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Sustainainable development and green growth: Comparison of the measurement frameworks at Statistics Netherlands

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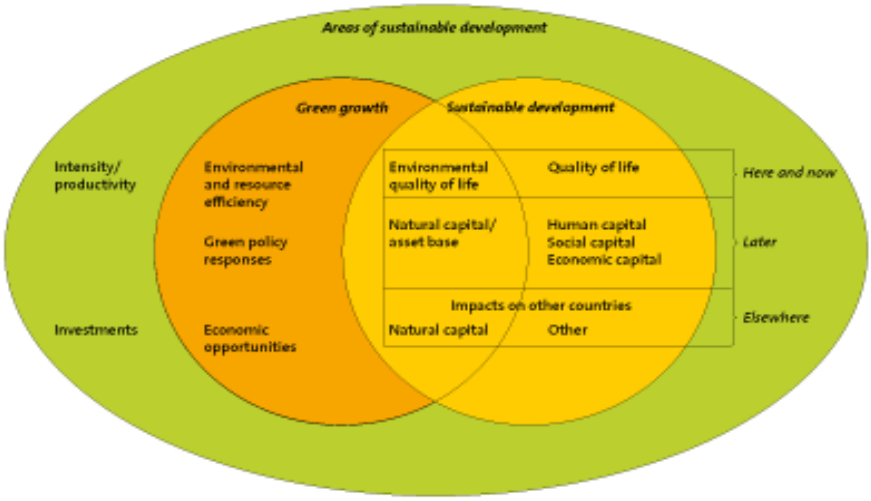
SUSTAINAINABLE DEVELOPMENT AND GREEN GROWTH: COMPARISON OF THE MEASUREMENT FRAMEWORKS AT STATISTICS NETHERLANDS

Summary: This report provides a conceptual comparison as well as an assessment of the overlap in the indicators between sustainable development and green growth. This is done with the frameworks that are currently in use at Statistics Netherlands. The measurement of sustainable development and green growth can be presented in a single conceptual framework. They are part of the overarching concept of "areas of sustainable development". Sustainable development captures all aspects that are needed for welfare in the "here and now", "later" and "elsewhere" dimensions. Those elements are also part of the green growth framework, although green growth thematically focuses on the green aspects of the sustainable development dimensions. Hence, the green aspects (mainly natural capital) are ostensibly the most supressed asset due to economic growth, and require additional measuring in order to ensure welfare in the here and now, later and elsewhere dimensions. Due to the focus on the environment-economy nexus by green growth, it provides more detail on environmental and resource productivity. Moreover, it exclusively addresses, although conceptually in line, the green policy indicators and the economic opportunities that might arise for 'greening growth'. Sustainable development does, due to its overarching presence, cover other broader policy indicators, such as, investments and productivities.



Keywords: Sustainable development, green growth, concepts and definitions, indicator frameworks

1. Introduction

It is widely recognized that GDP has its limitations as a single measure for welfare and human wellbeing, and that it does not properly reflect the sustainable development of society (e.g. van den Bergh, 2010). For decades, there have been efforts to go "Beyond GDP". This realization has led to various influential reports on the concepts and definition of sustainable development by various international organisations such as United Nations, OECD and the European Commission (e.g. Brundtland report, 1987, Stiglitz report 2009).

Many methods to measure sustainable development have been proposed. At Statistics Netherlands sustainable development is about dividing human wellbeing between three dimensions: "here and now", "later" and "elsewhere" (Brundtland definition). This is also the direction that is being proposed in the UNECE/OECD/Eurostat Task Force for Measuring Sustainable development (TFSD), which includes the UN, OECD, Eurostat, World Bank and 10 prominent countries in this field.

In the TFSD/Statistics Netherlands approach, the determinants of the "here and now" such as income, education, housing, access to food and safe drinking water, equality, and safety are monitored. The "later" dimension is represented by the assets (natural capital, social capital, human capital and financial/economic capital) that society leaves behind for future generations. The bill that is passed on to later generations can be calculated by assessing the trend of the stocks of those four capital forms. The impact on other parts of the world ("elsewhere") is captured through international trade (including "footprint" calculations), international transfers and migration.

More recently, additional focus on the economic and ecological nexus of sustainable development is being addressed by green economy (UNEP, 2011) and green growth (OECD, 2011a).[1] The main drivers for those recent initiatives are multilateral. It's the realization that scarcity of natural resources might hamper future economic growth, but also that tipping points of global critical boundaries are being exceeded (Rockström, 2009). Greening growth is also perceived as an effective way to eradicate poverty. Finally, the recent financial and economic crisis has led to the call for the transition towards a more resource efficient and less polluting economy that also may provide new economic opportunities.

According to the definition formulated by the OECD (2011), green growth is about fostering economic growth and development while ensuring that the quality and quantity of natural assets can continue to provide the environmental services on

[1] For a more extensive overview of see the resource guides to the green economy and related concepts which was published by the Division for Sustainable Development of the UN Department of Economic and Social Affairs (UNDESA) : http://sustainabledevelopment.un.org/index.php?menu=1224

which our well-being relies. It is also about fostering investment, competition and innovation, which will underpin sustained growth and give rise to new economic opportunities. Based on this definition, the OECD has also developed an underlying measurement framework for green growth.

UNEP defines a green economy as one that results in "improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities" (UNEP, 2010). In its simplest expression, a green economy is low-carbon, resource efficient and socially inclusive. In a green economy, growth in income and employment are driven by public and private investments that reduce carbon emissions and pollution, enhance energy and resource efficiency, and prevent the loss of biodiversity and ecosystem services. The main difference between the OECD green growth initiative and UNEP's green economy is that UNEP prominently includes the social dimension by looking specifically at poverty reduction and social equity[2]. Additionally, the green economy initiative does not have an underlying measurement framework at this moment.

Internationally, there is still a lack of clarity around the relationship between green economy/green growth and internationally agreed objectives such as sustainable development and poverty eradication (UNDESA, 2012). Due to the shared goal, namely preserving sufficient natural resources for future generations, green growth, green economy and sustainable development are sometimes regarded to be the same in practice. Although their goals may be similar, there are also some differences. The aim of this document is to discuss the differences and similarities between the concepts and monitoring framework of green growth and sustainable development. With respect to green growth/ green economy, we will follow the concepts and definition developed by the OECD (2011a), as this provides at present the most elaborated conceptual framework for green growth / green economy on which there is also international agreement[3].

This document is structured as follows. In paragraph 2 we make a conceptual comparison between sustainable development and green growth in order to identify the coherence and the main differences of the two concepts. Paragraph 3 describes some additional focus points of green growth and sustainable development. Paragraph 4 rounds up with the main conclusions. The annex provides more depth on the indicator sets through a thematic comparison.

[2] The OECD green growth strategy does not exclude the social dimension, however, this dimension is not explicitly addressed in the measurement framework for green growth.

[3] The Green economy initiative of UNEP is much more like sustainability than the green growth approach of the OECD as this also takes into account the social dimension.

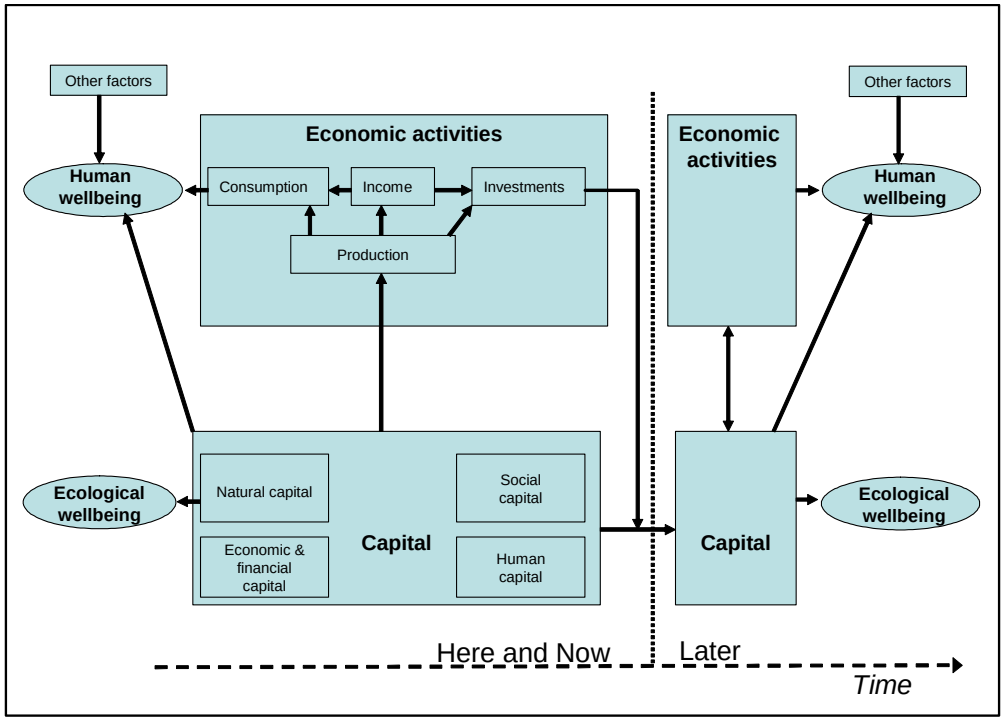
2. Sustainable development and green growth: a conceptual comparison

This paragraph describes how the conceptual frameworks of sustainability and green growth relate to each other. The conceptual framework of sustainability is described first, followed by how the concepts of green growth fit into this. Next, the differences and overlap between the two concepts are identified and visualised into one scheme.

2.1 The conceptual framework for sustainability: Now and later

Figure 1 shows the main determinants of human wellbeing and sustainable development for the "here and now" and "later" dimensions of the Brundtland definition. The third dimension "elsewhere' will be discussed in paragraph 2.3. Human wellbeing is seen as the overarching concept reflecting all matters that increase the quality of life of human beings. Figure 1 is based on the methodological framework developed and used for the Dutch sustainability monitor (Smits and Hoekstra, 2011; CBS, 2011a; for a more elaborate description).

Figure 1: Sustainable development: now versus later



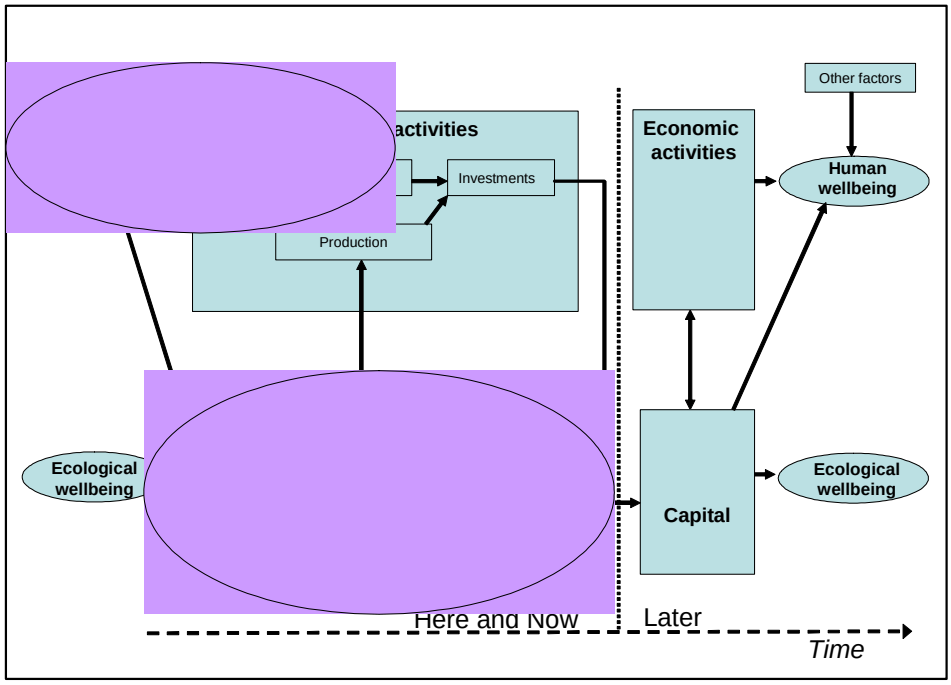
Capital assets (natural, economic and financial, social and human capital) are used as inputs for economic production processes. Part of the produced goods and services are consumed by households or by the government, which contributes to human wellbeing. Production also provides income/value added and thus contributes to GDP. GDP provides income used for consumption and in this way contributes to human wellbeing. Part of GDP is also used for investments, increasing future capital stocks.

Capital has also a direct effect on human wellbeing. For example, individuals with higher levels of human capital may exhibit higher levels of wellbeing. Also natural capital may directly affect human wellbeing, for example clean air and access to green areas. Certain types of natural capital, such as biodiversity, have an existence value, irrespective of its use by society. This is represented by the introduction of the term ecological wellbeing. Finally, some other factors may influence human wellbeing, such as availability of information, individual psychological characteristics, income distribution etc.

Figure 1 also shows the "later" dimension, i.e. whether human and ecological wellbeing can be maintained towards the future. In short, our present dealing with our resources affects future levels of capital stock that can be used by future generations for their wellbeing. From an intergenerational perspective, sustainable development is development that ensures non-declining per capita wealth by replacing or conserving the sources of that wealth, namely produced, human, social and natural capital.

Two key areas for monitoring sustainability address the "now" and "later" dimension respectively (Figure 2). Indicators for the 'now" dimension focus on measuring subjective well-being and the factors directly affecting human well-being, namely consumption and income, the direct influence of capital (for example, labour, education, air quality etc.) and other factors (for example, physical safety). Indicators for the 'later" dimension focus on measuring natural, economic, human and social capital.

Figure 2: Key areas (encircled in purple) for monitoring the "now" and "later" dimension in sustainable development.



The TFSD/Statistics Netherlands measurement system provides two ways of showing the indicator sets: the conceptual and thematic representation (provided in chapters 2 and 3 of the Dutch sustainability monitor (CBS, 2011a)).

In the conceptual classification, the “here and now”, “later and “elsewhere” split is adopted. For each dimension, themes are identified (education, health, consumption, energy resources etc.). In total there are 21 themes, and in some cases a theme is relevant to two or more dimensions. For example, education affects human well-being in the “here and now” as well as “later”. The synthesis of the themes and dimensions is provided in the annex of this paper. The thematic classification does not distinguish the three dimensions, but simply looks at the 21 themes individually.

The advantage of the conceptual classification is that it provides an overview of the “state of the nation” with respect to sustainable development. However, the thematic classification is more suitable for policy purposes because it allows for sub-indicators such as investments and productivity. The thematic categorisation is therefore very similar to the indicator system of green growth (see the annex).

2.2 Conceptual framework for Green Growth

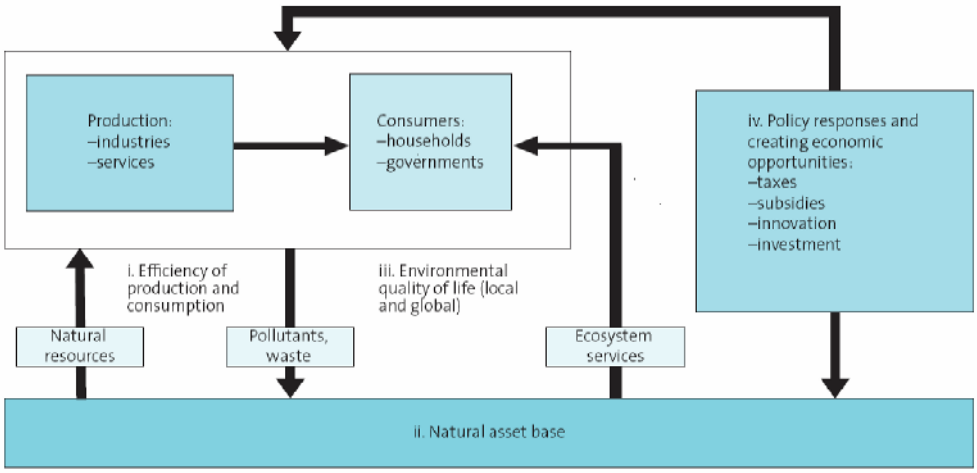
According to the measurement framework for green growth of the OECD, the indicators are grouped into four themes: environmental and resource productivity, natural asset base, environmental quality of life, and policy responses and economic opportunities (OECD, 2011b). These groups complement indicators for the general socio-economic context and characteristics of growth.

Figure 2 shows how these groups of indicators interrelate. Economic production and growth depend on the environment for inputs of natural resources such as energy, water and basic materials, but also use it as a sink for outputs in the form of waste and emissions. Therefore, *environmental efficiency* and its evolution over time are central measures of green growth. Efficiency increases may coincide with displacement effects, for example if domestic production is replaced by imports. In view of globalising supply chains, it is essential to also include a ‘footprint’ type indicator here that estimates worldwide environmental pressure as a result of national consumption requirements.

In addition to monitoring the relationship between environmental burden and economic growth, it is equally important to ensure that the burden does not exceed nature’s carrying capacity. This is measured in the natural asset base. The *natural asset base* is monitored by way of stocks of renewable assets like timber, and non-renewable assets such as fossil energy reserves, preferably in terms of quantity and quality. Next to this, it monitors also ecosystem related indicators like changes in land-use and biodiversity. The link between the environment and the population’s quality of life is captured in the third set of indicators, and deals primarily with local issues such as population exposure to pollution.

A shift to green growth not only requires *policy responses*, it also opens up new *opportunities*. Governments can choose between several policy instruments such as taxes, subsidies and regulation to steer development in a preferred direction. Monitoring the extent and effects of these instruments is of great interest to policymakers. Such measures will also create new opportunities for economic activities that may generate new jobs and stimulate economic growth. This is measured in the fourth box of indicators.

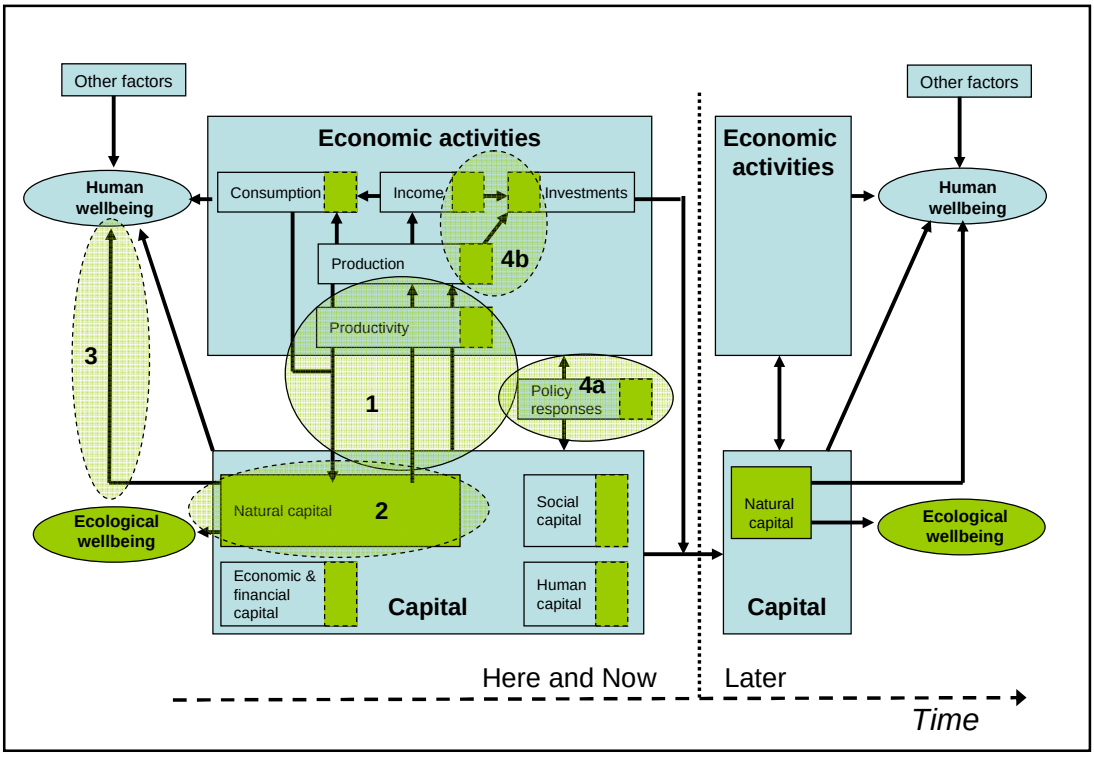
Figure 3. Conceptual scheme of green growth indicators.



2.3 Integration of concepts: detailed representation

In Figure 4, the main concepts of green growth are fitted into the conceptual scheme for sustainable development. Basically, the main features of the conceptual framework of green growth, as developed by the OECD (Figure 3), have been integrated into Figure 1. Green boxes and extra arrows indicate this. Those represent relationships that are particularly addressed by green growth. The sub themes of green growth were identified in this framework of sustainable development. Below, we will describe these four highlighted areas in more detail.

Figure 4: Key (encircled) areas for monitoring green growth. The numbers reflect to the four themes in green growth.



1. The key area of interest in green growth is the interrelations between economy and natural capital (the natural asset base). First, the economy depends on the environment as a source of all kinds of raw materials, such as energy, biological and mineral resources that are essential inputs into economic production processes (resource function). Secondly, the natural assets also absorb the residuals of economic activities, such as waste, and emissions to air, soil and water (sink function). Central here is the concept of environmental and resource productivity. This is defined as the partial productivity measure that related economic output to environmental input, whether as an environmental input, or as a regulating service, i.e. the sink function for residuals. In practical terms, the indicators for the first sub theme, environmental and resource productivity, focus on productivity indicators or (the reciprocal) environmental intensity indicators. Those combine physical flow data with economic output (or value added) data.

2. Within the capital domain, the focus of green growth is clearly on natural capital. Due to growing pollution, global warming, scarcity and depletion of resources, governing the quality and quantity natural assets is vital to preserve future growth in the green growth strategy. The second sub theme of indicators thus monitors the development of environmental assets in time, such as fish stocks, timber stocks, mineral resources and biodiversity. However, the focus is not exclusively on natural capital. For economic capital, environmental investments, for example the stock windmills or other

environmental equipment may be of interest. For human and social capital, the link with green growth is somewhat less obvious, but one may think about environmental education or "green" social networks. Environmental education is measured in the fourth box (policy responses and economic opportunities) in green growth. In green growth, the second box is exclusively for natural capital.

3. The third key area of interest for green growth is the environmental quality of life. These are the direct impacts from natural capital that may influence human wellbeing. Examples are air quality, access to some basic environmental services such as clean water and sewerage, etc. This is also a subset of sustainability, which considers all direct effects of capital on human wellbeing (i.e. also of social, human and economic/financial capital).

4. Finally, green growth particularly addresses economic opportunities and policy responses. Policies primarily affect economic activities, but may also directly influence the capital domain. Green growth focuses on the "green part" of policies, namely how policies may contribute to a 'greener" economy. Examples are green tax reform, environmental subsidies or environmental regulation.

   The second aspect, economic opportunities that are created while greening the growth are found more scattered in Figure 4 (indicated with 4b). Central to the green growth concept is the idea that "green can stimulate growth". Accordingly, transition to a more resource efficient and less polluting economy may also present economic opportunities that contribute to economic growth. Part of production, consumption, income, investments, innovation and labour may be identified as green. This aspect can thus be found in several parts of the economic activities block, but also in part of the capital block (green jobs, innovation).

A more detailed comparison of the overlap in themes can be found in the annex. The overlaps and differences found in the annex were in correspondence to those found in the conceptual comparison.

A detailed description of the "here now" and "elsewhere" dimension with the overlap with green growth is not discussed here. However, it was observed that the current OECD measurement framework for green growth does not specifically address the "elsewhere" dimension. Some aspects of this dimension are covered by the green growth indictors, such as carbon footprint, referred to as the consumption based carbon emissions, or international financial flows of importance to green growth. These indicators are however found scattered among the four different themes for green growth.

2.4 Integration of concepts: simple representation

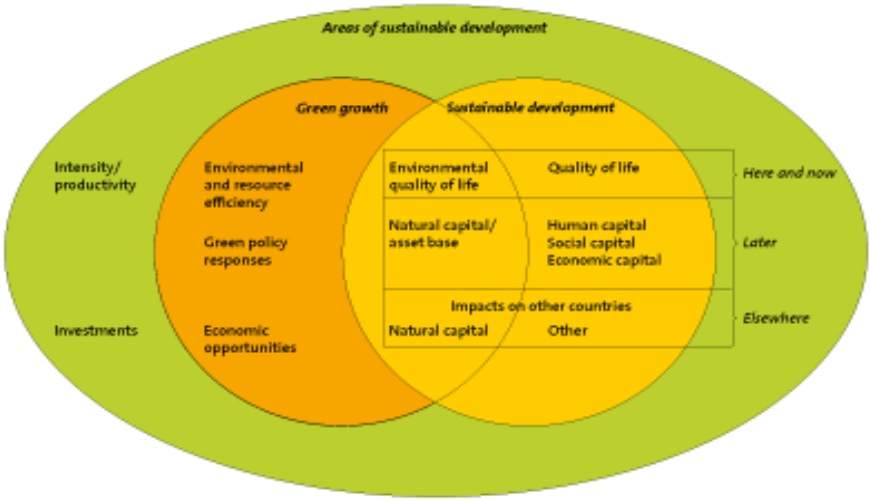
When the concepts of green growth and sustainable development are integrated in detail, such as shown in Figure 4, it leads unarguably into a complex figure.

Although conceptually correct, it will be hard to communicate to stakeholders and to the general public. Another shortcoming of Figure 4 is that the third dimension of sustainable development, “elsewhere”, is not addressed, since it would lead to an even more incomprehensible scheme. An attempt to overcome these issues is depicted in Figure 5.

Figure 5 shows how sustainable development, both the conceptual measurement as the broader policy oriented perspective, and green growth relate to each other. These correspond to the three indicator visualisations on the sustainability-green growth published on the website of Statistics Netherlands. The main point is that the conceptual measurement of sustainable development (in yellow), i.e. the pursuit of welfare, now and in the future, and green growth (in orange) partially overlap, but also that each specifically focuses on certain issues that are not addressed by the other. On the other hand, both green growth and the conceptual measurement of sustainable development can be regarded as part of the broader “areas of sustainable development” (in green).

More in detail, figure 5 shows on the right-hand side how the “here now” and “later“ and “elsewhere” dimensions are translated to respectively human well-being, the different forms of capital and impact on other countries in the conceptual measurement of sustainable development. The scope of sustainable development is, as discussed above, broader than green growth, which focuses predominantly on its green elements. The translation of green growth into the “here now”, “later” and “elsewhere” dimensions is for instance environmental quality of life, natural capital and the impact on global capital. Since green growth focuses on the environment-economy nexus, measurement areas were identified that are not specifically addressed in the conceptual measurement of sustainable development. Those comprise environmental and resource productivity, green policy indicators and the economic opportunities that arise from greening growth. Although those areas are not specifically mentioned in sustainable development, it is not in contradiction and thus conceptually coherent. Finally, the broad concept of sustainability also does cover productivity (i.e. other than environmental productivity) and investments (other than environmental investments).

Figure 5: Simplified representation showing the relation between green growth and sustainable development.



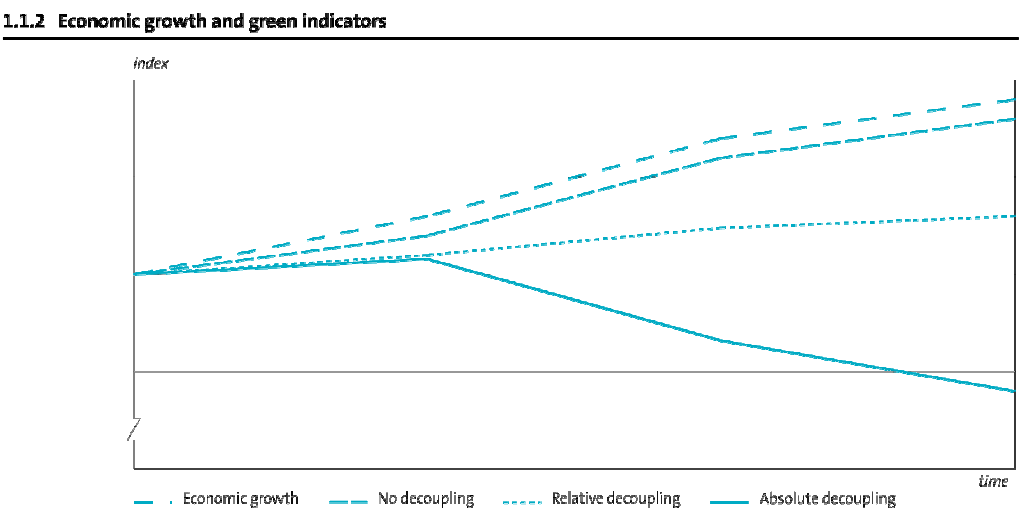
3. Some additional differences in focus between sustainable development and green growth

Although sustainable development and green growth share the same conceptual basis, the indicator sets differ in focus. The sustainable development indicators are aimed at providing a "state of the nation" through the conceptual classification, but in a broader sense they also give an overview of policy indicators through the thematic classification. It includes a sharp focus on the long-term developments through its focus on capital stock measurement.

The concept of green economy / green growth is narrower in scope, as it focuses primarily on the intersection between environment and economy. On one hand, the natural assets are currently most supressed by the economy, and therewith endanger future wellbeing. One the other hand, it provides a strong focus on fostering the necessary conditions for innovation, investment and competition that can give rise to new sources of economic growth (OECD, 2011a). In addition, green growth primarily looks at the short-term policy levers and economic opportunities that may arise from "greening" the economy. Often, it is perceived as a pathway to achieve sustainable development (e.g. World Bank, 2012). The focus on the short term and its economic focus is illustrated by the importance of decoupling indicators. Decoupling occurs when the growth rate of an indicator of environmental pressure is lower than the rate of economic growth in a given period. Decoupling can be either absolute or relative (see Figure 6). Decoupling is interpreted as changing the growth path, and is thus perceived as a step towards a greener economy. This is usually measured for relatively short time periods (5 to 20 years), depending on the (user)

needs. Sustainable development also covers those decoupling indicators, however, they are less prominently presented.

Figure 6: Concept of decoupling



4. Conclusions

The concepts of green growth and sustainable development can be represented in the same conceptual framework and its measurement can be regarded to be part of the broader area of sustainability. The conceptual measurement of sustainable development and green growth are thus coherent with each other. More specifically, the pursuit of welfare now and in the future and green growth overlap partially, but each specifically focuses on certain issues that are not addressed by the other.

The conceptual measurement of sustainable development focuses the “here now” and “later“ and “elsewhere” dimensions which translates to indicators for respectively human wellbeing, the different forms of capital and impacts on other countries. The focus of green growth is narrower and focuses on the economy-environment nexus, but there is a direct overlap with the indicators that relate to:

- Human wellbeing (here and now): the environmental quality of life
- Capital (later): natural capital
- International dimension (elsewhere): the international interrelationships that may affect global natural capital

There are also three areas that are specifically addressed by green growth:

- Environmental and resource productivity
- “Green” policy responses
- Economic opportunities that arise from greening the economy.

Finally, green growth indicators do not cover the following areas, which are included in the measurement of the sustainable development:

- Quality of life (other than environmental quality of life)
- Human, social and financial capital (other than green aspects)
- Impacts on other countries (other than on natural capital)

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Annex: thematic comparison of the indicators

In section 2.3 we made a conceptual comparison between sustainable development and green growth. Here, the differences in the indicator sets for sustainable development and green growth are discussed. A thematic comparison is made by comparing the underlying classification schemes for the indicators. These classifications for green growth and sustainable development are obtained from OECD (2011) and Smits and Hoekstra (2011) (which is a summary of the TFSD work). First, a comparison is made starting with the OECD green growth indicator classification (Table 1). Next, a comparison is made starting from the sustainable development indicator classification (Table 2).

Table 1 shows how the OECD Green Growth indicators relate to those of sustainable development. As expected, the green growth indicators are mostly being covered by sustainable development, although in some cases the indicators have a broader perspective in sustainable development. The main difference arises in the group of economic opportunity and policy responses (green growth level 1). This is mostly absent in sustainable development. For the group environmental and resource productivity the themes overlap, although the nature of the underlying indicators an what they measure may be different.

Table 1 Comparison the theme classification of green growth and sustainability

Green Growth Level 1		**Green growth: Level 2**	**Sustainable development: Thematic**
The socio-economic context and characteristics of growth	G1	Economic growth, productivity and competitiveness	S2 Consumption and income
	G2	Labour markets, education and income	S2 Consumption and income, S6 Health, S7 Labour, S8 Education
Environmental and resource productivity	G3	Carbon & energy productivity	S18 Climate
	G4	Resource productivity	S14 Non-energy reserves; S13 Energy reserves
	G5	Multi-factor productivity	Broader concept: S2 Consumption and income
Natural asset base	G6	Renewable stocks	S16 Water, S15 Land and ecosystems
	G7	Non-renewable stocks	S14 Non-energy reserves, S15 Energy reserves
	G8	Biodiversity and ecosystems	S15 Land and ecosystems
Environmental quality of life	G9	Environmental health and risks	S17 Air quality, S19 Physical safety
	G10	Environmental services and amenities	Broader concept: S9 Health
Economic opportunities and policy responses	G11	Technology and innovation	Broader concept: S20 Knowledge capital

G12	Environmental goods and services	Not covered
G13	International financial flows	S2 Consumption and income
G14	Prices and transfers	Not covered
G15	Regulations and management approaches	Not covered
G16	Training and skill development	Broader concept: S8 Education

In Table 2 we make the opposite comparison, namely starting with the classification for sustainability indicators and matching the green growth indicator classification. This table also shows the three dimensions of sustainability, and where these dimensions overlap for the different themes. Summarising the results of Table 2, we note that we have a complete overlap for the themes related to natural capital. For the themes related to the other capital forms, we have no or partial overlap.

Table 2. Comparison the theme classification sustainable development and green growth

	Theme	**Sustainable development**			**Green growth**
		Human well-being	**Capital**	**International dimension**	
S1	Subjective wellbeing	X			Not covered
S2	Consumption and income	X		X	G1 Economic growth, productivity and competitiveness
S3	Leisure	X			Not covered
S4	Inequality	X			Not covered
S5	Physical safety	X			Partly covered: G9 Environmental health and risks
S6	Housing	X			Not covered
S7	Labour	X	X		Partly covered: G12 Environmental goods and services
S8	Education	X	X		Partly covered: G16 Training and skill development
S9	Health	X	X		Partly covered: G9 Environmental health and risks
S10	Trust	X	X		Not covered
S11	Shared norms and values	X	X		Not covered
S12	Institutions	X	X	X	Not covered
S13	Energy reserves		X	X	G7 Non-renewable stocks

S14	Non-energy reserves		X	X	G7 Non-renewable stocks
S15	Land and ecosystems		X	X	G8 Biodiversity and ecosystems, G6 Renewable stocks
S16	Water		X	X	G6 Renewable stocks
S17	Air quality	X	X		G9 Environmental health and risks
S18	Climate		X	X	G3 Carbon and energy productivity
S19	Physical capital		X	X	Not covered
S20	Knowledge capital		X	X	partly covered: G11 Technology and innovation
S21	Financial capital		X		Not covered