availability and reliability ▼ Ignore social aspects ▼ Are still primarily a system of experts with interest in statistics; not very popular and rather complex ■ Practical application and dissemination could be improved ■ Federal Statistical Office of Germany has established a separate satellite accounting system to account for social aspects. ■ Provides data for scientific institutions (e.g. for modelling purposes)
System of Economic and Social Accounting Matrices and Extensions (SESAME) *(Statistics Netherlands)*	Satellite account describing economic, social and environ mental aspects of human activities in an integrated framework.	▲ Accounts for social issues ▲ Possibility of linking economic, social and environmental aspects Other ▲ , ▼ and ■ : cfr SEEA, GEEA, NAMEA
Supplementing GDP setting social and environmental information in relation to GDP		
Sustainable Development Indicators (SDI) *(European statistical office, Eurostat)*	Put GDP in the framework of other economic, social and environmental indicators.	▲ Comprehensive, well-structured ▲ Provides a clear and easily communicable structure for assessing policies ▲ Ideal for monitoring of progress in achieving SD objective (achievements, trade-offs and failures) ▼ Not an aggregated measure; does not provide for a general direction ▼ Difficult to get an overview of 'direction to head to' as there are over 150 indicators involved ▼ Headline indicator 'GDP per capita' leads to same shortcomings as GDP ▼ Lack of policy coherence between SDI and Structural Indicators (Lisbon Strategy), Cardiff Strategy and the Environmental Action Programme ■ Unclear policy coherence between EU SDS and Lisbon Strategy for the general public ■ Improved policy coherence needed

Indicator	Main features	Assessment
Decoupling Indicators *(Various statistical offices)*	Sets pressure indicators in relation to socio-economic driving-forces.	▲ Simple and straightforward methodology; can be applied to different kinds of environmental pressures and social indicators ▲ Can visualise e.g. dematerialization of the economy ▲ Analyse past developments to inform future decision-making ▲ Assess whether or not different measures can lead to a desired qualified growth ▼ Do not explain reason for (de)coupling of indicators; this may depend on a variety of environmental, social or economic reasons, which require careful analysis ▼ No automatic link to the environment's capacity to sustain, absorb or resist pressures of various kinds ■ Important is the choice of the pressure indicators and a correct interpretation of how and why decoupling takes place ■ Substitution effects and a shifting of environmental burden also need to be considered
Political and civil freedom indicators (VK) *(Freedom House, US)*	Provides an aggregated index of individual liberties based on expert judgements.	▲ Include impact of political rights and civil liberties on a person's well-being ▲ Qualitative approach, based on individual opportunities according to the Universal Declaration of Human Rights ▲ Numerical ranking allows for a quick assessment of comparison between different countries ▲ Long-term development surveillance (10-year-ratings timeline) ▼ Only selected political and civil spheres covered ▼ Excludes economic, social and environmental outcomes (although correlations exist) ▼ Subjective scoring for political rights and civil liberties ▼ Cannot be used on a supranational level as its methodology can only be applied to political territories ▼ Relatively unknown to the public ▼ Promotes general democracy, but no clear direction for policy guidance ■ Same ranking for all EU ranking ('free'); evaluation of differences between states is difficult and could only be undertaken on sub-category levels ■ Could be linked to the process for evaluating possible new EU accession candidates
Millennium Development Goals (MDGs) *(United Nations)*	Provide a system of goals and targets for global development.	▲ High international recognition ▲ Based on the solidarity principle ▲ Conceptualised for a 15-years time frame; underlining mid- to long-term engagement ▲ Clear and comprehensible ▼ MDGs are rather general, especially MDG-7 and MDG-8 ▼ No clear responsibilities ▼ Strong focus on problems prevailing in developing countries ▼ Data within the framework is neither compared with earlier situations nor is it planned to evaluate the data after 2015 ■ Mainly related to development issues ■ Could support coordination of EU policies in areas such as donor cooperation, trade policy, migration policy etc. by providing a common reference and assessment framework

6 ANNEX — Additional information

6.1 Presentation of indicators

➤ *One single composite measure*

A composite indicator is a compilation of individual indicators into one single index on the basis of an underlying model whereby all underlying indicators were normalised and weighted in an appropriate way. The outcome of the indicator does not necessarily have to be expressed in monetary units. The strengths and weaknesses of composite indicators largely derive from the quality of the underlying variables and the weight given to each. A composite indicator can summarise multi-dimensional and complex issues, is easy to interpret; facilitates ranking of countries/regions; and facilitates communication with the audience. However, if it is poorly constructed or misinterpreted, it can give misleading policy messages; it may lead to simplistic policy conclusions; and it may disguise serious failings in some dimensions (OECD, 2005).

EXAMPLE: Human Development Index (HDI)
The HDI is based on the single composite index principle. More information on this indicator is to be found in Chapter 4.2.1. The HDI measures a country's development and is a simple average of three indexes reflecting a country's achievements in living standard, education and health, and longevity. The component indicators, expressed in different units, are being homogenised by choosing minimum and maximum target values (see Chapter 4.2.1), resulting in a value between 0 and 1, without unit. The HDI is then calculated as a simple average of these three indices.

➤ *A framework accounting approach*

Measuring well-being implies measuring several indicators (such as income, safety, health, leisure, environmental quality, etc.) which weighting into one single composite indicator cannot be established unambiguously. More feasible in this case is to summarise the most important attributes into a limited number of core macro-indicators. Many countries have at their disposal national accounts as well as social and environmental accounts. When linking those together, one gets an integrated information system allowing for all kinds of modelling analyses and policy simulations (Kazemier *et al.*, 1999).

EXAMPLE: SESAME, An Integrated Economic and Social Accounting System (Netherlands)
A SESAME (System of Economic and Social Accounting Matrices and Extensions) is a modular statistical information system that serves to enable an integrated measurement of welfare, including its social and environmental attributes. The modular design allows for adding and removing modules on the environment, population, tourism, health etc according to the user priorities and data availability.
The same principle is applied in NAMEA (National Accounting Matrix including Environmental Accounts) where indicators on environmental problems are expressed in physical units, complementing the economic indicators expressed in monetary units. The resulting matrix allows seeing the contribution of for example agriculture to GDP, to employment and to greenhouse gas emission. See Chapters 4.3.2 and 4.3.4.

➤ *A suite-of-indicators approach*

The suite-of-indicators approach sets out key aspects of progress side by side and discusses the links between them. Readers can make their own evaluations of whether the indicators together imply that there is progress or not. This approach is relevant for informing the public of national progress, rather than for using as a scorecard for government policy (ABS, 2006).

EXAMPLE: Measuring Australia's Progress
For almost 100 years, the Australian Bureau of Statistics (ABS) has been measuring Australia's progress through statistics relating to economy, society and environment. "Measuring Australia's Progress" brings those together by providing a set of headline indicators of progress. Environmental progress relates to reducing threats to the environment and improving the health of our ecosystems; economic progress concerns enhancing the nation's income while at least maintaining the national wealth that will support future consumption; and social progress relates to improving the well-being of the population, social cohesion and democratic rights.
The approach does not make an overall assessment about whether the indicators imply that life is getting better or worse. Instead, it allows the reader/audience to make their own assessment based on own preferences and values.

6.2 Calculation of GDP

➤ *The Expenditure Approach to GDP (Effective Demand)*

For any of the calculation methods, it is essential for GDP that the expenditure for consumption is final for the given time period used (mostly annual or quarterly), i.e. the same resources will not be used for further production in the same period.

Next to final consumption expenditure, investment by firms (into capital goods) is also part of final demand in as far as the investment goods are durable and are not used up in the same period. Applying this logic yields two basic components of GDP from the expenditure side:

(1) **Consumption expenditure** + **Investment expenditure** = **GDP**

(1) **C** + **I** = **GDP**

In modern accounting practice, two modifications to this basic identity are made. The first one is to treat the government and private sector separately, based on the different tasks and incentives underlying these two sectors (denoted "G" below).[67] The second one is to account for the fact that not all domestic production leads to domestic consumption, but exports and imports change this picture. The above aggregate (1) will already include imports as their final consumption is on the domestic market (even though production is abroad). But it will not include exports as these are used for final consumption on the world market, yet their production is at home. One way to correct for this is to use net exports (exports minus imports, denoted "X"), thereby capturing the net contribution of foreign production to domestic consumption.

(1a) **C** + **I** + **G** + **X** = **GDP**

➤ *The Production Approach to GDP (Value Added)*

Correctly measuring "production" in a (modern) complex economy of tangible and non-tangible products and multiple steps along the production chain can be very challenging. To avoid multiple counting and thus outright exaggeration of the production value, the principle of value added is very helpful. Part of the production of a firm may be for final use but part of it may just as well be used as an input somewhere else still. Value added catches the contribution of each stage to each final product.

Value added is the revenue of one firm in the production chain minus the amounts this firm has paid to its suppliers (raw materials, services etc.). The final aggregate amount of all value added along a production chain equals the final (factor) price. The following (slightly simplifying) identities apply:

(2) **GVA** = **Value of outputs** + **Value of inputs**

while GVA denotes Gross Value Added.

(3) **GDP** = **GVA** + **Product taxes** – **Subsidies**

This means that it is fairly straightforward to arrive at GDP from GVA, just adding (indirect) product taxes and possible subsidies by the government.

➤ *The Income Approach to GDP (Remuneration)*

In monetary terms, production and income should eventually yield the same result. This is because money is a veil, and it cannot buy anything that has not been produced, or to put it differently, the real value of money is what it can buy. Also, the money paid for production becomes income in the hands of the people holding them in the form of wages, profit, interest etc. Breaking GDP down from the income side has the practical advantage that GDP becomes a traceable function of tax revenues.[68]

Caution is needed when identifying personal Disposable Income from the national accounts. There is a closely related and widely used alternative to GDP, the Gross National Product (GNP) or according to latest ESA95 definitions of Eurostat, Gross National Income (GNI), where the production is not defined by individuals within certain geographical borders, but the production owned by citizens of a country. The GNI rather than the GDP should to be used for the income approach as only this way overseas income that can be properly accounted for (equation 4). Basically, GNI is GDP with citizen's production income from abroad added and foreigner's production income at home subtracted.

(4) **GNI** = **GDP** + **Net receipts of factor income from abroad**

Also, depreciations of the capital stock are still included in GNI which is expenditure used for the maintenance of the capital at its present level. The net product here is Net National Product (NNP).

67 In this aggregate, government transfers are not counted as they are not directly used to consume or invest.

68 For the sake of argument, disregard tax evasion and the black economy which obviously distort this picture.

(5) **NNP** = **GNI** – **Depreciation of capital stock**

Moreover, some forms of (indirect) taxation are placed on production before anyone receives it in the form of income. This is where the NNP effectively can be called income for the first time (Net National Income, NNI).

(6) **NNI** = **NNP** – **Indirect taxes**

Also, there may be a significant time lag between production and income. This happens e.g. when a company pays out the dividends on its profit a year later. The result of taking these time lags into account is called personal income (PI).

(7) **PI** = **NNI** + **Income currently received but not earned** – **Income currently earned but not received**

At the end of this chain, excluding direct taxes yields the Disposable Income of citizens (DI), a measure much more suitable to assess people's (financial) real wealth than any of the higher components of this aggregate.

(8) **DI** = **PI** – **Direct Taxes**

Note that instead of getting national income from subtracting the various subaggregates from GNI, we could arrive at the same figure by adding up

(9) **NNI** = **Wage** + **Interest** + **Proffits** + **Rents**

i.e. the compensation of employees (wage), property income (receivable less payable), gross operating surplus and gross mixed income. The difference between the two approaches will at the end only be a negligible statistical discrepancy.

6.3 Index of Sustainable Economic Welfare (ISEW) — Details

The adjustments made to GDP to calculate the ISEW fall into the following categories (Jackson *et al.*, 2005):

1. the total personal consumption is adjusted to account for inequalities in income distribution (for example through the use of the Gini-coefficient[69] or the Atkinson index[70]);
2. non-monetised contributions to welfare from services provided by household labour (the 'informal economy') are taken into account;
3. deductions for the environmental costs related to air and water pollution (emissions), noise pollution and climate change (carbon emissions[71]);
4. account is taken of certain 'defensive' expenditures such as private expenditures on health, education, commuting, car accidents and personal pollution control; government expenditures are included in the index only to the extent that they are regarded as non-defensive;
5. adjustments to account for changes in the sustainability of the capital base: inclusion of a 'net capital growth' adjustment to account for changes in the stock of human-made capital. The index also includes the net transactions in overseas assets and liabilities in order to provide an indication of the robustness (and sustainability) of the economy in international terms;
6. the difference between annual expenditure on consumer durables and the services flowing in each year from the stock of those goods is considered; and
7. depreciation of natural capital as a result of the depletion of natural resources[72], the loss of habitats and the accumulation of environmental damage from economic activity is included.

69 The Gini-coeffient is obtained by dividing the area between the Lorenz curve of the income distribution and the uniform (perfect) distribution line by the area under the uniform distribution line. It is expressed as a value between 0 and 1 where 0 corresponds to perfect income equality — http://en.wikipedia.org/wiki/Gini_coefficient

70 The Atkinson index reflects society's concern about income equality.

71 Originally, the emissions were calculated as cumulative emissions. However, this has been criticised and the Genuine Savings index for example uses a damage cost based only on annual carbon emissions.

72 For example by subtracting the entire value of annual resource extraction, or by taking into account a replacement cost method which estimates the costs of replacing all fossil fuel consumed in a given year with renewable energy.

6.4 Ecological Footprint — Graphs

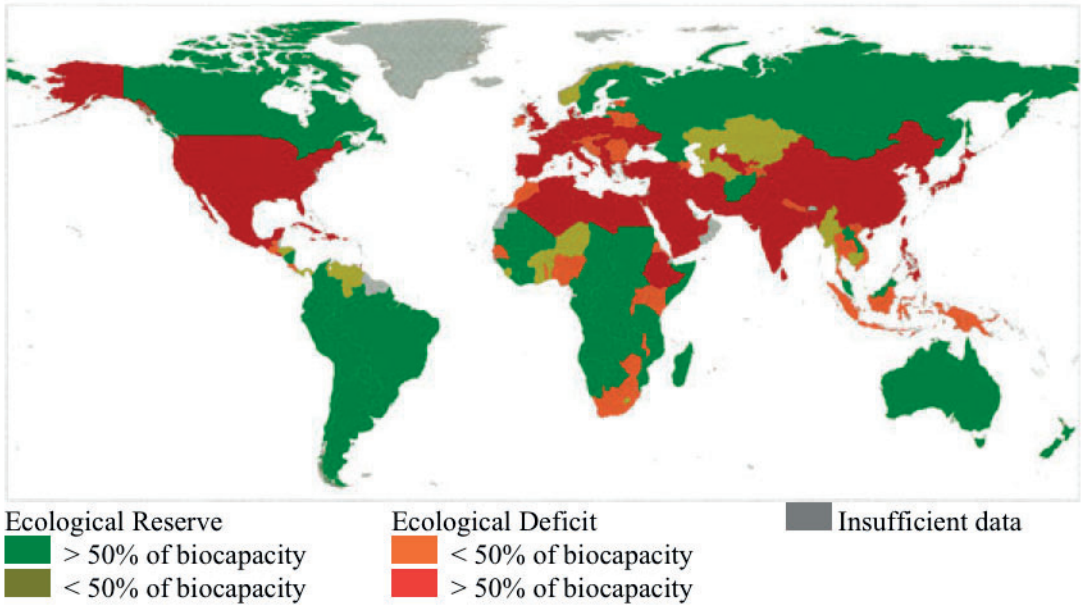

Figure 15: Ecological creditors (depending on net imports from ecological services to maintain their economies) and debtors (countries with ecological reserves)
(Source: Global Footprint Network, 2006)

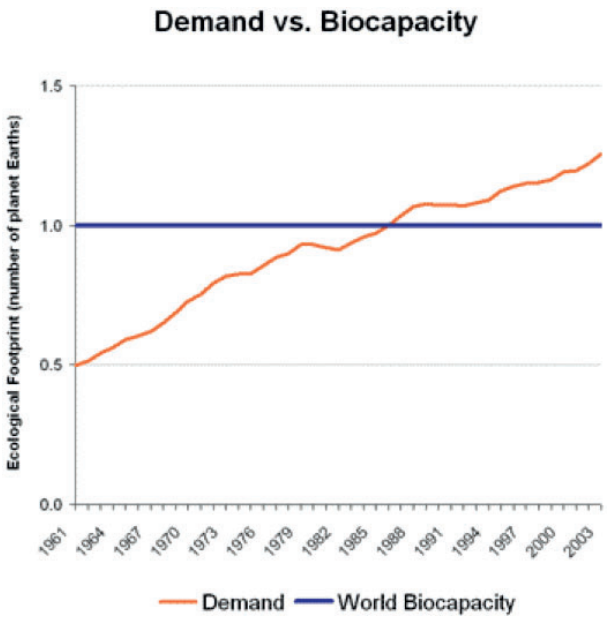

Figure 16: Demand vs biocapacity
This figure shows the ratio between the world's demand and the world's biocapacity in each year, and how this ratio has changed over time. Expressed in terms of "number of planets," the biocapacity of the Earth is always 1 (represented by the horizontal blue line). This graph shows how humanity has moved from using, in net terms, about half the planet's biocapacity in 1961 to about 1.25 times the biocapacity of the Earth in 2003. This global ecological deficit of 0.25 Earths is equal to the globe's ecological overshoot.
(Source: Global Footprint Network, 2006)

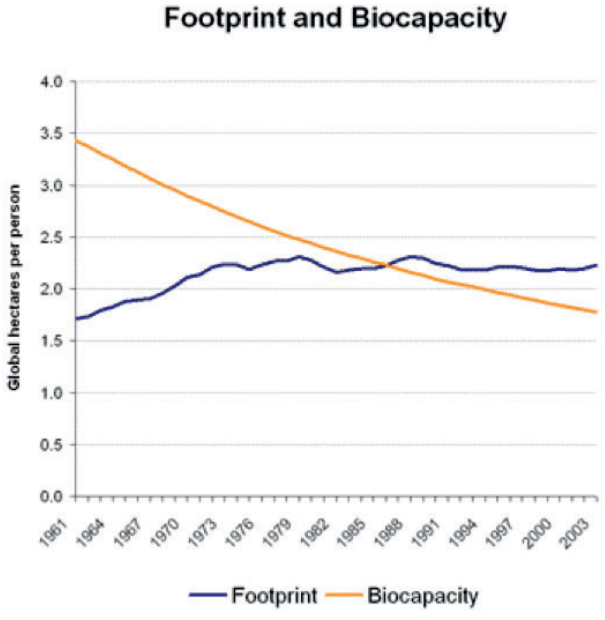

Figure 17: Ecological Footprint and Biocapacity
This figure tracks, in absolute terms, the world's average per person Ecological Footprint and per person biocapacity over a 40-year period.
(Source: Global Footprint Network, 2006)

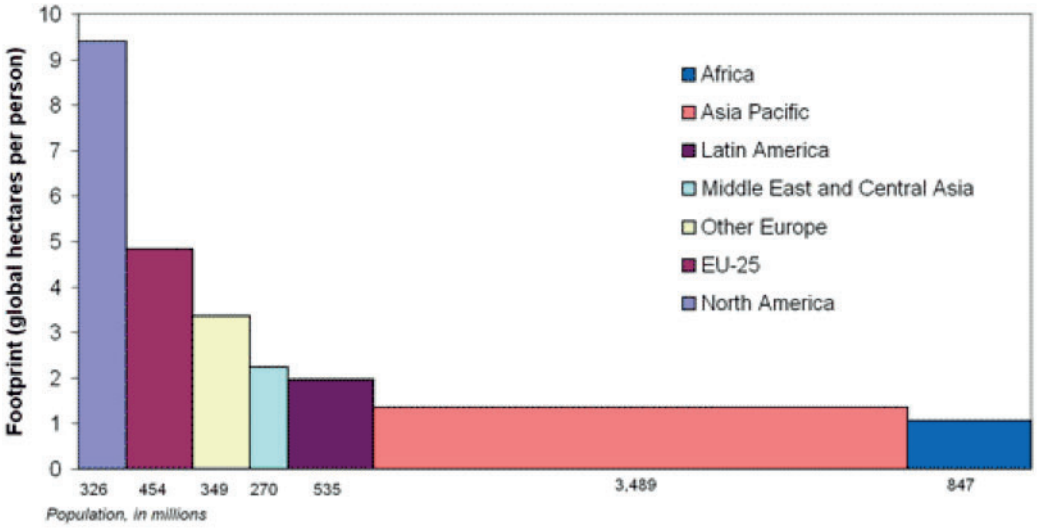

Figure 18: Regional Ecological Footprint analysis (Source: Global Footprint Network, 2006)

6.5 Happy Planet Index — Results[73]

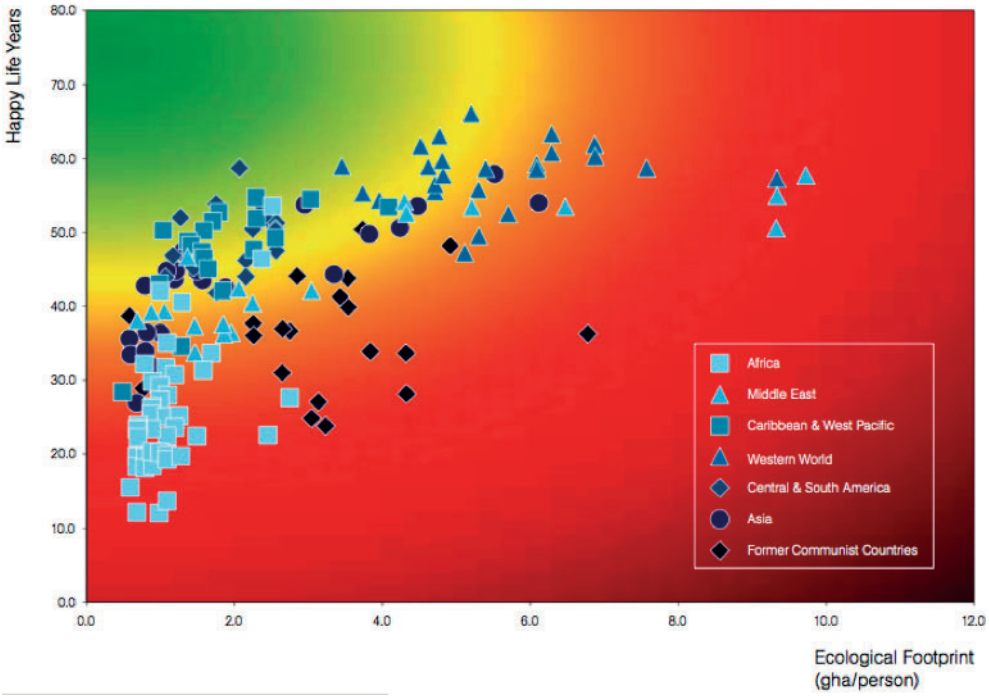

Figure 19: Results of the Happy Planet Index
The Graph shows 'Happy Life Years' on the vertical, and 'Ecological Footprint' on the horizontal axis. Countries near the upper-left corner score best. (Source: nef / FoE 2007)

The nations that top the HPI are those in which citizens achieve long, 'happy' lives without over-stretching the planet's resources. In figure 19, countries in the dark green area would score well on all three indicators (however, none does), while those in the yellow or red zones are coming short on some of these.

The indexing shows that high levels of well-being are achieved by countries at very different Ecological Footprint levels. Western, industrialized countries tend to have widespread longevity and variable but comparable levels of life satisfaction, but Ecological Footprints are not sustainable (upper right quadrant in the figure). Europe is separately evaluated as well: The three countries scoring highest are: Iceland, Sweden and Norway. The lowest scoring countries are: Greece, Bulgaria and Estonia. The Happy Planet Index reveals that Europe as a whole is less efficient at delivering human well-being in terms of relatively happy, long lives to its citizens than it was over 40 years ago.

73 Source: Wuppertal, 2007

6.6 QUARS — Illustration of the results

QUARS	
Trentino Alto Adige	1.42
Toscana	1.21
Emilia Romagna	1.05
Valle d'Aosta	0.96
Umbria	0.90
Marche	0.88
Friuli Venezia Giulia	0.67
Veneto	0.47
Piemonte	0.32
Lombardia	0.27
Abruzzo	0.27
Liguria	0.13
Sardegna	-0.34
Lazio	-0.62
Molise	-0.79
Basilicata	-0.80
Puglia	-1.16
Sicilia	-1.52
Calabria	-1.64
Campania	-1.68

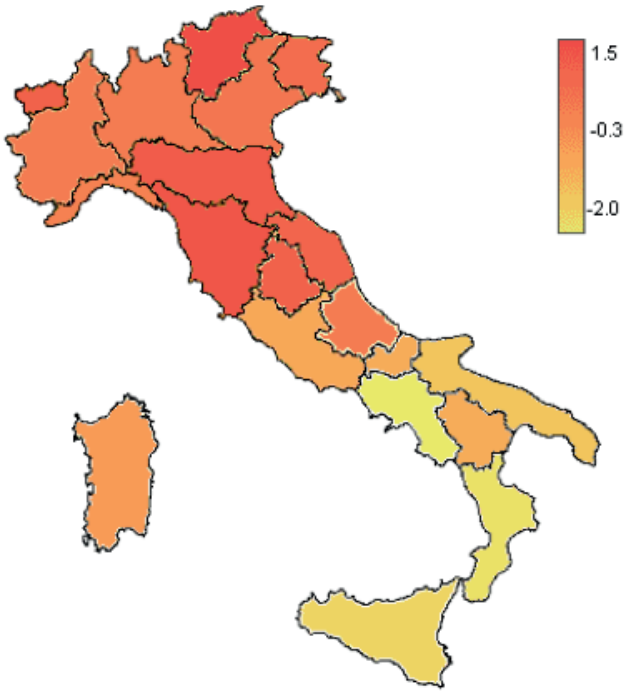

Figure 20: QUARS of the Italian regions
(Source: Sbilanciamoci!, 2006)

6.7 System for integrated Environmental and Economic Accounting (SEEA) — Graphs

		Assets			
		OPENING STOCKS	Economic assets	Environmental assets	
	Industries	*Households/Government*	+		*Other countries*
	DOMESTIC PRODUCTION	*FINAL CONSUMPTION*	*CAPITAL FORMATION*	*CAPITAL ACCUMULATION*	*REST OF THE WORLD*
SUPPLY of products	Output				Imports
USE of products	Intermediate consumption	Final consumption	Gross capital formation		Exports
CAPITAL use	Capital consumption		Capital consumption		
NATURAL ASSET use	Environmental cost	Environmental cost	Natural capital consumption		
			+		
			Other asset changes	Other asset changes	
			=		
		CLOSING STOCKS	Economic assets	Environmental assets	

Figure 21: SEEA flow and stock accounts
(Source: Bartelmus, 2007)

The asset accounts measure the value of opening and closing stocks of economic and environmental assets, and their changes during an accounting period. Changes in assets are brought about by the formation and consumption of produced and natural capital (assets) and other non-economic influences such as discoveries, natural disasters or natural regeneration. The latter, i.e. 'other asset changes,' are recorded outside the income and production accounts; these changes do not, therefore, affect the conventional indicators of cost, income, product and capital formation (Bartelmus, 2007).

6.8 Overview of accounting systems

Table 8: Review of accounting systems
(Source: Overview taken from Mulalic, 2004)

	Reference	Characteristics	Economics facts	Environmental facts	Social fact
SAM Social Accounting Matrix	SNA Systems of National Accounts	Presentation of interrelationships between structural futures of an economy and the distribution of income expenditure among household groups	National accounts incorporated into a matrix accountancy framework		Labour accounts by industry, by type of labour (male/female, skill level, etc.), by household sub-sector
NAMEA National Accounts Matrix including Environmental Accounts	SEEA System of Integrated Environment and Economic Accounting	Integrated environmental-economic accounts	Supply-use tables, Input-output tables, environment protection expenditures, stock values, etc.	Consumption of natural resources and pollution, stock of resources, etc.	
SESAME System of Economic and Social Accounting Matrices and Extensions	SNA Systems of National Accounts	Description of economic, social and environmental aspects of human activities in an integrated framework	National accounts	NAMEA-types	SAM-types plus supplementary tables: labour accounts, time accounts, socio-demographic accounts, etc.

6.9 Visualisation tools

An interesting tool for visualising indicators, etc is GAPMINDER: http://www.gapminder.org/. For the Millennium Development Goals specifically, the following link can be interesting: http://mdgs.un.org/unsd/mdg/Trendalyzer/index.html

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