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# Green Transformation towards Sustainable Development?

A Comparative Analysis of the Green Transformation Concepts by UNEP, OECD, and WBGU through the Lens of Sustainable Development



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## **Abstract**

Both the concept of sustainable development (SD) and the new green transformation concepts (GTC) aim for the integration of environmental protection and development. Previous comparative research on these GTC is not based on theoretically founded criteria that are related to the established development paradigm of SD. The study closes this research gap by providing a conceptual comparison of different GTC versions as published by UNEP, the OECD, and the German Advisory Council on Global Change (WBGU). The analysis reveals that GTC concepts are indeed based on central goals and principles of SD. Unlike the concept of SD, the GTC acknowledges planetary boundaries as limits to growth. However, the more economy-focused concepts of UNEP and the OECD do not only disregard important social goals but also concerns of intergenerational equity and the globality principle of SD. In contrast, the WBGU focuses on civil society participation and both intra- and intergenerational equity by aiming for decisive institutional changes. It is shown that this GTC partly extends beyond the scope of SD and thus could mark an important step with regard to the further development of the concept.

Keywords: Green Economy, sustainable development, transformation, Rio Conference, UNEP, OECD, WBGU

## **Zusammenfassung**

Das Konzept der nachhaltigen Entwicklung und die neuen *Green Transformation Concepts* (GTC) zielen auf die Integration von Umweltschutz und Entwicklung ab. Bisher fehlt eine systematische Gegenüberstellung anhand theoretisch fundierter Kriterien, die auf den Zielen und Prinzipien der nachhaltigen Entwicklung beruhen. Die Studie schließt diese Forschungslücke durch einen konzeptionellen Vergleich der GTC von UNEP, der OECD und dem Wissenschaftlichen Beirat für Globale Umweltveränderungen (WBGU). Die Analyse zeigt, dass die GTC auf zentrale Ziele und Prinzipien des Konzeptes der nachhaltigen Entwicklung eingehen. Eine wichtige Entwicklung zeigt sich darin, dass die untersuchten Transformationskonzepte die planetarischen Grenzen als Limitierung für Wachstum begreifen. Jedoch werden nicht nur die sozialen Ziele der nachhaltigen Entwicklung, sondern auch die intergenerationale Gerechtigkeit und das Prinzip der Globalität der Lösungen von UNEP und OECD weitestgehend außer Acht gelassen. Das Konzept des WBGU fokussiert sich weit mehr auf eine gesteigerte Beteiligung der Zivilgesellschaft sowie intra- und intergenerationale Gerechtigkeit, wofür institutionelle Veränderungen im Sinne einer grünen Transformation vorgeschlagen werden. Die Analyse macht deutlich, dass insbesondere dieses GTC wichtige Impulse für die Weiterentwicklung des Konzeptes der nachhaltigen Entwicklung beinhaltet.

Schlagwörter: Green Economy, Nachhaltige Entwicklung, Transformation, Rio Konferenz, UNEP, OECD, WBGU



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## List of Abbreviations and Acronyms

BMU	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
CCS	Carbon Dioxide Capture and Storage
CISDL	Center for International Sustainable Development Law
EU	European Union
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GE	Green Economy
GER	Green Economy Report
GG	Green Growth
GGE	Green Growth and Green Economy
GGs	Green Growth Strategy
GHG	Greenhouse Gas
GT	Great Transformation
GTC	Green transformation concept(s)
IPRs	Intellectual Property Rights
IUCN	International Union for Conservation of Nature and Natural Resources
MDG	Millennium Development Goals
NGO	Non-Governmental Organisation
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PES	Payment for Ecosystem Services
PRSP	Poverty Reduction Strategy Paper

REDD	Reducing Emissions from Deforestation and Forest Degradation
SD	Sustainable development
SELA	Sistema Económico Latinoamericano y del Caribe (Latin American and Caribbean Economic System)
TEEB	The Economics of Ecosystems and Biodiversity
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNCHE	United Nations Conference on the Human Environment
UNCSD	United Nations Conference on Sustainable Development
UNDESA	United Nations Department of Economic and Social Affairs
UNEP	United Nations Environment Programme
UNGA	United Nations General Assembly
WBGU	Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (German Advisory Council on Global Change)
WCED	World Commission on Environment and Development
WCS	World Conservation Strategy
WSSD	World Summit on Sustainable Development



# 1. Introduction

## 1.1. Green Transformation towards Sustainable Development?

The debate on how to achieve a more sustainable development started at the latest in 1972, when the famous report *The Limits to Growth* (Meadows et al. 1972) was released and the United Nations' (UN) first major conference on international environmental issues took place in Stockholm (United Nations Environment Programme (UNEP) 1972). An important milestone for the emergence of the concept of sustainable development (SD) was the World Commission on Environment and Development (WCED), also known as Brundtland Commission, which provided the most common definition of SD. According to the WCED (1987: 43), "sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". The report served as a background for the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 which acknowledged the integration of environmental, economic, and social concerns as a global development paradigm.

After twenty years of debate and implementation, the concept of SD finds itself "still in its infancy" (Waas *et al.* 2011: 1643; cf. United Nations General Assembly (UNGA) 2010a; 2010b). Despite important successes that could be reached, critics perceive "a conceptual deadlock" in which SD is trapped in (Bakkour *et al.* 2012: 2; cf. Bigg 2011: 28; Drexhage and Murphy 2010: 12; 19-20; Pawłowski 2008: 87).

In 2012, the United Nations Conference on Sustainable Development (UNCSD), also called "Rio+20", again took place in Rio but dealt with a "new buzz word in sustainability discourses" (Brand 2012a: 28) – Green Economy (GE). During the last years, various concepts aiming for a "green" transformation of the economic system have been developed.<sup>1</sup> Although some of these strategies are thought to renew the commitment to achieving SD, until now it remains unclear how the concepts' objectives and assumptions are related to the internationally acknowledged concept of SD (Bär *et al.* 2011b: 27; Haas 2012: 97).

## 1.2. State of Research

Although a growing number of studies is devoted to the topic of green growth and green economy (GGE) (e.g. Brand 2012b; Conservação Internacional 2011; Forum Umwelt & Entwicklung 2011; Selin *et al.* 2011), to date, no at-

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<sup>1</sup> In this study, "green transformation concept" (GTC) is understood as a set or framework of principles, goals or concrete actions that aims at restructuring the economy by taking into account environmental boundaries and social concerns. The term, as applied in this thesis, refers to, *inter alia*, the Green Economy Report (GER) published by the United Nations Environment Programme (UNEP), the Green Growth Strategy (GGS) by the Organisation for Economic Co-operation and Development (OECD), and other concepts that use different wordings like e.g. the Great Transformation (GT) applied by the German Advisory Council on Global Change (WBGU).

tempts of embedding the concepts in the SD framework have been undertaken. The relation between SD and green transformation concepts (GTC) has not been thoroughly discussed. Haas (2012) finds that whilst the GE has been promoted in the debate before Rio+20, there are only a few studies that attempt to define it, but do so in divergent ways (cf. Dröge and Simon 2011b). Cook and Smith (2012) as well as Dröge and Simon (2011a) lament the current lack of a clear definition and conceptual accuracy.

The public and academic debate on the GTC focuses on the general conceptualisation as well as the challenges of their implementation. Critics argue that the social dimension, i.e. the third pillar of SD, is neglected (Cook and Smith 2012; Brand 2012a; Forum Umwelt & Entwicklung 2011; Khor 2011b). This also represents, together with the concerns regarding green protectionism and new conditionalities towards the developing countries, the major critique in the public debate in the run-up to Rio+20 and on GGE in general (Bär et al. 2011b: 11–13; Forum Umwelt & Entwicklung 2011; Jenkins and Simms 2012). Until now, there are only a few studies that draw first comparisons among the GTC (Bär et al. 2011b; Berger and Gjoksi 2010; Sistema Económico Latinoamericano y del Caribe (SELA) 2012). These studies include concepts with diverse geographical and organisational coverage (international as well as non-governmental approaches), but mainly focus on those issued by the “policy leaders” (Blaxekjær 2012: 1): the Organisation for Economic Co-operation and Development (OECD), the United Nations Environment Programme (UNEP), and the European Union (EU).

Different criteria, such as the concepts’ elaboration, the proposed implementation mechanisms, and the role of growth are considered in the comparison; however, the selection of criteria partly remains unexplained or does not relate to the conceptual background of SD. Other studies refer to aspects of SD but do not further elaborate on their relation to the concept on a theoretical grounding.<sup>2</sup>

### 1.3. Statement of Purpose and Research Question

As could be shown, no systematic comparison of the transformation concepts has been elaborated that builds on the concept of SD. The scientific contribution of this thesis lies within closing the identified research gap by answering the following question: To what extent do the GTC correspond to the three dimensions (economic, environmental, and social) and to the fundamental principles and elements inherent to the concept of SD? Additionally, this research question allows for determining potential progress in understanding and conceptualising SD that may be found in the new transformation concepts.

Therefore, a sample of GTC will be compared through the lens of the internationally acknowledged concept of SD. The analysis allows for figuring out how far the concepts include those goals and principles that are inherent to the de-

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<sup>2</sup> Sawyer (2011) relates it to the emergence and the basic idea of SD without further elaborating on common underlying assumptions or objectives. Halle (2011) shortly discusses the GE as a means to reach SD and the need for accountability in the institutional design.

velopment paradigm of SD. For answering the research question to what extent the GTC relate to the concept of SD it does not suffice to analyse the economic, environmental, and social dimensions. It will be shown that there are elements inherent to SD that go beyond the tripartite conceptualisation and are of similar importance so as to be able to ascertain the level of convergence of SD and the new GTC. Thus, in the fourth analytical unit it will be of interest to find out to what extent the GTC contain elements that: assure the equality of the three dimensions and their integration, reflect the SD inherent principle of global partnership and governance, set up appropriate policies for population growth, guarantee for intergenerational equity, and stress the importance of education for the transformation as proposed in the concept of SD.<sup>3</sup>

The analysis of these four groups of criteria helps gaining systematically compiled insights into the similarities and dissimilarities of the compared GTC – a task that has not been fulfilled in the previous research on the GTC. Furthermore, it can be ascertained whether current critique of the concepts can be affirmed or even extended, in case that the most basic elements of SD are not recognised satisfactorily. Similarly, the concepts' value added can be identified in contrast to the concept of SD.

Due to their international reputation in development policy and research as well as their importance in the discussion in the run-up to Rio+20, the comparison will focus on three important international transformation strategies proposed by UNEP, OECD, and the German Advisory Council on Global Change (WBGU). The selected GTC seem eligible for the intended comparison since all explicitly claim to pave the way towards sustainability.<sup>4</sup> As already could be shown, on the one hand, the concepts by UNEP and the OECD have already been subject to discussion and primary comparisons. On the other hand, the WBGU report has not been included in comparative studies so far, but is considered to be highly relevant for the debate on a green transformation.

#### 1.4. Structure and Methodology of the Study

With the intention of identifying the relation of the GTC to the concept of SD, the analytical framework will be elaborated deductively on the basis of the concept of SD. The definition and understanding of SD is extracted from the deliberations of the WCED and the UNCED as the most important international milestones for the emerging global development paradigm.

By analysing the transformation concepts' argumentative structures regarding the tridimensional conceptualisation (economic, environmental, and social dimensions) and the underlying principles of SD, it will be ascertained to what extent the compared concepts differ from or converge with the concept of SD. Furthermore, the different assumptions of the GTC allow for comparing the concepts among each other.

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<sup>3</sup> It is important to note that this study cannot elaborate on the plausibility or (technical) feasibility of the proposed measures in the GTC. This could be the target of further studies.

<sup>4</sup> Cf. OECD (2011b: 10-11; 35; 115-116), UNEP (2011a: 17; 19), and WBGU (2011: 62-63; 271).

In order to answer the research question, this study proceeds as follows: The subsequent chapter will provide the conceptual background for the comparative analysis by focusing on the emergence and evolution as well as the understanding of SD in the political debate. The three dimensions of SD and their relation will be presented before outlining the critique of the concept. The third chapter elaborates on the development of the GTC before giving an overview of those selected for the analysis, and reviews the state of the debate. In the fourth chapter, the analytical framework for the comparative analysis will be developed. With the intention of assessing potential similarities and differences of the selected strategies and evaluating their correspondence to the concept of SD (chapter 5), the GTC shall be examined in a qualitative analysis on the basis of the previously developed analytical dimensions. The final chapter summarises the results of the comparative analysis, reviews the potentially beneficial contribution of the GTC for the development of the concept of SD, and provides an outlook on further research on the GTC and SD by concentrating on the critique of the concepts.

## 2. Concept of Sustainable Development

Sustainable development (SD) is one of the most successful political terms in the late twentieth century which has gained extraordinary attention in policy discourse (Bruyninckx 2006: 265). This is due to both the combination of social, economic, and environmental goals united in a “visionary development paradigm” (Drexhage and Murphy 2010: 6) and the vagueness of the concept that allows broad interpretation since it represents “an essentially contested concept” (Death 2010: 59; cf. Giddings *et al.* 2002: 187; Hinterberger 1998: 74; Waas *et al.* 2011).

In order to give important insights into the development of SD as a political concept, the next section elaborates on its roots and the historical context. Subsequently, its definition and most important elements, the conceptualisation (three dimensions), and the criticism voiced in the debate are spotlighted.

### 2.1. Emergence and Evolution of the Concept

The origins of the concept of SD can be found in the early 1970s.<sup>5</sup> However, it was not until the end of the following decade that environmental problems and development issues were integrated and discussed at a global stage. The concept of SD can be regarded as a “result of the growing awareness of the global links between mounting environmental problems, socio-economic issues to do

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<sup>5</sup> Some authors find the origins of the debate on SD even earlier: Quental *et al.* (2011: 18) date it back to the late 1940s when the International Union for Conservation of Nature and Natural Resources (IUCN) was founded and the worsening of ecological conditions became apparent. According to Dixon and Fallon (1989), Steer and Wade-Gery (1993: 23), and Jörissen *et al.* (1999: 11-13), the roots of sustainability and the limits of the earth’s carrying capacity are already to be found in the eighteenth century: The work of Thomas Robert Malthus, Carl von Carlowitz, and Georg Ludwig Hartig is often referred to as early treatise on sustainability (in forestry) and the limits to growth.

with poverty and inequality and concerns about a healthy future for humanity” (Hopwood *et al.* 2005: 39). The famous but also harshly criticised report *The Limits to Growth* by Meadows *et al.* (1972) is commonly referred to as the starting point for the modern consideration of environmental issues for human development and economic growth (e.g. Bruyninckx 2006: 265; Death 2010: 38; Dingler 2003: 189; Pezzoli 1997; Waas *et al.* 2011: 1640). By modelling the relationship between the world’s increasing population growth, proceeding industrialisation, depletion of limited natural resources, growing food production, and increasing pollution levels, Meadows *et al.* conclude that in a world with finite resources, growth cannot be realised forever.<sup>6</sup>

The second cornerstone in the evolution of the concept of SD is the United Nations Conference on the Human Environment (UNCHE) in Stockholm in 1972. The UNCHE can be regarded as pivotal since it acknowledged the strong link between the well-being of humankind and the environment. It highlighted the need for common action to protect the global environment, which was also displayed in the creation of UNEP (Kirkby *et al.* 1995a: 1). Important principles for the preservation and enhancement of the human environment were agreed in the Stockholm Declaration (UNEP 1972). At the same time, conflicting interests were voiced with regard to the assumed incompatibility of the two goals of environmental protection and development (Dingler 2003: 214–215).

For the first time in an international document, the term “sustainable development” was used in the publication of the *World Conservation Strategy* (WCS) which was jointly published by the International Union for Conservation of Nature and Natural Resources (IUCN), UNEP and the World Wide Fund for Nature (IUCN *et al.* 1980). The conservation of nature is central to the study (Kirkby *et al.* 1995a: 1; Di Giulio 2004: 29-32; Dingler 2003: 215), whereas the social dimension is found to be rather neglected (Lélé 1991: 610; Robinson 2004: 372). The “conservationist-environmentalist” argumentation of the WCS was criticised for claiming that the behaviour of the poor was found to be the main cause of environmental damage (Kirkby *et al.* 1995b), whereas a solution for overcoming poverty was not elaborated (Langhelle 1999: 132).<sup>7</sup>

The report *Our Common Future* (WCED 1987), which was prepared by the Brundtland Commission, an international group consisting of politicians and experts on development and environment, marks the most important milestone in the international debate on SD. The term was introduced into the political as well as the public debate while also transforming the earlier understanding of

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<sup>6</sup> Meadows *et al.* (1972) also gave an optimistic outlook on the necessary changes in order to address these growth trends and to reach a state of equilibrium that could be sustained in the future. However, this was not further discussed as the critics caught on concentrating on the modelling and presumptions of the report (cf. Bardi 2011: 11-13; 49-62). According to Bardi (2011: 2), the “results were a shock. [...] Some recognized it as a milestone [...], while others dismissed it as a worthless exercise based on flawed assumptions.”

<sup>7</sup> During the 1980s, the school of “ecodevelopment” evolved as another decisive predecessor of the SD concept (cf. Adams 2001: 114-116; Harborth 1991). The representatives of “ecodevelopment” agreed to the undeniably existing limits to growth and combined this thesis with the ultimate goal of satisfying human needs as well as with the idea of zero growth (cf. Dingler 2003: 215). However, its radicalness could not assert itself (Eblinghaus and Stickler 1996: 31-32).

SD. The overarching goal was to develop a “global agenda for change” by integrating both environmental and developmental issues and the goal of inter- as well as intragenerational justice (WCED 1987: ix; cf. Jörissen *et al.* 1999: 15). The final report provided the most commonly used definition of SD and initiated a broad and intensive discussion about the means to achieve it (cf. Di Giulio 2004; Jörissen *et al.* 1999: 16–17; Kirkby *et al.* 1995a: 1).<sup>8</sup>

Another important milestone in the evolution of SD was the United Nations Conference on Environment and Development (UNCED) taking place in Rio de Janeiro in 1992. The title of the conference indicated that a compromise between environment and development had to be found. Despite the ambiguous interests of developing and developed countries (Adams 2001: 80),<sup>9</sup> the results were considered a success (Quental *et al.* 2011: 21) or “better than was feared” (Kirkby *et al.* 1995a: 10), partly fuelled by the rising concern about environmental change (Quental *et al.* 2011: 21; Vogler 2007: 435). The governments present at the Earth Summit formally acknowledged the concept of SD as underlying principle for development and as premise for national policies (Dingler 2003: 216; Kirkby *et al.* 1995a: 10–12).

The UNCED gave birth to an international framework on SD including various instruments, *inter alia*, the Agenda 21 (Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit (BMU) 1997) and the Rio Declaration on Environment and Development (UNCED 1992). A practical approach for the implementation of SD policies at the local and the (inter)national level was offered by the Agenda 21. It was supposed to build “a new and equitable global partnership through the creation of new levels of cooperation among States, key sectors of societies and people” (UNCED 1992; cf. Adams 2001: 83–95; Kirkby *et al.* 1995a: 12). The Rio Principles, although not establishing the expected legally binding “Earth Charta” (Adams 2001: 83; Porras 1992; Waas *et al.* 2011: 1624),<sup>10</sup> were of particular importance for the evolving global SD paradigm. Further outcomes of the conference were the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, and the Statement of Forest Principles. Later, as recommended by the Agenda 21, the Commission on Sustainable Development was founded in order to ensure the effective implementation and follow-up of the agreements made in Rio (Kirkby *et al.* 1995a: 12).

Ten years after the conference in Rio and five years after the first and deflating review at the Earth Summit+5 in New York, the World Summit on Sustainable Development (WSSD) was held in Johannesburg in 2002 (Di Giulio 2004: 227–253; Drexhage 2010: 8; Gardner 2002; Lafferty and Meadowcroft 2002b). The

<sup>8</sup> For WCED’s definition of SD, see section 2.2.1.

<sup>9</sup> According to observers, the dividing line within the debate lay between the interests of the South in eradicating poverty, their fear of losing the right to development, and the claims for additional development aid vis-à-vis the Northern interest in global environmental protection and concerned with the financial support for implementing SD (Adams 2001; Kirkby *et al.* 1995a: 10; Porras 1992: 246–247; Vogler 2007: 436–437; 439).

<sup>10</sup> Despite the euphoria and the public and political awareness of and attendance at the Earth Summit 1992, the conference did not produce the hoped-for “Earth Charta” that has been proposed by the WCED (Porras 1992; Waas *et al.* 2011: 1624).

deficient implementation and possibilities of adjustment were the major issues discussed at the summit (Vogler 2007: 437). The developing nations were interested in a conference that would give developmental concerns a more dominant position since former conferences were criticised for being biased towards environmental concerns (Bruyninckx 2006: 269-270; Jörissen *et al.* 1999: 18; Porras 1992: 252; Victor 2006; Waas *et al.* 2011: 1643). The Johannesburg Summit, which was backed by the agreement on the Millennium Development Goals (MDG),<sup>11</sup> aimed at further eradicating environmental degradation, poverty as well as patterns of unsustainable development (Drexhage and Murphy 2010: 8-9). The interdependence of economic as well as social development and environmental protection was reaffirmed in the Johannesburg Plan of Implementation (United Nations Department of Economic and Social Affairs (UNDESA) 2002). However, Victor (2006: 94) states that the “process reached its lowest point with a sprawling and incoherent plan”. This might have been due to the current political priorities (e.g. fight against terrorism) and thus diminished the political commitment to SD (cf. Drexhage 2010: 9; Quental *et al.* 2011).

The UNCSD in Rio in 2012 was convened by the UNGA (2010a: 5) in order to “secure renewed political commitment for sustainable development, assessing the progress to date and the remaining gaps in the implementation of the outcomes of the major summits on sustainable development and addressing new and emerging challenges.” Key priorities of the conference were, firstly, the reform of the institutional framework for SD12 and, secondly, to fathom out the possibilities of eradicating poverty by greening the economy and to locate the concept in the sustainable development framework (UNGA 2010b: 4). However, the outcomes of the UNCSD in Rio in 2012 (UN 2012) are deemed to be a setback on the way towards further institutionalising and encouraging the concept of SD as leading global development paradigm (Messner 2012).

Figure 1: Shifts in the UN Conferences



Source: Compiled by the author.

As could be shown, the concept of SD evolved in a long process that paved the way for the negotiations of global environmental and developmental politics and, hence, the SD paradigm (cf. Figure 1; Baker 2006: 54-55; Death 2010: 38; Di Giulio 2004: 24-29).

<sup>11</sup> The MDG include eight goals (halving extreme poverty, stopping the spread of HIV/AIDS, providing universal primary education, etc.) which are to be met by the international community by the year 2015. For an encompassing discussion, see Nuscheler and Roth (2006).

<sup>12</sup> The deficient implementation of the SD agenda is also part of the critique of SD (cf. section 2.3 in this study). For an overview on the current discussions about the reform of the institutional framework for SD, see Beisheim *et al.* (2011).

## 2.2. Definition and Understanding of SD

In the course of the debate, several divergent definitions have been assembled (Dingler 2003: 216-220). Hopwood *et al.* (2005: 47) state that there is no “single unified philosophy of sustainable development; there is no sustainable development ‘ism’.” Nevertheless, the basic idea of SD is to preserve the ecologic quality, to create economic welfare, and, therein, ensure social equality – in an intergenerational and intragenerational manner (Keiner 2005).<sup>13</sup> However, for the prevalent understanding of SD within the international community, the WCED and the UNCED were of utmost importance since they built global consensus on SD as international political goal and development paradigm (Dingler 2003: 233).<sup>14</sup> Bruyninckx (2006: 270) characterises both definitions as the “meta-concepts, which capture a broad, integrated, not to say holistic vision of the future” (cf. Adams 2001: 54; Di Giulio 2004: 305-307; Jörissen *et al.* 1999: 19).

### 2.2.1. World Commission on Environment and Development (WCED)

The most widely cited definition, which effectively is considered as path-breaking and “the official one” (Kirkby *et al.* 1995a: 1), is the definition compiled by the WCED (cf. Carvalho 2001: 63; Dingler 2003; Lélé 1991: 611, Redcliff 2005: 213; Sneddon *et al.* 2006: 255). According to the WCED (1987: 43), SD is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. Aside this anchor definition, another more operational definition is given (Waas *et al.* 2011: 1649): SD is furthermore “a process of change in which exploitation of resources, the direction of investments, the re-orientation of technology development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations” (WCED 1987: 46).

The ecological crisis is considered to be a global problem and the main hindrance for human development that has to be prevented by encouraging participation of all societal actors. The reconciliation of ecology and the economy is seen as central in order to reach a “new development path” (WCED 1987: 4; cf. Dingler 2003: 222-224). SD, as a normative-ethical principal (WCED 1987: 308), shall guide human behaviour towards this reconciliation and shall provide criteria for the evaluation of human action and its impacts (cf. Di Giulio 2004: 59-61; Langhelle 1999: 139; Spangenberg 2004: 75). The report takes an optimistic viewpoint by arguing that it is not about constraints and renouncement but rather about a common vision of the future which leads to jointly conducted changes (cf. Di Giulio 2004: 46; 379-380).

<sup>13</sup> In the early 1990s, more than 70 definitions of the concept were counted (cf. Dingler 2003: 216; Dixon and Fallon 1989; Hopwood *et al.* 2005: 41; Kirkby *et al.* 1995a: 1).

<sup>14</sup> For alternative understandings of SD, see Dingler (2003: 342-383) and Carvalho (2001). In economic approaches to SD, classifications often are made by applying the distinction between “strong sustainability” and “weak sustainability” basing on divergent assumptions about whether natural capital is substitutable by other forms of capital (human and man-made capital) or not (Daly 1996; Neumayer 2010; cf. Dingler 2003: 384-482).



The understanding of SD bases on fundamental concepts concerning the needs of current and future generations, the notion of limitations of development, and a global and long-term perspective by envisioning the SD as a guard rail for the development of the human society (WCED 1987: 43; cf. Di Giulio 2004: 44-49). The concept of needs – especially the essential needs of the poor (WCED 1987: 8) – is given paramount priority. The satisfaction of those needs and moreover the equal opportunity to do so both in a global and in a temporal dimension displays the overarching goal of the concept of SD in the understanding of the Brundtland Commission. "Needs" are understood not just as basic needs such as water, energy, food, and housing, but as well as the wish for a better life (WCED 1987: 8). Those needs are assumed to be the same for all human beings. Kirkby *et al.* (1995a: 1-2), Dingler (2003: 222), and Robinson (2004: 373) detect a shift towards a more anthropocentric definition of SD than in earlier definitions, such as the WCS (IUCN *et al.* 1980).

Since it concerns all people nations, the WCED takes a global and a long-term perspective when defining SD (Di Giulio 2004: 63): The title *Our Common Future* especially mirrors this notion of the shared responsibility for the future of all people on earth, albeit the national strategies to reach a more sustainable development must vary depending on the specific context (WCED 1987: 40).

The management of SD through the people and institutional change processes is emphasised in this definition (cf. Franks 1996: 55; Waas *et al.* 2011: 1649). With regard to this, the merging of environmental considerations in (economic) decision-making, the people's participation, and the role of education for SD is of importance (WCED 1987: xiv; 21; 47; cf. Di Giulio 2004: 58-59; 64; Waas *et al.* 2011: 1649).

Although not explicitly claimed, the intragenerational nature of sustainability is stressed (Dingler 2003: 223); the report merely states that the concern of equity must "logically be extended to equity within each generation" (WCED 1987: 43). The Commission argues that this "logic" derives from the poverty-environment relationship since "the reduction of poverty itself is a precondition for environmentally sound development" (WCED 1987: 69). That explains the necessity for the satisfaction of needs of the poor in both present and future generations (cf. Langhelle 1999: 140-142).

The unsustainable development is traced back to poverty and population growth within the developing world (WCED 1987: 3; 29; 96). More at the margin of the report, economic growth in the developed countries is also assumed to be responsible for the ecological crisis. The Commission argues that past models of growth have failed to eradicate poverty and thus created a "downward spiral of poverty and environmental degradation" (WCED 1987: xi-xii). According to the WCED (1987: 49), "the critical objectives which follow from the concept of SD are to revive growth as well as to change the quality of growth; to meet the essential needs for jobs, food, energy, water, and sanitation; to ensure a sustainable level of population; to conserve and enhance the resource base; to re-orient technology and managing risks; to merge environment and economics in

decision-making; and to re-orient international economic relations. The Brundtland Report argues for “freer market access for the products of developing countries, lower interest rates, greater technology transfer, and significantly larger capital flows, both concessional and commercial” (WCED 1987: 89).

Controlled growth is central to reach SD: The report assumes that a growth rate of the gross domestic product (GDP) of five to six per cent in developing countries and of three to four per cent in developed countries would be an adequate goal for a global growth strategy aiming for SD (WCED 1987: 50). In order to change the quality of growth, the report proposes to manage nature by technique (cf. Dingler 2003: 227): increase efficiency, decoupling of economic growth from physical growth and environmental deterioration, and the rationalisation of technology and the production as well as the management of common goods and resources (WCED 1987: 45-49). In contrast to former documents such as *The Limits to Growth* report, the reconciliation of ecology and the economy, i.e. economic growth, is a key element for achieving sustainability (WCED 1987: 49). The notion of limits to growth shifted considerably to the possible “growth of the limits” (Dingler 2003: 226) by referring to alterable limits set by technological development and social organisation and not by planetary boundaries (WCED 1987: 8; 43). Literature refers to this break as a major conceptual transformation or “innovation” of the SD discourse (Dingler 2003: 223-226).

In line with Robinson (2004: 372), it can be said that the Brundtland definition combines both radical and reformist elements: Ecological sustainability cannot be achieved if poverty is not successfully reduced worldwide. This implies the radical element of arguing for an integration of the complex issue of environmental degradation into social development and poverty eradication. On the other hand, the report argues from a reformist point of view to promote more development even if this is one cause of the environmental deterioration. The solution for underdevelopment in the developing countries as well as over-consumption in the developed countries lies within more, even though environmentally sensitive development, i.e. if “the content of growth reflects the broad principles of sustainability” (WCED 1987: 44).

### **2.2.2. United Nations Conference on Environment and Development (UNCED)**

The second paradigmatic contribution in the debate on SD was provided by the UN at the Earth Summit in 1992. The Rio Conference based on the programmatic guidelines of the Brundtland Report and built on its major achievements. Although SD was the unifying theme of the summit and the term appears throughout the Rio Documents<sup>15</sup>, an explicit definition of SD is not given (Adams 2001: 83; 86; Di Giulio 2004: 87; 106; Dingler 2003: 234; Porras 1992: 248). It rather dealt with the elaboration of an implementation framework for the new development paradigm (Kirkby *et al.* 1995a: 10). However, the UNCED slightly transformed the former concept of SD in order to reach a broad global consen-

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<sup>15</sup> In this study, the Agenda 21 and the Rio Declaration are also referred to as the Rio Documents.

sus (Dingler 2003: 233; Kirkby *et al.* 1995a: 10; Jörissen *et al.* 1999: 17–19). Therefore, the Rio Declaration endorsed many principles mentioned in earlier contexts (cf. UNEP 1972), e.g. the precautionary principle or the “polluter pays” principle (UNCED 1992: Principles 15 and 16). Socio-economic concerns dominated the debate on the integration of the environment and development (Quental 2011: 21; Spangenberg 2004: 77; Vogler 2007: 437).

Despite the lack of a definition within the Rio Documents, the understanding of SD can be derived both from the Rio Declaration and from the Agenda 21 (Dingler 2003: 234-238). Similarly to the definition elaborated by the WCED, the understanding of SD builds on the integration of environmental and developmental concerns giving the satisfaction of basic human needs and the improvement of living standards of all people (current and future generations) a special significance. Eradicating poverty is recognised as the “indispensable requirement of sustainable development” (UNCED 1992: Principle 5; cf. Dingler 2003: 234; Porras 1992: 248). It is claimed that the anthropocentric focus of the Brundtland Report is sustained in the Rio Documents (Dingler 2003: 249; 253; Porras 1992: 247). This is due to the fact that SD aims for the sustainable usage of natural resources as well as the preservation and provision of resources needed for development in order to avoid the deterioration of ecosystems that are important for human well-being (BMU 1997: 3; 9; 68; UNCED 1992: Principle 1 and 3). Therefore, the “right to development” (Principle 3) must be guaranteed in order to fairly meet the developmental and environmental needs of present and future generations. This right is constrained by Principle 4, the environmental protection imperative, which postulates that “environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it” (UNCED 1992).

Furthermore, the principle of common but differentiated responsibility is of importance for the understanding of SD:

States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command (UNCED 1992: Principle 7).

Two important elements included in this principle aim at equality between the developing and the developed countries within the regime: Firstly, there is the common responsibility for the protection of nature of all states. Secondly, there are differentiated responsibilities of countries according to their former responsibility for causing the problem of unsustainable development as well as for the way towards more sustainable development by delivering the technological and financial resources for change (Center for International Sustainable Development Law (CISDL) 2002). Especially this principle of the Rio Declaration lays the foundation for the global SD cooperation or partnership between developing

and developed countries by transferring resources in view of different levels of environmental standards and different contributions to the status quo (CISDL 2002: 2; Porras 1992: 250).

Principle 11 is closely related to the principle of common but differentiated responsibilities. This principle is reflecting on asymmetrical environmental and developmental backgrounds as well as rights and obligations of the countries (CISDL 2002: 2): “[e]nvironmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries” (UNCED 1992).

With regard to the causes for the environmental crisis and unsustainable development, Steer and Wade-Gery (1993: 28) see a “causal duality” in the agreements of Rio. They argue that the “international community agreed that environmental damage has two main causes: first, unmanaged economic expansion; and second, a lack of economic development”. This indicates that besides the prevailing production and consumption patterns as well as the lacking modernisation in the developing countries, poverty is seen as an important cause for over-consumption of environmental assets (BMU 1997: 235; cf. Dingler 2003: 316; 234-235). Population growth in the emerging and developing countries also ranks high as a cause for environmental degradation within the SD concepts (Dingler 2003: 242-243). This shows a shift in the term’s radius of application: Since the Rio conference, the developed countries are firmly included in the debate on the global dynamics of development formerly dominated by the discussion on causes and solutions lying within the developing countries (Adams 2001: 88-89; Dingler 2003: 193-194; Porras 1992: 247-249).

Despite the changes in the analysis of causes of the Brundtland Report and the Rio Documents, the solutions for unsustainable development changed only slightly (Dingler 2003: 235-238; 241-251; Schmidt 2005: 84). Similarly to the Brundtland Report, it is assumed that economic growth and environmental protection complement each other (BMU 1997: 244; UNCED 1992; Principle 12; cf. Di Giulio 2004: 90; Dingler 2003: 235-236). Additionally to economic growth as solution to the environmental crisis, a reduction or elimination of “unsustainable patterns of production and consumption” mainly in the developed countries and a reduction of demographic pressure (“promote appropriate demographic policies”) in the developing countries is demanded (UNCED 1992: Principle 8).

As outlined above, the break with past deliberations on environmental sustainability and limits to growth as done in the definition of SD of the WCED is sustained or even amplified in Rio. The limits to development are identified not to be environmental in nature, but rather lie within the socio-economic system (Dingler 2003: 235-236; 243-248; Kirkby *et al.* 1995a: 7). According to Dingler (2003: 236-238), four strategies are proposed in order to lessen the negative impact of economic growth on the environment and to promote “win-win” measures that benefit from the positive relation between economic growth and

environmental improvements (Steer and Wade-Gery 1993: 28). More modern and efficient socio-economic structures as well as production and consumption patterns shall be established with these measures (BMU 1997: 235; cf. Dingler 2003: 238): firstly, improvements in efficiency and new technologies; secondly, scientific resource management, i.e. to optimise the industrial usage of nature in order not to over-consume it; thirdly, scientific research on the ecological crisis, its (anthropogenic) roots, and the possible solutions to the crisis; and, in the fourth place, liberalisation of trade, incentive measures, and instruments for the ecological reform of the economic system, i.e. regulations as well as more frequently proposed market-based instruments for the internalisation of external effects (BMU 1997: 10; 23; 58-63; 70-71; 90; 253-255). Dingler (2003: 238) observes a shift from more governmental regulation as recommended in the Brundtland Report to more market-based strategies; a fact that he traces back to an economisation of the SD discourse in Rio. Similarly, Bernstein (2002) postulates that the UNCED marks the beginning of the so-called “liberal environmentalism” in which trade and liberalisation and environmental protection are not only seen as consistent with each other, but liberalisation is regarded as necessary for protecting the environment (cf. Sneddon *et al.* 2006: 258).

Besides the emphasis on the global dimension of SD, the importance of the local level is, as in the Brundtland Report, also highlighted in the Rio Documents, e.g. in Principle 10 of the Rio Declaration and especially stimulated by the Agenda 21 (Death 2010: 46; Di Giulio 2004: 130-132; 173-177). Increased stakeholder participation is envisaged; the subsidiarity principle and global governance shall be given a major significance (cf. Baker 2006: 42; Bruyninckx 2006: 281-284; Drexhage and Murphy 2010: 12).

### **2.2.3. Conjunction of WCED and UNCED**

Summing up the prior remarks, it became apparent that both concepts display normative principles embedded in a technocratic concept of technological, societal, political, scientific, and economic solutions for the ecological crisis. There are decisive continuities as well as slight differences in the understanding of SD when comparing the Rio Documents with the Brundtland Report.

Victor (2006) and Kirkby *et al.* (1995a: 10-12) claim that the UNCED has to be regarded as setback because the high ideals of the Brundtland Report have been diluted. Kirkby *et al.* (1995a: 11) contrast the report with the outcomes of the conference pointing out that “the lack of relationship between them is bewildering, when one is explicitly a follow-up of the other”.

In contrast, other authors find that the Agenda 21 is strongly connected to its predecessors, *inter alia*, the Brundtland Report and the WCS, because the centrality given to growth is re-expressed, the issues of environmental management are repeated, and it is equally technocentrist. Further, it builds on multilateralism and common interests and responsibilities of developing and developed countries also highlighted by the WCED (Adams 2001: 88–89; Dingler 2003: 233-296; Di Giulio 2004: 79-182).

In order to establish the analytical framework for the comparative analysis of the three GTC, the understandings of both the WCED and the UNCED as the “meta concepts” (Bruyninckx 2006: 270) of SD are taken into account. However, it is not the aim of this study to elaborate a common definition of SD. It is rather assumed that the two concepts of SD base on similar assumptions since the Rio Documents strongly build on the Brundtland Report and aim at establishing a framework for the implementation of SD. Combining both understandings of SD as coined by the Brundtland Commission and the UNCED, it can be synthesised that SD is a global development paradigm that integrates environmental, social, and economic concerns in a global and long-term perspective. That is to say, both intra- and intergenerational equity shall be assured so that both present and future generations are enabled to satisfy their needs. The global partnership for SD is a key element in both deliberations. The Rio Documents pay special attention to the responsibilities of developed countries due to the impacts their development paths had on the environment by establishing the principle of common but differentiated responsibilities. Consequently, the developed countries shall make available the financial resources and technologies for development in the developing countries. However, all countries have a common, future-oriented responsibility for the protection of the environment so as to secure well-being.

#### **2.2.4. The Economic, Environmental, and Social Dimensions**

The “tripartite description” of SD including the economic, environmental, and social dimensions constitutes the basis for concepts of SD elaborated by the WCED and the UNCED (Lehtonen 2004: 200; cf. Eblinghaus and Stickler 1996: 52; Vogler 2007: 437).<sup>16</sup>

Besides the normative orientation towards the inclusion of inter- as well as intragenerational equity, the integration and interweaving of the three basic dimensions of SD is thought to guarantee a pathway to sustainability (Spangenberg 2004: 75). These three basic dimensions inherent to the concept of SD result from the claim of integrating the environment and development into one framework so as to solve interconnected social, environmental, and economic problems in a comprehensive manner. The dimensions represent the more concretised goals to reach the overarching objective – the satisfaction of human needs as well as a good life for present and future generations (Di Giulio 2004: 49-58; 108-123; 322).

In the following, each of the three dimensions shall be itemised into its respective sub-goals before outlining their relation.

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<sup>16</sup> Although the opinions on the pillars of SD diverge in the literature, the most common at international level is the tripartite division (Littig and Grießler 2005). In this study, the consensus on the three pillared approach is not further discussed since the following analysis of the GTC shall base on these three core dimensions of SD. Spangenberg (2008) proposes to further include an institutional and a governance dimension. Other authors, e.g. Pawłowski (2008), include a moral, legal, political, cultural, and technical dimension. For different models illustrating SD, see Keiner (2005), von Hauff (2009: 113-138), and Waas *et al.* (2011).

## Economic Dimension

The economic dimension of SD encompasses the ability to both maintain and generate income as well as to create welfare in view of the satisfaction of human needs. It aims at reaching the highest value possible with the given combination of resources. The following aspects pertain to the economic goals of SD:

- economic growth,
- a liberalised international trade which is open, fair, and non-discriminating and aims for an optimal distribution of production, international competition, and promotes economic growth,
- sufficient financial resources stemming from international cooperation, public and private investments,
- industrial reorientation in line with a more resource, material, energy efficient, and environmental-friendly production,
- reorientation of technological development in order to support new, environmental-friendly technology which can promote economic growth and the creation of jobs,
- internalisation of environmental and social costs related to economic activities as well as inclusion of costs that arise in activities aiming for the regeneration of the natural resource base and ecosystems,
- changes in consumption patterns, and
- creation of new jobs and poverty reduction (BMU 1997; WCED 1992; cf. Di Giulio 2004; von Hauff 2009: 4).

In sum, economic growth, sufficient financial resources, and structural changes in the production and consumption patterns as well as full accounting of environmental and related costs of economic activity are the most important elements of the economic dimension of SD.

## Environmental Dimension

The environmental dimension of SD generally aims at ensuring the persistence of human life on earth depending on the preservation of natural capital and the ecological systems as the “*life support system*” (von Hauff 2009: 3). With regard to this, the environment’s capacity to supply natural resources and usefulness as well as its function as absorbing medium stand in the focus. In order to tackle the most important driving forces behind pressing environmental problems, i.e. to reduce the environmental pressure, the following is pursued:

- preservation as well as protection of ecosystems and their functioning in order not to jeopardise human health and security and to minimise possible threats to human beings stemming from changes in the environment,
- safeguarding biodiversity,
- preservation of the availability of natural resources by adequately adjusting their usage in terms of efficiency and environmental compatibility as well as by avoiding their over-consumption, and

- reduction and safe handling of emissions, pollutants, and waste (BMU 1997; WCED 1992; cf. Di Giulio 2004: 53-54; 119-121; Lehtonen 2004; Littig and Grießler 2005; Spangenberg 2004: 77).

The conservation and enhancement of the resource base as well as the aim to stay within the environmental limits are important elements that pertain to the environmental dimension, hence, indicating the special importance of a precautionary future-oriented perspective of the concept of SD (Spangenberg 2004: 77).

### **Social Dimension**

Social sustainability refers to meeting “essential normative social principles” such as the right to lead a decent life, social justice and equality, and participation (Bruyninckx 2006; Littig and Grießler 2005: 72). In order to reach those principles, the following is pursued within the social dimension:

- alimentation and provision of drinking water,
- safe shelter and adequate housing conditions,
- health and sanitation as well as a secure workplace,
- basic education without social, economic or gender-specific differences,
- reasonable level of maintenance and standards of living by providing basic services and infrastructure,
- productive employment in order to secure reasonable maintenance as well as fair distribution of income in order to reduce poverty,
- fair access to natural resources,
- distribution of power and influence (empowerment of marginalised and underrepresented groups), and
- energy supply for all people (BMU 1997; WCED 1992; cf. Di Giulio 2004: 50-51; 113-118; Lehtonen 2004; Littig and Grießler 2005, Spangenberg 2004: 77).

As could be shown, beyond the access to goods, services, and resources, the equitable distribution of welfare and opportunities among social classes, nations, and sexes plays an important role within this dimension (Spangenberg 2004: 77). Decent work is especially highlighted as an important factor for the satisfaction of needs (Littig and Grießler 2005: 71). The normative foundation of the social dimension is strongly focusing on the inclusion of intragenerational solidarity into decision-making.

### **Interdependence of the Dimensions**

The goals of SD as divided into the three core dimensions are supposed to be connected by the mutual attainment of the goals in order to meet the requirements of SD as an integrated approach (Di Giulio 2004: 55; 75-76; 121-122; 163-164). Thus, the achievement of one goal directly or indirectly has to serve the attainment of the other goals as well. In both documents, e.g. the economic goals seek to reduce poverty and to enhance the living standard. At the same time, they aim for the protection of the environment by reducing the pressure on



the environment. Environmental goals are closely related with the other dimensions, since these form the basis for the social (e.g. health and nutrition) and economic goals (resource use in order to create welfare).

The division into three dimensions outlines the mutually reinforcing but also competing aims of SD: to achieve social and economic development and, at the same time, to ensure environmental protection (Dingler 2003: 223). In line with Lehtonen (2004: 200), the critical challenge of SD lies at the interfaces, i.e. the synergies and trade-offs between the often conflicting goals of the three sub-systems of environmental protection, social development, and economic development. Hence, the convergence and integration of the three dimensions as well as the balancing of trade-offs between the various goals have to be guaranteed so that SD can be reached (cf. Robinson 2004: 378). In order to achieve sustainability, the three dimensions are to be treated equally. A predominance of one or two pillars contradicts the basic idea of SD (Littig and Grießler 2005; Lehtonen 2004: 201).

### 2.3. Critique of the Concept of SD

Ever since its emergence, the concept of SD “has had a rocky history” (Haas 2012: 97). It has generated both appraisal and harsh criticism (cf. Bruyninckx 2006: 270; Dingler 2003: 258–296; Langhelle 1999; Lélé 1991; Neumayer 2010; Sneddon *et al.* 2006: 264).<sup>17</sup>

The concept’s appraisal is related to its acceptance as a guiding principle with global outreach (Victor 2006: 91) which results from the “perception [...] that the world is facing a meta crisis, including crisis of development, environment and security” (Kirkby *et al.* 1995a: 2). According to Pezzoli (1997), the staying power of the SD concept can be explained by its ability to provide a common basis for environmentalists and development actors. This may be attributed to the broadness and vagueness of the concept that allow for flexible interpretations and usage (cf. Dingler 2003: 340; Drexhage and Murphy 2010: 9–11; Kirkby *et al.* 1995a: 2; Pearce *et al.* 1989: 1). Drexhage and Murphy (2010: 11) even argue that it might be the only real development paradigm “left standing” which gains renewed momentum in times of crisis and proceeding environmental deteriorations. SD is omnipresent and is partly responsible for the efforts to mainstream environmental concerns in other sectors as well as for the attraction in the public debate (Drexhage and Murphy 2010: 14-15). Robinson (2004: 374) is of the opinion that the “constructive ambiguity”, i.e. the definitional imprecision of the term may be a political opportunity (cf. Di Giulio 2004: 355-356).

At the same time, the vagueness of the concept of SD represents one of its major weaknesses (Dingler 2003: 340; Giddings *et al.* 2002: 188; Robinson 2004: 373). Victor (2006: 91) states that “the interconnection of everything” implies the

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<sup>17</sup> Only the most fundamental critique of the concept of SD will be reviewed in this study (cf. Dingler 2003: 258-296; Kirkby *et al.* 1995a; 1995b; Redclift 2005). Langhelle (1999) gives a balanced review of critique on the WCED while Lélé (1991) and Harborth (1991) argue against the dominating understanding of SD as coined by the UN.

risk that diverse interest groups draw their own conclusions from that ambiguity. Reflecting the same apprehension, Redclift (2005: 213) as well as Hopwood *et al.* (2005: 40) hold the opinion that the simplicity of the term and the concept is misleading because it risks its relevance and conceals the underlying contradictions and complex connections.<sup>18</sup>

Another point of critique is the human-centred definition of SD. Lee (2000: 38) regards SD as “an unashamedly anthropocentric concept”, because needs are merely defined from a human, but not from an environmental position. Arguing from a similar standpoint, Lélé (1991) states that SD is rather concerned with the maintenance of development in economic terms (cf. Dingler 2003: 222; 249; 253; Kirkby *et al.* 1995a: 1; Porras 1992: 247; Robinson 2004: 373).

The basic assumptions on implicit moral principles concerning the needs of current and future generations as well as the implicit claim for equity and justice within and between the generations are controversially discussed: According to Dingler (2003: 277; 281), the determination of present-day and future needs is regarded as an unsolvable challenge. In the concept of SD, no hypotheses are made about presumable human needs in the future, e.g. derived from possible technological and social development. Several authors, like Di Giulio (2004: 316-319), Dingler (2003: 276-281), and Baker (2006: 35-6) criticise that needs are assumed to be equal and constant over time for all human beings or have to be based on arbitrary assumptions. Carvalho (2001) complains about the economic notion of needs. Furthermore, it is not clarified who could plead for the rights and needs of future generations conflicting with those of present generations (Di Giulio 2004: 318-319). Hence, Di Giulio (2004: 318-319) concludes that the consideration of future generations is just an empty signifier for taking a long-term perspective.

The underlying causes of the environmental crisis are also in the spotlight of critics. Dingler (2003: 272-276) and Lélé (1991: 613) criticise the underlying problem diagnosis of both the Brundtland Report and the Rio Documents. The Brundtland Report attracted criticism for assuming that the underlying causes identified for the ecological deterioration are poverty and population growth in developing countries. The critique draws on the argument that the causes of over-consuming natural resources are mostly wealth-related and inherent in the production and consumption patterns in developed countries. Thus, not poverty, but rather wealth and its consequences are shown to be the causes of environmental degradation as assumed in the understanding of SD acknowledged in Rio. Despite the adjustment, Lélé (1991) and MacNeill (cited in Drexhage and Murphy 2010: 13), the former Secretary General of the WCED, lament that structural power relations are not only neglected as source of the environmental crisis, but are rather reaffirmed. According to Eblinghaus and Stickler (1996: 12; 56; 118) as well as Dingler (2003: 281-283), the result is a fairly reformist con-

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<sup>18</sup> Bruyninckx (2006: 270) and Spangenberg (2004) even compare the term SD with other ambiguous and controversially debated terms, e.g. peace (cf. Di Giulio 2004: 355-356).

cept of SD as promoted by the UN that aims at reproducing an ecologically and technologically reformed form of the status quo.

The solutions for the ecological crisis proposed in the two concepts are also in the focus of criticism. The prevailing technology-orientation and the imperative of growth are among the most fundamentally criticised (Langhelle 1999: 130; Lélé 1991). The claim for more and renewed growth in developing as well as industrialised countries is the most vulnerable point of the Brundtland Report (Schmidt 2005: 74). Although some researchers claim that SD challenges the current economic model (cf. Christie and Warburton 2001), others point out that SD may justify what could be called “sustainable growth” (Hopwood *et al.* 2005; Lélé 1991). According to Daly (cited in Dingler 2003: 243; 259), “sustainable growth” is oxymoronic and at odds with a real sustainable development, because growth is regarded as responsible for environmental degradation rather than as its solution (cf. Lélé 1991: 608; Redclift 2005). In line with Daly, Robinson (2004: 369–370) dubs this as “a contradiction in terms”.

Kirkby *et al.* (1995a) argue that the Brundtland Report rejects the idea of limits to growth by referring to the change of the quality of growth, i.e. less energy- and material-intensive growth. The limits to growth as understood in both the WCED<sup>19</sup> and the Rio deliberations are not environmental, but purely socio-economic and technological (cf. Carvalho 2001: 63; Dingler 2003: 264-272; Jörissen *et al.* 1999: 17; Lee 2000: 41; Robinson 2004: 370; 377). The more radical critics are of the opinion that SD would only be achievable if it implied a transformation of the current economic and societal system by abandoning growth and the accumulation of capital (Lélé 1991; cf. Bruyninckx 2006: 274).

Critique concerning the dimensions of SD is manifold. Highly relevant are the integration and prioritisation of the three dimensions (Drexhage and Murphy 2010: 17; Lehtonen 2004: 201).<sup>20</sup> Victor (2006: 92) argues that SD instead of truly linking the three dimensions has remained a checklist of meaningless targets. Di Giulio (2004: 90; 322-324) argues in a similar manner by detecting that the mere juxtaposition of the three dimensions is often regarded as sufficient for the claim of integration.

An imbalance between the two main concerns, i.e. the environment and the development, has been found by Dingler (2003: 240; 488), Di Giulio (2004: 90; 122), Kirkby *et al.* (1995a: 12), and Porras (1992: 245–246). Reflecting the same apprehension, an “ecologicalization of sustainable development” is also ascertained by Bruyninckx (2006: 271) and Lehtonen (2004: 201). This is especially the case for the UNCED: Kirby *et al.* (1995a) and Daly (1996) diagnose a dilution of the concept in 1992 (cf. Jörissen *et al.* 1999: 18; Porras 1992: 252;

<sup>19</sup> Methodological critique is raised by Harborth (1991): From his point of view, the dilemma between the focus on economic growth and ecological sustainability can only be solved in the Brundtland Report, because the analysis bases on optimistic indicators for population growth, resource stocks and progress in efficiency-raising technologies (cf. Jörissen *et al.* 1999: 17; Spangenberg 2004: 76).

<sup>20</sup> As already could be shown, there is no consensus on the number of the SD dimensions. According to the critics, important dimension are missing in the concept of SD (cf. footnote 16; Lehtonen 2004: 201; Pawłowski 2008; Spangenberg 2008).

Victor 2006: 95–102; Waas *et al.* 2011: 1643). In the same vein, Langhelle (1999) argues in favour of the Brundtland Report by refuting and qualifying parts of the critique and arguing that the dimensions are treated more equally by the WCED than in Rio. In contrast, Di Giulio (2004: 56; 75-76; 123; 163-165) assesses a not explicitly justified predominance of the social dimensions. This is traced back to the quasi-independent goals pertaining to this dimension in contrast to the claimed equal treatment and integration of the goals with regard to their attainment. Littig and Grießler (2005) indicate a prioritisation of the economic over the other two dimensions.

Furthermore, the unaddressed, potentially conflicting goals between the three dimensions are part of the critique (Di Giulio 2004: 76; 164; 322-324). Indications that explain how to decide in cases of trade-offs and on the basis of which criteria a decision could be taken in case of conflicting goals neither can be found in the WCED Report nor in the Agenda 21 (cf. Lehtonen 2004: 201). However, Di Giulio (2004: 376; 381-382) concludes that the open questions with regard to conflicting goals are seen as a value judgment. From her point of view, the concept of SD has to be seen as an opportunity for a critical reflection on the foundation and goals of human development within each generation.

With regard to the implementation of SD, the empirical evidence indicates an implementation gap and “only slow incremental steps to transformative action” (Drexhage and Murphy 2010: 13; cf. Lafferty and Meadowcroft 2002a: 440; UNGA 2010b). According to Adams (2001: 100), Baker (2006: 56-57), and Victor (2006), this deficiency is due to the weak institutionalisation and the lack of binding commitments (cf. Beisheim *et al.* 2011; Drexhage and Murphy 2010: 13; Simon 2011).<sup>21</sup> Similar to that, Victor (2006: 92) states that the political will for structural changes is not sufficiently present (cf. Brand 2012a; Karlsson-Vinkhuyzen 2012). Explanations may be found in a retreat from multilateralism, the increasing prevalence of security issues or the declining power of the nation state vis-à-vis the private sector (Sneddon *et al.* 2006: 257-259). Karlsson-Vinkhuyzen (2012) identifies the lacking integration of actors and institutions on the vertical governance dimension as one reason for the deficient successes. Drexhage and Murphy (2010: 13) adduce that the global redistribution and patterns in, *inter alia*, trade and financial aid are responsible and financial resources needed for SD implementation are not sufficiently made available.

### 3. Green Transformation Concepts (GTC)

Despite the fact that SD is a contestable concept which finds itself in an impasse, its major motive seems to remain important: to secure both environmental protection and developmental successes. One of the key questions within the ongoing debate on SD proves to get even more relevant, namely how to manage the economic system in order not to damage the environmental foun-

<sup>21</sup> A review of the institutionalisation of SD cannot be given in this study. For an extensive discussion, see the contributions in Beisheim and Dröge (2012).

dation of human life and development prospects. The GTC which are increasingly prominent in the spotlight of international attention could deliver new impetus for SD. This is due to the fact that the concepts seek to overcome the unsustainable economic system that causes environmental deterioration while at the same time, to a varying degree, taking into account social concerns (Bauer *et al.* 2011; Bigg 2011: 28; Halle 2011: 21). Despite different wordings in the numerous concepts, for this study a definitional delimitation is used according to which GTC represent a set or framework of principles, goals or concrete actions that aim at restructuring the economy and a low-carbon development.<sup>22</sup>

Since the goal of this study is to analyse their relation to the concept of SD as well as to compare a sample of GTC, it is fruitful to give a general overview of the emergence of the concepts before presenting the selected concepts. Subsequently, the previous debate on the transformation concepts shall be assessed in order to demonstrate the already indicated research gap.

### 3.1. Roots and Emergence of the Concepts

The roots of the debate about a “green” transformation can be traced back both to recent and to long-lasting discussions. Of course, the concept of SD is one of the most important predecessors due to the fact that developmental and economic concerns are integrated in a global paradigm (Bass *et al.* 2009: 6; Runnalls 2011: 1; Verzola and Quintos 2011: 3).<sup>23</sup>

Bär *et al.* (2011b: 7; 2011d: 5) assume that the concepts arose from several environmental, social, and economic debates in recent years as well as the economic successes achieved in the environmental sector. Increasingly, both “a trend away from a sectoral understanding” and a shift towards “a mainstreaming of green technologies” are observable which fuels the preoccupation with environmental topics in other areas (Bär *et al.* 2011b: 8; Verzola and Quintos 2011).

Some also perceive a revival of the term “green economy” as already brought into the discussion by Pearce *et al.* (1989). In their book *Blueprint for a Green Economy*, the authors suggest that there does not need to be a trade-off between environmental protection and economic development.

The “Green Jobs” approach<sup>24</sup> which is aiming for the creation of decent jobs to create human well-being (Pollin *et al.* 2008) is considered to be of importance for the emergence of the concepts. Introduced through the financial crisis’ stimulus packages, it implied the creation of jobs in green sectors, the adjustment of

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<sup>22</sup> It is important to point out that the term GTC is an umbrella term that shall facilitate a broad delimitation of the concepts in general, before elaborating on each of the three concepts in detail in section 3.2 and in the comparative analysis (chapter 5). That is to say, it is not the objective of this study to elaborate a single definition of the GTC, but rather to compare the concepts on the basis of criteria derived from the concept of SD. For example, Scholz (2012) uses the term “green transformation” besides the nomination “green transition” so as to make reference to the changes needed in the economic system and development paths taken by developed and developing countries in the coming decades.

<sup>23</sup> The concept of SD is reviewed in chapter 2 of this study.

<sup>24</sup> As major proponents on international level, one can find UNEP, the International Labour Organization, and trade unions (cf. Bär *et al.* 2011b: 8-9; Pollin *et al.* 2008).

job profiles and educational preconditions, as well as strong environmental and social policies (Bär *et al.* 2011b: 8-9; Bigg 2011: 28-29).

According to Bass *et al.* (2009: 6) as well as Bär *et al.* (2011b: 10-11; 2011d: 8-9), attempts to measure the economic value of ecosystem services are another important foundation for the GTC. Different studies aim at estimating the economic value of nature's services that go unaccounted for and, hence, are subject to inefficient allocation. The most commonly known studies are the prominent *The Economics of Climate Change* also known as the "Stern Review" (Stern 2007) as well as the study *The Economics of Ecosystems and Biodiversity* (TEEB 2010).

Bär *et al.* (2011b: 9-10) are of the opinion that the discussion on the measurement of well-being, which started in the 1980s and was picked up again by international commissions and studies, plays an important role in the emergence of the GTC. In this regard, the *Report by the Commission on the Measurement of Economic Performance and Social Progress* (Stiglitz *et al.* 2009) represents a remarkable example. The current focus on GDP<sup>25</sup> as measure of progress and wealth should be overcome. The elaborated "quality of life"-approach contains indicators on subjective well-being, capabilities and their just allocation. With regard to sustainability, an encompassing stock approach is proposed, i.e. changes in the stock of physical, natural, human, and social capital are considered. The report *Prosperity without Growth* by Tim Jackson (2009), which was commissioned by the government of the United Kingdom, is directing in a similar course but much more critically: His proposal for a re-defined understanding of prosperity rests to a large extent on the "ability to participate meaningfully in the life of society" (Jackson 2009: 65; 143).

As the previous overview of the roots of the discussion on a green transformation indicates and as Le Blanc (2011: 153) states, the "discussions of a green economy may not be as much new territory as one would think" since the underlying ideas have already been articulated and implemented during the last twenty years (cf. Halle 2011: 22).

However, recent incidents and renewed attention awarded to the topic of SD due to Rio+20 opened a window of opportunity for new ideas related to achieving sustainability. Several trends are thought to be responsible for a growing belief that economic growth cannot be sustained while continuously causing high environmental and social costs: the financial crisis, the "collapse of trust in the liberalization and globalization model" and the pursued growth paradigm (Drexhage and Murphy 2010: 19) as well as the alarming findings about the "planetary boundaries" (Rockström *et al.* 2009) and threats posed by climate change (Blaxekjær 2012: 2; Brand 2012a; Sedlacko and Gjoksi 2009: 10).

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<sup>25</sup> GDP measures the market value of all final goods and services produced within an economy in a given period of time. This macro-economic indicator neither measures income nor well-being. Therefore, it stands in harsh critique as a measure of (sustainable) development and progress (Costanza *et al.* 2009; Stiglitz *et al.* 2009).

Especially in light of Rio+20, several conceptual frameworks have been published on the international level aiming for a better reconciliation of the economy and the environment (Dröge and Simon 2011b: 2). Various actors have set up strategies for a possible green transformation: among those are individual country roadmaps or green stimulus packages, strategies by regional organisations, concepts of UN organisations, other intergovernmental and non-governmental organisations (NGO) as well as think tanks.<sup>26</sup>

Khor (2011b) states that the GTC have to be partly embedded in the context of the Rio Conference in 2012 as well as that they “must be derived from and rooted in the spirit, objectives, principles and operationalising of UNCED”. Nevertheless, a substantive number of the concepts have evolved independently of the UN processes, especially as answers to the financial and economic crisis (cf. Bär *et al.* 2011b: 7; European Commission 2010).

One can find the report *Towards a Green Economy* by UNEP (2011a) and *Towards Green Growth* published by the OECD (2011b) among the most publicised concepts on international level<sup>27</sup>. The European strategy “Europe 2020” (European Commission 2010) can also be regarded as an important input on the global discussion and implementation of green economy strategies. A remarkable document has been published by The Association of Academies of Sciences in Asia (2011) which gained attention because of the exceptional detailedness of a “green development model” for the region. The renowned WBGU (2011) whose members are distinguished directors of leading research institutes and exert global influence also contributed to the discussion on a global transformation by issuing the flagship report *A Social Contract for Sustainability*. Most recently, the World Bank (2012) has released its *Inclusive Green Growth* report.<sup>28</sup>

### 3.2. Overview of the Selected GTC

In the following section, a short overview on the selected GTC by the OECD, UNEP and the WBGU will be given. The three GTC chosen for the comparative analysis aim for the restructuring of the economy and seek to implement different measures for a low-carbon development.

#### 3.2.1. OECD: Green Growth

In 2009, the “Green Growth Declaration” was signed at the OECD Ministerial Council to assert the member states’ willingness to create economic recovery

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<sup>26</sup> For a good overview of a number of GTC, see Bär *et al.* (2011b) and Berger and Gjoksi (2010). A chronological overview of green growth policy concepts worldwide and a categorisation of relevant actors in an analysis of the concept’s life cycle can be found in Blaxekjær (2012). Blaxekjær analyses the emergence and spreading of the GGE policy concept. He identifies Korea and Denmark as policy entrepreneurs, followed by the OECD, UNEP, and the World Bank who advocate the concept as policy leaders.

<sup>27</sup> This study aims for a comparison of international GTC published as a contribution to Rio+20 while separating these from the debate on national strategies (cf. Huberty *et al.* 2011).

<sup>28</sup> For a short assessment, see Schalatek and Alexander (2012).

pathways that imply environmentally and socially sustainable economic growth by declaring that:

Green growth will be relevant going beyond the current crisis, addressing urgent challenges including the fight against climate change and environmental degradation, enhancement of energy security, and the creation of new engines for economic growth. The crisis should not be used as an excuse to postpone crucial decisions for the future of our planet (OECD 2009a: 1).

The Ministerial Council charged the OECD with elaborating the Green Growth Strategy (GGS) which could serve as an actionable “policy framework that blends economic, social and environmental policy objectives for the most efficient shift to a sustainable world economy” (OECD 2009b: 2). The GGS (OECD 2011b) includes two additional documents: the toolbox for GG policies at the national level (OECD 2011a) and a catalogue of indicators for the measurement of progress towards GG (OECD 2011c).

GG as promoted by the OECD emphasises a dual approach: to pursue continuing economic growth through innovation and investment in green markets and to preserve its environmental fundament, i.e. GG shall serve as a source for protection of natural capital:

[G]reen growth is about fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. It is also about fostering investment and innovation which will underpin sustained growth and give rise to new economic opportunities (OECD 2011b: 114).

In order to address both the economic and the environmental challenge, the environmentally deteriorating impacts of economic activities, the undervaluation and mismanagement of natural capital<sup>29</sup>, and the uncertainty for investment and innovations that are created by this have to be dealt with (OECD 2011b: 17-31). This implies a “vigorous process of ‘creative destruction’ [...] to achieve green growth” (OECD 2011b: 95).

The GG framework aims for the increase of well-being by establishing adequate policies and institutional settings in a longer-term perspective (OECD 2011b: 10; 86). It acknowledges the difficulties that are related with actions in the short and in the long term. According to the OECD, especially the urgently needed actions with regard to climate change could imply high opportunity costs and a considerable degree of path dependence since later new technologies could be even more advantageous. However, the decision on the timing of “structural economic change” is to be taken with respect to both the costs and the economic and environmental benefits of action (OECD 2011b: 31).

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<sup>29</sup> Natural capital is defined as the sum of natural resources in flow and stock, land, and ecosystem services. The GGS considers natural capital as an important factor of production alongside other services, commodities etc. (OECD 2011b: 10; 20-21).



### 3.2.2. UNEP: Green Economy

The flagship report *Towards a Green Economy* released by UNEP (2011a) is the major outcome of the Green Economy Initiative. The report, also referred to as Green Economy Report (GER), bases on two important studies: the TEEB (2010) as well as on the call for a Global Green New Deal<sup>30</sup> (cf. Barbier 2010; UNEP 2011a: 16). Furthermore, it is influenced by

[...] widespread disillusionment with the prevailing economic paradigm, a sense of fatigue emanating from the many concurrent crises and market failures experienced during the very first decade of the new millennium, including especially the financial and economic crisis of 2008. But at the same time, there is increasing evidence of a way forward, a new economic paradigm – one in which material wealth is not delivered perforce at the expense of growing environmental risks, ecological scarcities and social disparities (UNEP 2011a: 14).

According to UNEP (2011a: 16), the GER “demonstrates that [...] the greening of economies has the potential to be a new engine of growth, a net generator of decent jobs and a vital strategy to eliminate persistent poverty”. A GE is defined as an economy that is “low-carbon, resource efficient, and socially inclusive” and “that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities” (UNEP 2011a: 16). Thus, the GER assumes that economic growth and environmental sustainability are not only compatible, but mutually reinforcing and benefiting goals (UNEP 2011a: 16; 628).

The GER highlights the wide range of policy instruments that are able to adjust the conditions for the transition towards a GE. Green investments shall enhance the creation of new markets and technologies which will be the driver of technological progress and the modernisation of production as well as the source of future growth and development (UNEP 2011a: 628).

### 3.2.3. WBGU: The Great Transformation

In its most recent report to the German federal government *World in Transition – A Social Contract for Sustainability*, the WBGU (2011) elaborates on the need for as well as the prerequisites and challenges of a global transformation in order to preserve the natural life-support systems for present and future generations. Furthermore, it makes clear that this transformation is not only necessary, but technologically and financially feasible (WBGU 2011: 5; 29; 171).

Especially the urgency of action is emphasised by the WBGU (2011: 27-28; 64; 91; 269; 272; 318; 323). Decisive action for the proposed decarbonisation and reversal of environmental degradation has to take place worldwide in order to manage the transformation towards a low-carbon society and economy in time and to minimise global greenhouse gas (GHG) emissions by 2050. The envi-

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<sup>30</sup> The Global Green New Deal aims at bringing economies back on track after the financial crisis, tackling poverty and climate change, and create jobs in green industries (UNEP 2011a: 16).

sioned “Great Transformation” (GT), defined as an all-encompassing transition (WBGU 2011: 83; 395), is characterised by a “worldwide remodelling of economy and society towards sustainability” (WBGU 2011: 5). The overarching goal of the GT is “that prosperity, democracy and security are achieved with the natural boundaries of the Earth system in mind” especially considering the internationally acknowledged 2°C guard rail for climate change (WBGU 2011: 265).

The WBGU proposes a managed transition, because the GT “is by no means an automatism” (WBGU 2011: 1). However, it is assumed that once initiated, the transformation develops its own dynamics since it represents an unpredictable, open-ended democratic search process supported and accompanied by decisive scientific findings (WBGU 2011: 28; 52; 107; 175-176; 268).

The challenge, unique in history, with regard to the upcoming transformation into a climate-friendly society is advancing *a comprehensive change for reasons of understanding, prudence and providence*. The transformation must be anticipated, based on scientific insights regarding the risks of continuing on high-carbon development paths, in order to avoid the ‘standard historic reaction’, a change of direction in response to crises and disasters (WBGU 2011: 5, emphasis in original).

The major requirement for the transformation is a “new global social contract” that can overcome political, institutional, social, and economic challenges hindering global changes towards sustainability (WBGU 2011: 276-278). It aims for a sustainable, low-carbon economy and society basing on shared responsibility, equity within and between generations, and the active participation of a diverse set of actors from the local to the international level.

The report already sees windows of opportunity for the GT: democratic transformations occurring during the last years, sustainability-oriented consumer behaviour, and significant changes in fossil fuel-based economic systems, such as the growth in renewable energies in many countries (WBGU 2011: 46-74).

### 3.3. Previous Debate on the GTC

Before entering into the analysis of the GTC on the basis of criteria derived from the concept of SD, firstly, the general debate and, secondly, the critique of the three specific concepts shall be shortly portrayed in the following.

In the centre of the discussion about the GTC stand the concepts’ usefulness and appropriateness as a paradigm for a more sustainable development while combating the climate and financial crisis as well as prevailing poverty (Le Blanc 2011: 151; Dröge and Simon 2011b: 4).

First of all, the definitional imprecision and vagueness is critically assessed by several authors, such as Cook and Smith (2012) and Dröge and Simon (2011a). Recalling the findings on the concept of SD, Brand (2012a: 29) argues that the GGE concept could be “the next oxymoron” which has the intention “to bundle different, partly contradictory, interests and strategies, and gives them a certain

legitimacy and coherence". Haas (2012: 97; 99-100) argues that a consensus is needed on the normative principles of the proposals for a green transformation in order to foster political alignment.

With regard to the concepts' adequacy for a pathway towards sustainability, the opinions differ significantly: In the view of Khor (2011c), it "is emerging as a significant concept, though also a controversial one". It appears to be an idea whose time has come for opening-up new potentials for political and economical transformations in case of overcoming current production and consumption patterns as well as structural characteristics inherent to the economic system (Brunnengräber and Haas 2012: 17; Jänicke 2011: 9). Reflecting the same apprehension, several authors (e.g. Acharya and Zhou, cited in Fulai *et al.* 2011: 68) regard the concepts as able to help SD out of the impasse by concentrating on the possible harmony between economic development and environmental protection. The appraisal partly results from the fact that it seems to be a more tangible and pragmatic guiding principle for policymakers (Brand 2012a: 28; Khor 2011b; Verzola and Quintos 2011: 9-10). Khor (2011b) appreciates the improved valuation and recognition of environmental goods and services inherent in the concepts. This results in the costs and opportunity costs of exploiting certain resources. Arguing from an opposing standpoint, Cook and Smith (2012: 9) as well as Verzola and Quintos (2011: 9) point to the difficulties of a commodification of environmental resources and the proposed market-based approaches in the strategies. They warn against the misassumption that this will automatically lead to socially sustainable, equitable, and just outcomes.

Similarly, other critics warn against the illusionary hope that greening growth could be the panacea (Cook and Smith 2012: 6). Others claim that the debate on the concepts results, *inter alia*, from the following facts: the unresolved question of costs of a green transition and their distribution; the feasibility and potential magnitude of decoupling economic growth from resource consumption; and the potential advantages for developed countries in adapting to and promoting green development in terms of knowledge, capacity, and technology (Blank and Theis 2011: 11; Brand 2012b; Scholz 2012). Related to the latter, Khor (2011a; 2011b) elaborates on the disadvantages for the developing countries in particular: The reasons for doubt include the fear of green protectionism, new forms of conditionality, and the disregard of the developing countries' needs and circumstances which could be neglected in an "one size fits all" approach (Khor 2011a: 6; cf. Bär *et al.* 2011a; 2011b: 11-13; Brunnengräber and Haas 2012; Forum Umwelt & Entwicklung 2011; Jenkins and Simms 2012). Verzola (2011: 6-7) warns against the uninterrupted pursuit of economic profit and growth within the green concepts.

Furthermore, one of the most highly debated issues concerns the social dimension of the green concepts which is found to be missing (Brand 2012a; Cook and Smith 2012; Forum Umwelt & Entwicklung 2011; Khor 2011b). In the view of Onestini (2012: 2), the strategies for green development present "a step backwards from a developmental point of view". According to her findings, this is due to the fact that important steps towards the better integration of social

factors, questions of equity, and human welfare in the debate on SD are neglected in the current proposals (cf. Brand 2012b: 37; 39; Cook and Smith 2012: 6; Sawyer 2011: 41; Scholz 2012; Verzola and Quintos 2011: 8; 10).

Some observers argue that the radiance and power to solve structural failures in the current times of crises is lacking in the concepts for a green transformation (Brand 2012a: 30–31; Brunnengräber and Haas 2012) since structurally conservative interests still predominate and hinder a socio-economic re-orientation (Methmann 2010; Mittler 2011; Rest 2011).

Additionally, concerns of participation and democracy in the transition have been raised: Cook and Smith (2012) as well as Brand (2012a: 32) pose the questions by whom the green transformation is constructed and influenced as well as who can participate in the decision-making process on possible development alternatives. Currently, according to their view, the concepts by UNEP and the OECD do not indicate how to deal with this task (cf. Conservação Internacional 2011; Selin *et al.* 2011).

As already could be shown in the introductory section (1.2), to date, neither an analysis which seeks to embed the new green concepts in the long-established concept of SD nor a comparison which compares a number of new concepts on the basis of the dimensions and principles of SD has been elaborated (cf. Haas 2012: 98). Those studies that elaborate a comparative analysis of selected GTC rather concentrate on a broad comparison on the basis of priority areas of the concepts (cf. European Environment Agency 2011: 96–137) – thus, seemingly arbitrary criteria whose roots are not further mentioned (cf. Berger and Gjoksi 2010). From these studies, no direct link to the concept of SD can be drawn. One exception is the study by Bär *et al.* (2011b: 24–26; 2011c) who shortly analyse the concepts of, *inter alia*, UNEP and the OECD on the basis of the economic, environmental, and social dimensions but without indicating the elaboration of the criteria on a theoretical basis regarding the concept of SD.<sup>31</sup>

Within these comparative studies as well as in the public debate, the most debated and criticised concept of the three analysed in this study is the GER published by UNEP (cf. Blaufuss 2011; Brockington 2012; Methmann 2011; Mittler 2011; Pavese 2011). *Towards a Green Economy* (UNEP 2011a) stands in the spotlight due to its prominence in the run-up to Rio+20. Especially the topic of social justice is found to be deficiently tackled in the GER (European Environment Agency 2011: 132; Methmann 2011: 16).

Another point of critique is the inclusion of controversial technologies such as measures for carbon capture and storage (CCS) as well as methodological problems (Blaufuss 2011; Brockington 2012).

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<sup>31</sup> The study determines three different discourses varying from proposals of greening the existing economy to those concepts that also emphasise the importance of the social pillar of SD. However, the concepts are not concretely assigned to the respective discourse.

The concept on GG published by the OECD is not as frequently debated as the GER, but is often compared to the latter. The results of such comparisons differ from each other, especially regarding the inclusion of social issues. In the comparison made by Bär *et al.* (2011b), the GER performs worse in the acknowledgement of the social dimension than the OECD concept. Jänicke (2011: 7) finds that GG “is meant here as the core ecological component of a global investment programme” since it concentrates on the decisive interference of the economy and the environment. Contrarily to these results, the study by SELA (2012) comes to the opposite conclusion by attributing a more social character to the GER than to the GGS.

The critics of the GT concept published by the WBGU, such as Weizsäcker (2011), Vahrenholt (2012) and Maxeiner (2011), mainly criticise the proposed management of the “great transformation” towards a sustainable society. Therefore, drastic individual as well as democratic incisions are required that would be difficult to cope with. The critics argue that the proposals made by the council result in an eco-dictatorship which in turn is strongly repelled by its members (cf. Leggewie 2011).

## 4. Analytical Framework

In this study, the research gap concerning a systematic comparison of the GTC that bases on the concept of SD shall be closed. The analytical framework is derived from the concept of SD as theoretical background in order to be able to analyse the reports’ assumptions and argumentation systematically. Therefore, the guiding questions for each analytical unit are compiled in the following.<sup>32</sup>

Recalling the findings from the conceptual background (section 2.2), it is suitable to establish the following criteria: The analysis of the economic, environmental, and social dimensions (section 4.1, 4.2 and 4.3) accounts for the conceptualisation of SD. Both the WCED and the UNCED promulgate this division which shall guarantee the comprehensive integration of developmental and environmental concerns into one framework. However, although in most cases this tripartite division is used when referring to SD, there are more elements inherent to the concept which must be included in a thorough analysis of the transformations concepts’ relation to SD. Therefore, a fourth unit comprises the most important principles of SD (section 4.4). For an overview of the analytical units in a tabular form see Figure 2.

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<sup>32</sup> The selection of the following points is derived from the most important assumptions of SD, but does not claim to be a complete review of principles and elements underlying the concept of SD. Population growth could be of interest as another criterion for the analysis. However, due to the scope of this thesis only a limited selection of criteria can be analysed here.

## 4.1. Economic Dimension

The first criterion of this analysis scrutinises the fulfilment of the most important elements of the economic dimension extracted from the SD concept. The guiding questions with regard to economic sustainability are the following:

- What role does economic growth play in the GTC? Are there limits to growth being identified in the strategies and do these relate to the limits identified within the concept of SD?
- For the path towards SD, financial resources are of utmost importance. Where do the financial resources stem from that are needed for financing the transformations?
- With regard to industrial transformation, are there special sectoral strategies proposed by UNEP, the OECD or WBGU? Do they propose an industrial reorientation and rationalisation in order to reduce the resource and energy intensity of economic sectors as promoted by SD?
- What role do technological development and innovation play in the concepts? By which measures shall decoupling be achieved in order to reduce the impact of further economic growth?
- Within the concept of SD, the internalisation of environmental costs has been proposed in order to ensure a more sustainable development. What role does the “polluter pays” principle play in the GTC? What is the role of economic valuation of ecosystem services?
- Do changes in consumption patterns on the household level play a central role?
- Furthermore, the generation and safeguarding of income as well as the creation of welfare is of importance within the concept of SD. What is proposed in order to achieve this aim? To what extent are new jobs to be created so as to guarantee income for the whole population? How can poverty be reduced according to the concepts?<sup>33</sup>

## 4.2. Environmental Dimension

The environmental dimension, the second centrepiece of the concept of SD that shall be examined in the GTC, concentrates both on the preservation and management of ecosystems as well as the natural resource base and on the reduction and safe management of emissions and pollutants. The guiding questions that belong to these two groups are the following:

- The environmental dimension of SD especially emphasises the precautionary future-oriented perspective. What are measures to preserve and to restore ecosystems and their functioning? How shall the availability of natural resources be guaranteed? What role does the protection of biodi-

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<sup>33</sup> Similarly to the economic dimension, productive employment is an important sub-goal in the social dimension of SD which shall secure a decent living standard and poverty reduction. In the social dimension, factors such as equity and justice merge with the mere creation of jobs and income. Thus, in the view of the author, it is reasonable to merge and postpone the analysis of this sub-goal (see section 4.3 and 5.3 on the social dimension).

versity play within the concepts? What is planned to increase the resource efficiency, the environmental compatibility of resource extraction and to avoid over-consumption of resources?

- With regard to the absorbing capacity of the ecosystems, do the concepts thematise the minimisation and safe handling of pollution, emissions, and waste?

### 4.3. Social Dimension

The third dimension includes social goals of the concept of SD. The following questions can be derived in order to assess the importance of social sustainability in the GTC:

- Within the concept of SD, the satisfaction of human needs and human well-being is very important. What role does the fair access to or provision of basic foodstuff, housing, education, health, sanitation, services, and infrastructure play in the respective concept (among different social classes, nations, and sexes)? What role does the fair access to natural resources and energy supply play?
- Are questions of distribution tackled in the concepts? Are the concepts aiming for equity and justice, i.e. intragenerational equity?
- To what extent do the GTC address the issue of income, productive and decent employment, and access to productive resources as important factors for the satisfaction of needs?
- Is the importance of poverty reduction in the concept of SD reflected in the new transformation concepts?
- Besides the access to resources, services, and goods, the access to the decision-making process plays an important role in the concept of SD. What do the concepts propose with regard to the distribution of power and influence (participation, inclusion, and empowerment of marginalised and underrepresented groups in particular)?

### 4.4. Principles and Elements of SD

Besides accounting for the tripartite conceptualisation of SD, it is important to further include the underlying principles of SD which also can be derived from the understanding of the concept delivered in section 2.2. The following elements are essential within the concept of SD and, consequently, for the analysis in this study:

- For achieving SD and its overarching goal, the interdependence and mutual attainment of all three dimensions (economic, environmental, and social) is a significant premise. Do the GTC integrate the three dimensions, if fulfilled, in a way that the sub-goals of social and economic development as well as environmental protection are mutually reinforcing and equally important?

- Furthermore, the globality of the problem and the solution as well as the countries' historical responsibilities play an important role in the concept of SD. Do the analysed strategies base on similar assumptions? Is the principle of common but differentiated responsibility being respected within the new concepts? Do they acknowledge the countries' different roles in causing the environmental crisis, the divergent developmental stages, and the implications for current and future policies in a green transformation? How do the new concepts relate to the right to development as established in the Rio Declaration?
- Is the idea of global cooperation and partnership for a green transformation adopted in the concepts, i.e. are there support measures for the developing countries' efforts?
- Another aspect of interest is the global governance for a green transformation. To what extent are proposals for the inclusion of different governmental levels, the civil society, and the private sector included in the new concepts?
- What is proposed in order to guarantee for intergenerational equity, i.e. how are trade-offs between the interests of the current and future generations handled?
- Furthermore, education for SD plays a major role. How relevant is education in the GTC?

Figure 2: Overview of the Analytical Units in section 5.1-5.4

Economic Dimension	Environmental Dimension	Social Dimension	Principles and Elements of SD
>Economic Growth – Limits to Growth >Financing the Green Transformation >Industrial Transformation, Technological Development, and Innovation >Economic Valuation and Internalisation of External Costs >Changes in Consumption Patterns	>Protection and Management of Ecosystems and the Natural Resource Base >Reduction and Safe Management of Emissions and Pollutants	>Fair Access to Basic Goods and Services >Income and Employment >Poverty Reduction >Distributional Aspects >Access to and Distribution of Power	>Relation of the Economic, Environmental, and Social Dimensions >Globality Principle >Intragenerational Equity and Justice >Role of Education for the Green Transformation

## 5. Comparative Analysis of the GTC

With the intention of identifying to what extent the GTC correspond to the three dimensions and the most important principles of SD, the criteria previously elaborated in the analytical framework (chapter 4) shall be applied on the three



selected concepts which were already presented in section 3.2.<sup>34</sup> Furthermore, it is of interest to examine how far the green transformation concepts converge in the reviewed criteria; thus, making possible a clustering of the three strategies by classifying and structuring the different positions held within the reports. The results are also displayed in Figure 3-6 at the end of each section.

## 5.1. Economic Dimension

### 5.1.1. Economic Growth – Limits to Growth

Growth is the overarching goal of the strategic framework by the OECD. It can be achieved through establishing a greener economy (OECD 2011b: 3; 9; 114). The imperative of continuous growth is not questioned in the GGS. Contrarily to that, it is assumed that there is a vast potential for growth and, consequently, for the improvement of living standards of the world's population that could not (sufficiently) profit from economic growth in the past. Through the reduction of risks stemming from resource bottlenecks and the surpassing of potential environmental thresholds that would risk highly damaging and irreversible effects, GG shall have positive environmental impacts (OECD 2011b: 9; 21-22; 26). Although the detrimental impacts of past growth dynamics and dangerous path dependencies are acknowledged, the solution to the growth induced crisis lies within more, but redefined growth. That is to say, in the view of the OECD, GG is able to integrate the challenges of increasing environmental pressure and needed economic opportunities. Thus, it is seen as the precondition for well-being, development, and (new) employment opportunities (OECD 2011b: 18; 21; 24; 31; 38).<sup>35</sup> The GGS aims at promoting more economic growth while at the same time guaranteeing the provision of natural assets on which the well-being is based. New growth potential is detected in greater resource productivity, in green innovations, and the creation of new green markets (OECD 2011b: 9; 22; 31; 114). Limits to growth are not identified explicitly, the GGS detects risks to growth that stem from resource bottlenecks as well as abrupt changes in the natural systems. Staying within the "planetary boundaries" is regarded as essential (OECD 2011b: 21; 29-30). Furthermore, the technological development and innovations are seen to be crucial for the development within these limits (OECD 2011b: 10).

In the concept published by UNEP economic growth is the principal goal of development while decoupling it from environmental degradation and ensuring social inclusiveness. Similarly to the OECD concept, the GER does not question continuing growth. It is assumed that past economic growth trajectories and the

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<sup>34</sup> As already indicated in section 4.1 (cf. footnote 33), the sub-goals of employment and income creation as well as poverty reduction belong to both the economic and the social dimension of SD. In the analysis, these aspects will be included in the social dimension (cf. sections 0 and 5.3.3).

<sup>35</sup> GG is understood as an environment- and innovation-friendly form of growth. The conventional understanding of growth that is a "process through which workers, machinery and equipment, materials and new ideas and technologies contribute to producing goods and services that are increasingly valuable for individuals and society" is complemented by additional elements. The GG also claims to pay attention to other forms of capital, such as natural, human, physical, and intangible assets (OECD 2011b: 19; 21; 23).

rapid capital accumulation cannot be continued any longer since this would have detrimental social and environmental impacts (UNEP 2011a: 14-18; 630). A “global green economic transformation” is needed (UNEP 2011a: 588), because further economic growth and developmental and environmental gains cannot be realised under current economic patterns (UNEP 2011a: 17).

The greening of the economy, reached by reducing pollution, increasing energy and resource efficiency, and preventing losses in ecosystem services and goods, shall lead to even more GDP growth.<sup>36</sup> Furthermore, green economic growth is expected to avoid damaging growth and shall lead to gains in natural capital (UNEP 2011a: 16-17; 629-630). Like in the GGS, this dual benefit of greener growth as the “new engine of growth” is highlighted and justifies continued growth in green sectors (UNEP 2011a: 16). Similarly, no explicit reference is made to limits to growth. Risks to growth stem from depleting ecosystems as well as the deficient valuation and allocation of environmental goods and services. By setting up policies and investments, these risks can be managed.

The GT concept stands in contrasts to the other analysed concepts since it assumes that there are certain limits to growth: Basically, it is assumed that the so-called “planetary guard rails” shall be “the starting point of all social development and prosperity increase” (WBGU 2011: 91) and thus can be interpreted as the limits to growth set by nature.<sup>37</sup> This implies that the era of economic growth relying on fossil energy carriers and driving GHG emissions will have to come to an end. According to the WBGU (2011: 35; 46; 123; 178-179; 269), economic restructuring and technological development aiming at decoupling economic growth from GHG emissions in the energy, industry, and the land-use sectors is the only viable strategy for maintaining growth. In order not to exceed the limit of CO<sub>2</sub> emissions that are manageable within the planetary guard rails (no more than 750 Gigatons CO<sub>2</sub> until the year 2050), “the CO<sub>2</sub> intensity of the global economic output over the next few years would have to be decreased at least twice as fast as it has done in the past” (WBGU 2011: 287). It is assumed that economic growth does need not be in conflict with decarbonisation: economic growth can, on the one hand, provide the financial resources for innovations and, on the other hand, be driven by the increasing investments in the low-carbon technologies (WBGU 2011: 159; 179). However, the WBGU (2011: 179) also acknowledges that it remains unclear whether reaching the required scale of decoupling is technologically feasible.

It is the only concept of the three analysed that discusses risks of further but also of no or little growth (WBGU 2011: 126; 178-179): Despite the technological challenges ahead, the WBGU regards moderate growth rates of two to three per cent as the only way towards a fair low-carbon economy and society. In case of no or slowed down growth this would have significant social distribu-

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<sup>36</sup> After five to ten years, even higher growth rates are expected in comparison to a continuation of current economic growth patterns in the business as usual scenario.

<sup>37</sup> According to the WBGU (2011: 32; 46), the “planetary guard rails” are closely related to the “planetary boundaries” identified by Rockström *et al.* (2009). Staying within these guard rails ensures that the natural resources and ecosystems are preserved and sustainable development is possible.

tional impacts, especially for the developing countries, and is regarded to be faced with severe problems of acceptance among the population. Rather than aiming for significant changes in economic growth rates, the WBGU concept focuses on a restructuring of the economy and the detrimental impact economic growth has had in the past (WBGU 2011: 35; 46; 123; 269).

In comparison to the concept of SD – which is criticised for not taking into account environmental limits but rather socio-economic factors and technology that impede further environmental-friendly growth – the GTC show consideration for the planetary boundaries. However, as in the concept of SD, none of the concepts rejects further economic growth. To a varying extent the three concepts still assume that economic growth, environmental protection and social development are compatible.

Both the GER and the GGS rather perceive the planetary boundaries as a risk to growth which shall be avoided and do not question growth itself. The current patterns of growth have to be changed in order to cause less negative impact on the environment. These technological and socio-economic changes are quite similar to those proposed in the concept of SD. The GGS and GER even are explicit pro-growth strategies. Both make the same proposals on how to make growth and environmental protection compatible by modernising and “ecologising” current growth patterns.

Contrarily to that, the GT concept perceives the limits to growth, namely the planetary guard rails, as the major cause for more drastic changes in the patterns of growth: Developmental progress, also in terms of technological progress, is only possible when it does not collide with the planetary guard rails. Continuing growth is questioned in the WBGU concept; only moderate growth is regarded as compatible with the environmental limits. Hence, growth is not a goal in itself but rather a facilitating factor for simultaneously guaranteeing environment-friendly low-carbon development and social benefits. If cuts in growth rates were necessary they would have to take place in developed countries for reasons of fairness.

### **5.1.2. Financing the Green Transformation**

The financial resources needed for financing the transition towards GG are composed of public and private financing due to the magnitude of necessary investment for a green economy. According to the OECD concept (2011b: 13; 70), international investment is a central element for financing innovation, technology transfer, and the overarching goal of GG. The GGS proposes different sources of financing that vary across the OECD and the non-OECD members: revenues from tariffs, taxes, and permits as well as foreign direct investment (FDI), official development assistance (ODA), and funding by institutional investors (e.g. pension funds) or public-private-partnerships (OECD 2011b: 12-13; 24; 69-71). Financial resources can also stem from new GG measures, such as international trading schemes, by “leveraging them as a financial transfer mechanism” (OECD 2011b: 105). In order to mobilise funding, the GGS under-

lines the reduction of regulatory risks and the creation of a stable and predictable environment for investors as well as balanced macroeconomic conditions (OECD 2011b: 9; 17; 60; 62; 71; 74). The OECD emphasises the need for replacing ceasing tax revenues in order to guarantee the public funds needed for further investments in GG (OECD 2011b: 28; 69). Freed-up money, e.g. from a reform of existing subsidies, can offer opportunities to support GG activities (OECD 2011b: 28; 42-45).

UNEP (2011a: 622) argues that a “global transition towards a green economy will require substantial redirection of investment to increase the current level of public and private sector flows to key priority areas“. The GER aims at building up and enhancing natural capital, reducing environmental risks, and creating new technologies and sectors by investing a substantial amount of two per cent of global GDP per year until 2050 (UNEP 2011a: 24; 61; 270; 317; 358; 498-542; 594).<sup>38</sup> These investments are additionally needed for the creation of human capital, new technologies, management techniques, and for the scaling up of green infrastructure in the ten identified key sectors (UNEP 2011a: 23; 592; 628).

The role of governments in financing the transition to GE is especially important during the initial phase, although the financial amount is smaller in comparison to the private sector investments (UNEP 2011a: 589-590; 622; 629). The GER states that large parts of the required investment will stem from the private sector due to the large-scale financial potential and the growing green orientation (UNEP 2011a: 550; 553; 588). Therefore, UNEP (2011a: 277; 557; 576; 589; 596; 614; 622; 629) calls for public policy and support that is stable and predictable in order to incentivise private investments.

Furthermore, UNEP (2011a: 629) proposes “innovative financing mechanisms“, such as microfinance or carbon finance (UNEP 2011a: 595–613). Additionally, the important role of banks and institutional investors (e.g. pension funds, insurance companies, and foundations) is highlighted due to the fact that these control large pools of assets and thus are able to make the needed financing available by building up portfolios and financial products that favour green investments (UNEP 2011a: 49; 185-186; 362; 588; 608; 618).

In case of deficient private sector investment, e.g. in developing countries, the GER proposes the following: firstly, open fiscal space for green investments by restructuring the public spending on environmentally harmful subsidies towards taxes on resource usage (UNEP 2011a: 14; 16; 550; 561-563; 621); secondly, access to established financing mechanisms, e.g. the Global Environment Facility, and new green financing mechanisms, such as the Green Climate Fund or schemes for payment for ecosystem services (PES)<sup>39</sup> (UNEP 2011a: 293; 320;

<sup>38</sup> In the UNEP report (2011a: 23; 509-532), a scenario with investments in “business as usual“ is compared to a green investment scenario through a macroeconomic model “Threshold 21“ which includes natural resources as factor of production : These scenarios shall predict the impacts of investments into either the business as usual or the green scenario.

<sup>39</sup> E.g. REDD (Reducing Emissions from Deforestation and Forest Degradation) and other REDD+ mechanisms (UNEP 2011a: 293; 320; 628).

628); thirdly, strengthen the role of development banks as important provider of financial assistance (under environmental conditionalities) in case of limited national budgetary conditions (UNEP 2011a: 319; 595; 617-620; 622).<sup>40</sup>

Similarly to the other GTC, the WBGU (2011: 155-156; 161; 304; 322-325) calculates that a significant amount of additional investments has to be directed towards the key transformation areas (energy sector, land-use sectors, and urbanisation) as well as to research and education. According to the WBGU (2011: 158; 304), in a later point in time the savings on fossil fuels can compensate the significant investment amount which is required for the transformation.

The council shows that sufficient financial resources can be mobilised by a wide range of actors: states, the private sector, private households, and international financing and development organisations (WBGU 2011: 152-171; 268). At state level, the financing sources include public revenues stemming from the pricing of carbon or levies on the emissions in international transport as well as from a tax on international financial transactions. Additional resources can be freed-up by reforming fossil energy and agricultural subsidies (WBGU 2011: 12; 15; 144; 161-162; 180).

Furthermore, the possibilities of external funds for governmental financing of the transformation are discussed especially for the developing countries. In addition to ODA, the council proposes significantly increased loans and grants from national banks or international financing organisations. Complementing existing multilateral funds, new financing concepts, such as the upgraded Green Climate Fund and the global emissions trading system shall make available financial resources (WBGU 2011: 161-165).

As in the other GTC, the WBGU concept stresses the importance of governments setting incentives for investments by providing stable and binding policy targets and regulatory frameworks. Furthermore, governmental support is proposed by establishing national “Green Investment Banks” which could support private investments in transformation fields which are facing market risks and high investment barriers. As in the GGS and GER, institutional investors play an important role in generating finance for the transformation.

In case of underdeveloped financial markets or deficient access to funding for private investment, the WBGU (2011: 161; 165-170) proposes improving the financing activities of international financing organisations and the access to microfinance. In order to share the high investment costs, the council (WBGU 2011: 170–171) recommends several new business models, such as cooperative society financing in the renewable energy sector both in developing and in developed countries.

All concepts agree on the significant amount of investments stemming from governments, the international community, and the private sector that are

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<sup>40</sup> These new financing mechanisms also feature prominently in the global cooperation for GE which is analysed in section 5.4.2 in this study.

needed for financing the transformation. The GER and GGS in particular can be regarded as green investment programmes for reaching the green transformation. Although the largest amount will be financed by the private sector, governments have an important role for setting stable framework conditions that are paramount for mobilising private sector investments. Furthermore, public revenues from taxes (e.g. on financial transactions) and emissions trading schemes as well as freed-up money from subsidy reforms can be used to finance the transformation or to directly support the private sector. Besides the institutional investors which feature prominently in all of the three GTC, the private sector shall increasingly build on innovative financing (microfinance) and new business models (cooperative societies) as proposed especially in the concepts by UNEP and the WBGU.

External financial resources, be it in case of deficient access to private or public funding for the transition, shall be secured by traditional donors (development banks, ODA, etc.) and in form of innovative financing mechanisms, such as the Green Climate Fund or a global carbon emissions trading scheme as advanced most strongly by the WBGU.

### **5.1.3. Industrial Transformation, Technological Development, and Innovation**

The GGS is designed as an integral strategy that explicitly prescribes mainstreaming of GG policies into core economic strategies and government policies. However, the GGS strongly focuses on the emergence of new green activities and sectors which will, to a certain extent, replace others (e.g. fossil fuel-based activities) (OECD 2011b: 10; 13-14; 18; 35-36; 72-74; 85). The GGS elaborates on the technological changes particularly in the energy sector as well as in the water and transport sectors (OECD 2011b: 10; 13-14; 18; 35; 72-74; 85). Investment in these sectors shall “contribute to economic growth and prosperity because it enables trade specialisation, competition, access to new resources, the diffusion of technology and new organisational practices” (OECD 2011b: 63).

Green innovations are the “core of transforming an economy” due to the fact that only a strong inventiveness can achieve behavioural changes as well as altered production patterns (OECD 2011b: 51). Moreover, innovations shall help to decouple economic growth from the depletion of natural capital (OECD 2011b: 10; 51). The environmental performance, e.g. efforts to increase resource efficiency and the sustainable use of ecosystem services, are regarded as a competitive factor for business (OECD 2011b: 24-25; 51-60).

Therefore, the OECD strategy aims at incentivising innovations and research for more efficient technologies by giving stable and reliable signals to investors. The GGS identifies crucial conditions that allow green innovations to thrive: “sound macroeconomic policy, competition, openness to international trade and investment, tax and financial systems” (OECD 2011b: 51). Furthermore, a decisive role is played by the environmental policy framework, which shall price the

environmental resources in such a manner that it reflects the damaging impact of its use<sup>41</sup>, and policies on the demand-side, which encourage innovations e.g. through regulations (OECD 2011b: 35; 51; 53-54; 59-60). Secondly, the GGS supports new efficient technologies in the critical phase of emergence and upgrade (risks of lock-in, lacking financial resources or difficulties in scaling-up and market acceptance). Thirdly, barriers that exist with regard to the development and diffusion of technologies shall be reduced. The diffusion of green technologies allows for shared benefits especially in case of global public goods and technology transfer to developing countries (OECD 2011b: 12; 51-61).

The UNEP concept strongly aims for an industrial and technological transformation in order to reduce the resource intensity and deteriorating impacts of the production side. In contrast to the GGS, the GER represents a sectoral strategy for greening the economy. The agriculture, buildings, energy, fisheries, forests, manufacturing, tourism, transport, water, and waste management sectors have been identified as particularly important for the GE. These are regarded as increasing well-being, social equity, and reducing environmental degradation and the inherent risks. In each of these sectors, the GER proposes several mechanisms to promote technological modernisation and greening of economic activities (UNEP 2011a: 24; 29-450).

Technological development aims for the substitution of fossil fuels and decreasing emissions by promoting cleaner, low-carbon technologies. Renewable energy as well as resource and energy efficiency-raising technologies are important for decoupling economic growth from environmental pressure (UNEP 2011a: 248-282; 628).

Innovation processes shall be supported in order to promote the technological rationalisation and modernisation process and to create an “innovation rent” (UNEP 2011a: 23). Moreover, the creation of appropriate market-based incentives as well as regulations are of importance which drive private sector activities aiming for more efficient and environmental-friendly production and investment in research (UNEP 2011a: 552–577). Access to innovative solutions and technology is pivotal in the GER since this guarantees better management of natural capital. Intellectual property rights (IPRs), the removal of trade barriers, and green technology transfer are among the most important strategies for improved access to low-carbon technology (UNEP 2011a: 576).

The GT concept focuses on the transformation towards a post “fossil-nuclear metabolism” (WBGU 2011: 25) by aiming for an encompassing decarbonisation of the economic sectors (WBGU 2011: 172; 214). This implies a radical change of carbon and resource intensity as well as an altered energy demand in all industrial sectors. The WBGU concentrates on the energy and the land-using sectors which face the most urgent need for climate-friendly transformation.

The GT will require simultaneous innovation-driven advances in the following areas: the use of renewable energies or other low-carbon energy providers, e.g.

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<sup>41</sup>The internalisation of externalities is part of the economic dimension (see section 5.1.5).

incentivised by feed-in tariffs, the full exploitation of energy efficiency potentials, low-carbon technologies in the energy-intensive sectors (e.g. transport and industry), and technological shifts in the energy distribution system (power grids, storage technologies, etc.), decarbonising the pollution-intensive sectors with the help of measures such as CCS, and dematerialisation or use of renewable raw materials in the industrial production (WBGU 2011: 120-123; 127; 137; 143-145; 171; 287; 332-338). However, as stated by the WBGU (2011: 133-134; 172; 287; 291; 312; 333), these technological changes have to be accompanied by measures to limit the increase in future energy demand. These shall enable the conversion of the energy system so as to stay within the climate protection guard rail. Restricting the global energy demand will make it possible to “abstain from using risky technologies”, such as CCS (WBGU 2011: 133) and “allows more freedom in relation to the choice of energy generation technologies” (WBGU 2011: 172).

Especially for the developing and newly industrialising countries, the council estimates high potentials for energy system change. By leapfrogging past levels of technological development, a sustainable energy infrastructure can be established and dangerous path dependencies can be avoided (WBGU 2011: 62; 143; 172; 272).

In the WBGU concept innovations are as central as in the other two GTC. Innovations as well as their effective diffusion are regarded as key for the transformation: “Actor constellations with sufficient power, resources and creativity, prepared to welcome innovations [...], can be effective drivers of change, or they can channel, consolidate and shape processes of change which develop their own dynamics” (WBGU 2011: 84). According to the WBGU (2011: 6; 21-22; 332), innovations are to be incentivised by market-based and governmental instruments, such as carbon pricing or regulations or efficiency standards. The diffusion of technological low-carbon solutions shall be facilitated by: firstly, providing public support for private sector innovations especially in the most critical phase of demonstration and deployment of the respective innovation, and, secondly, setting up certain standards for the launch of a product; and, thirdly, conducting basic research on the effective diffusion of innovations and on the possibilities of changing social norms and consumption practices (WBGU 2011: 73; 106; 165; 177; 184-188; 205-207; 247; 274; 288; 302; 321-325).

All three GTC aim for the industrial and technological transformation towards more resource and energy efficiency despite of different scopes of application (sectoral or universal approach). The OECD offers a broad strategy that envisages the mainstreaming of green policies and technologies in the economy; whereas UNEP delivers a detailed description of required changes in ten key sectors. The WBGU envisages a universal mainstreaming of decarbonisation; however, the first steps are to be made in the energy and land-use sectors.

Decoupling economic activities from environmental degradation is central to the GGS, GER, and GT concept. By promoting technological innovations, which are the key for the transformation in all compared GTC, decarbonisation, increases



in energy and resource efficiency, and reduction of material throughput and waste material are the declared goals for the industrial transformation ahead. In comparison, the GT concept is aiming for the most far-reaching changes, e.g. reflected in the target to completely decarbonise the energy-sector.

Technological innovations shall be encouraged by corresponding governmental activities or market-based incentives. Their diffusion shall be facilitated so that the low-carbon technologies can take full effect in other sectors and countries.

#### **5.1.4. Economic Valuation and Internalisation of External Costs**

In order to minimise the high environmental and social costs of the mismanagement of natural resources and of the losses in ecosystem services, the appropriate valuation of natural capital<sup>42</sup> is of major importance in the GGS, e.g. through the internalisation of external costs (OECD 2011b: 24-25; 27-28; 48). This is derived from the assumption that “[m]easuring the contribution of ecosystems to societal well-being and economic growth would be a valuable way to improve regulatory decisions and integrating ecosystem services into economic policy” (OECD 2011b: 48).

Market-based instruments which directly modify the prices of resources and their usage (tradable permits and taxes) constitute “immediate win-win option[s] to promote sustainable management of resources” since they ensure that environmental goals are attained at the least economic cost, e.g. by raising taxes on energy and GHG emissions (OECD 2011b: 42; 46).

Furthermore, the GGS discusses the viability of subsidies so as to reflect the adequate economic value of natural assets. Subsidies which do not aim for environmentally sound production or practices shall be abolished due to the resulting market distortion (OECD 2011b: 28; 42-45).

The concept published by UNEP (2011b: 7) recognises the economic value of environmental goods and services in order to secure sustainable economic progress. The current misallocation of resources results from the deficient or misleading pricing of natural resources and ecosystem services (UNEP 2011a: 14; 18; 23; 550-565; 628). Therefore, capturing the full social and environmental cost of resource use and the internalisation of these externalities is a central aim of the strategies proposed by UNEP (2011a: 18-19; 552; 557-561): market-based instruments, such as tradable permit schemes, PES, and “full-cost pricing” through corrective taxes, charges or levies, shall help reflecting the economic value of the resource and its usage. The core idea of the GER is to treat natural resources and ecosystems as natural capital that can be traded as commodities – with the objective of “getting the economy right” (UNEP 2011a: 17).

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<sup>42</sup> The significance of natural resources and ecosystem services as economic asset and production factor is also reflected in the denomination as natural capital (cf. footnote 29; OECD 2011b: 19; 21; 23).

UNEP (2011a: 561–563) suggests the reform of harmful subsidies which hinder adequately reflecting the economic value of natural capital. The incentivising effect of valuation of natural resources and ecosystem services on further investment and innovation is valued as highly as the positive environmental impact (UNEP 2011a: 550; 559).

Similar to the GER and GGS, the GT concept stresses the importance of rating the economic value of ecosystem functions and internalising external social and environmental costs of economic activities (WBGU 2011: 179; 188). It is argued that current prices give misleading incentives, which thus result in market failure. Putting a price on carbon that is high enough to create a certain transformative effect is regarded as the major instrument for influencing investment decisions, decarbonisation, and consumption as well as production patterns (WBGU 2011: 282). The cost efficient market-based measures range from taxation to tradable permits on regional or international level and shall reflect the real price of fossil fuel-based activities. The WBGU even proposes to control the emitted quantity of emissions: Especially allowance trading schemes (so-called cap and trade systems) are appreciated by the WBGU (2011: 177-181; 268; 282) in case that the required institutional preconditions are fulfilled. The cap and trade systems are coordinated or, at its best, are of global extent in order to be able to send a “widely impacting, uniform price signal for the transformation” (WBGU 2011: 180). A CO<sub>2</sub> tax is a viable alternative in cases where the required institutional potentials are not prevailing (WBGU 2011: 282).

As in the concept of the OECD and UNEP, the WBGU (2011: 162; 167; 180-181; 229; 236; 238; 304) elaborates on the phasing out of subsidies for fossil energy carriers in order to reflect its real costs and to achieve the maximum impact of the carbon price signal.

Moreover, ecosystems and their functions also shall be valued in financial terms in order to internalise both negative and positive external effects in the price of a good (WBGU 2011: 39; 188; 323-324; 327): “As biodiversity and ecosystem services have the character of public goods which are not traded on markets, and which do not carry a specific price tag, the economic system hugely underestimates their importance” (WBGU 2011: 39).

So as to ensure development that is sustainable, the concept of SD proposes to internalise external costs of economic activities. Similarly, the three GTC compared in this study all make a case for the internalisation of external effects in order to value the environmental and social costs of economic activities. By this, they aim at ending with the current misuse and misallocation of environmental goods and services. Especially the GGS and GER stress the importance of commodification of natural goods. This is reflected in the fact that both studies regard environmental goods and services as natural capital which is valued as other forms of capital. Thereby, a better allocation and usage of these natural commodities shall be guaranteed and this, in turn, incentivises investments and innovations. The WBGU especially elaborates on the need for controlling the quantity and the price of global CO<sub>2</sub> emissions. By internalising the pollution

effect into the price of economic goods and services, the GT concept aims for providing the biggest incentive for the transformation.

In distinction from the other GTC, the WBGU concept also elaborates on the internalisation of positive effects on ecosystems and their function in the price of a certain good.

#### **5.1.5. Changes in Consumption Patterns**

Besides the changes on the production side, the GGS also includes measures to break path dependencies and to introduce changes on the consumption side (OECD 2011b: 21). Different types of economic and non-economic strategies for influencing the consumer behaviour are discussed in the report. Not only pricing the usage of environmental resources (e.g. water consume, fuel, etc.) or regulations and standards are regarded as an effective tool, but also information-based measures (e.g. certification) that are able to influence the behaviour of consumers towards more environment-friendly products and services. Additionally, “green” public services (e.g. recycling, transport, etc.) can complement the demand for environmental quality. Education shall raise the awareness of the consumer and thus influence their behaviour (OECD 2011b: 49–50).

The OECD (2011b: 28) warns against the compensation of energy savings due to efficiency-raising measures by an increasing consumption – the so-called rebound effect. However, the concept does not indicate relevant policies and measures that may prevent this effect.

Besides the internalisation of negative and positive externalities, the GER highlights the potential of charges, levies, and taxes on household consumption (e.g. in the water and waste sectors) as an important driver of changing consumer behaviour (UNEP 2011a: 320–321). Through marketing, information campaigns as well as public initiatives and education focusing on the impacts of their consumption and living standards, the GER aims at encouraging the consumers to adopt a more sustainable behaviour (UNEP 2011a: 67; 69; 132; 279; 303; 342-343; 397-398; 424-425; 481-483; 577). Additionally, the GER ascribes an important role to already changed consumption patterns that, conversely, could be a central factor in the further greening of the important GE sectors. Due to the resulting consumer pressure for certified products (e.g. in the fisheries sector), new markets could emerge and result in more environmental and social benefits (UNEP 2011a: 92; 103; 303; 436; 442).

Like the OECD, UNEP (2011a: 320-321; 478) warns against the rebound effect. The GER recommends “appropriate behavioural and institutional change[s]” in order to avoid this effect.

According to the WBGU concept (2011: 257), the success of environmental protection and the GT depends to a large extent on the consumers who have to “see that they themselves are responsible, both actually and historically, and participate in changes, or even initiate them”. The GT concept discusses sever-

al concrete areas, such as mobility, eating habits, and food waste, where altered consumer behaviour can already be observed or where further changes are required (WBGU 2011: 143-145; 257-260; 302-304; 336). The WBGU (2011: 137; 140-145; 184-188; 302-304) proposes several measures to strengthen and encourage altered consumer behaviour and to overcome existing uncertainties with regard to information on sustainable consumption: national regulatory frameworks (product standards, bans, etc.), information-based measures (labelling of sustainable products e.g. by indicating the carbon footprint), and campaigns for climate-friendly behaviour, such as car sharing, and the imitation of role models. Additionally, the GT concept stresses the importance of “public opinion leaders” who have to acknowledge the consumers’ responsibility (WBGU 2011: 260). As in the GER, but to a much larger extent, the WBGU (2011: 257–260) regards consumers as “change agents” that can actively put pressure on producers and thus make sustainability an important market factor. This influence is even reinforced by the fact that consumers can simultaneously act as producers – as so-called “prosumers” – e.g. if they feed-in energy generated in their homes into the power grid and thereby influence the market (WBGU 2011: 259).

Furthermore, the internalisation of external costs in certain products and services shall lead to a reduction in consumption of carbon-intensive products, e.g. by taxing foodstuffs according to their emission intensity (WBGU 2011: 180; 237; 304).

Another option for influencing consumer behaviour which is not featuring in the other concepts, is the so-called “nudging” (WBGU 2011: 78; 186; 188). “Nudges” are able to overcome barriers of change related to a lack of information and long-term orientation or convenience, i.e. not caused by a lack of environmental preference. These are, for example, “default options” of environmentally beneficial products from which the consumer can opt out. According to the WBGU (2011: 186), “nudges can help individuals to make their decisions in such a way that the resultant [environmental] benefit is optimised in the long run”.

Similar to the GER and GGS, the GT concept warns against the rebound effect. In contrast to the other concepts, the WBGU (2011: 139) proposes a gradual increase in energy and carbon prices in order to reduce this effect.

Changes on the consumption side feature prominently in all analysed GTC: However, the findings from the analysis of the GER and GGS do not indicate a cut with past consumption patterns, but rather focus on the reduction of the negative impact of consumption. Unlike the two other GTC, the WBGU concept does not only envisage altered consumption patterns, but also calls for the most far-reaching changes in the people’s lifestyle. This is also reflected in the fact that the GT concept is the only one which admits that the required changes will not take place without radical changes on the side of the population.

In the aggregate, the three concepts propose both economic and non-economic measures to raise the consumers’ awareness and to induce sustainable con-

sumer behaviour: pricing the usage of the resource, set up standards or even put a ban on certain products in combination with information-based measures and the promotion of new climate-friendly consumption alternatives. The WBGU proposes new forms of incentivising sustainable consumption patterns by “nudging”.

Furthermore, the WBGU and UNEP do not only perceive the consumers as passive actors, but rather acknowledge their importance as agents for bottom-up induced changes on the production side.

Figure 3: The Economic Dimension of the GTC

	OECD	UNEP	WBGU
<b>Economic Growth</b>	<ul style="list-style-type: none"> <li>&gt; overarching goal</li> <li>&gt; redefine growth</li> <li>&gt; GG has positive impacts on well-being, employment, and natural capital</li> <li>&gt; planetary boundaries as risks to growth</li> </ul>	<ul style="list-style-type: none"> <li>&gt; overarching goal</li> <li>&gt; decouple growth from environmental degradation</li> <li>&gt; GE as engine of growth</li> <li>&gt; risks to growth stem from environmental deterioration</li> </ul>	<ul style="list-style-type: none"> <li>&gt; planetary guard rails set limits to growth</li> <li>&gt; restructure growth</li> <li>&gt; moderate growth rates for a fair low-carbon society</li> <li>&gt; growth provides resources for GT</li> </ul>
<b>Finance</b>	<ul style="list-style-type: none"> <li>&gt; green investment programme</li> <li>&gt; public and private funding</li> <li>&gt; new sources: international trading schemes</li> <li>&gt; reduce investment risks by creation of stable and predictable environment</li> </ul>	<ul style="list-style-type: none"> <li>&gt; green investment programme</li> <li>&gt; public funding: smaller amount, important at the beginning</li> <li>&gt; private funding supported and incentivised by government</li> <li>&gt; financial transfer: new financing mechanisms</li> <li>&gt; create investment-friendly climate in developing countries</li> </ul>	<ul style="list-style-type: none"> <li>&gt; wider range of actors including private and public funding</li> <li>&gt; new financing mechanisms on international and national level</li> <li>&gt; governments set regulatory framework conducive for investment</li> <li>&gt; new business models for risky investments</li> </ul>
<b>Industrial Transformation and Technological Development</b>	<ul style="list-style-type: none"> <li>&gt; mainstream GG policies</li> <li>&gt; energy, water, transport sector in the focus</li> <li>&gt; innovations are key element for decoupling (diffusion)</li> </ul>	<ul style="list-style-type: none"> <li>&gt; sector-specific strategies</li> <li>&gt; decoupling through technological development and innovations</li> <li>&gt; “innovation rent”</li> </ul>	<ul style="list-style-type: none"> <li>&gt; encompassing decarbonisation of the industry sector</li> <li>&gt; energy and land-use sectors in the focus</li> <li>&gt; technological developments aiming at decoupling accompanied by limits to demand</li> <li>&gt; innovation-driven transformation</li> </ul>
<b>Valuation and Internalisation</b>	<ul style="list-style-type: none"> <li>&gt; increase commodification of environmental goods and services</li> <li>&gt; better valuation and allocation of natural capital through internalisation of negative externalities</li> <li>&gt; incentivises innovations</li> </ul>	<ul style="list-style-type: none"> <li>&gt; improve valuation of environmental goods and services</li> <li>&gt; internalisation of social and environmental costs</li> </ul>	<ul style="list-style-type: none"> <li>&gt; valuing environmental goods and services</li> <li>&gt; internalisation so as to incentivise transformation</li> <li>&gt; special focus on carbon pricing</li> <li>&gt; internalisation of positive externalities</li> </ul>

<b>Consumption Patterns</b>	<ul style="list-style-type: none"> <li>&gt; reduce impact of consumption</li> <li>&gt;information-based, market-based, and governmental measures</li> </ul>	<ul style="list-style-type: none"> <li>&gt;reduce impact of consumption</li> <li>&gt;information-based and market-based measures</li> <li>&gt;consumer pressure can effect changes on production side</li> </ul>	<ul style="list-style-type: none"> <li>&gt;altered consumption patterns and radical changes in lifestyle</li> <li>&gt;information-based, market-based, and governmental measures; “nudges”</li> <li>&gt;consumers as change agents; “prosumers”</li> <li>&gt;increase energy prices so as to prevent rebound effect</li> </ul>
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## 5.2. Environmental Dimension

### 5.2.1. Protection and Management of Ecosystems and the Natural Resource Base

The GGS offers several policies that seek to integrate environmental considerations into policy-making. The OECD bases its environmental assumptions to a high degree on the findings of Rockström *et al.* (2009) who identified certain “planetary boundaries”. The surpassing of so-called “tipping points” has to be avoided since after these points the impact on the ecosystems may be irreversible, unpredictable, and non-linear. Additionally, the GGS cautions against the decreasing ability of reproducible capital to substitute for depleting natural capital (OECD 2011b: 10; 23; 29-31; 116). The GGS considers preventive measures as more effective and less cost-intensive than remediation measures in order not to surpass the environmental thresholds (OECD 2011b: 25-26; 31).

According to the GGS, efforts that address the loss of natural capital are needed in order to reduce the expected negative impacts on growth (OECD 2011b: 10; 29). Additionally, these losses will affect “the Earth’s capacity to provide the ecosystem services such as carbon sequestration [...] and the provision of common genetic material that support economic growth and human well-being” (OECD 2011b: 31). The deterioration of ecosystem services as well as the inefficient use of resources are traced back to both market and regulatory failures which result in the misleading price (zero cost or only a limited one) of natural assets (OECD 2011b: 25-26). Therefore, the GGS proposes paying schemes for ecosystem services that would value the maintenance of these services and especially help resource-dependent developing countries (OECD 2011b: 9; 13; 17; 21; 25; 31; 129).

Sound management and usage of natural capital is central to the GGS. The different measures can be categorised as follows: The first group comprises framework policies, such as fiscal and regulatory settings, that shall guarantee the efficient allocation of resources. That is to say, the economic policy shall be designed in a way that favours both the realisation of maximum environmental advantages and the innovation processes. The second group of policies shall

provide incentives for the efficient use of natural resources by pricing the extraction of natural resources and pollution effects (OECD 2011b: 11; 35-74).<sup>43</sup>

According to the OECD (2011b: 37; 45), regulations and standards are regarded as crucial for both incentivising GG and complementing the market-based mechanisms (taxes, permits, and subsidies) in order to encourage a more efficient resource usage.

Boosting resource productivity is the core element in the environmental dimension of the GGS and directly relates to the overarching goal of the strategy, i.e. increase well-being and protect the environment by establishing adequate incentives or institutions (OECD 2011b: 19). By providing incentives for improvements in resource efficiency, less harmful economic growth shall be assured – especially in low-income countries where resource dependency is higher than in the OECD countries (OECD 2011b: 28; 63).

Important technological changes (cf. section 5.1.3) as well as huge infrastructure programmes in the three key sectors energy, water, and transport shall increase resource productivity and decrease carbon intensity. Thereby a more efficient use of natural capital shall be assured in order to preserve it (OECD 2011b: 35–74). However, this is not sufficient according to the OECD (2011b: 117): “rising productivity should be accompanied by absolute declines in environmental services in those areas where there is unsustainable use of environmental assets.” In order to avoid environmentally harmful extraction of resources, subsidies, e.g. on fossil fuels, have to be abolished. Thereby, excessive exploitation of these resources can be curbed (OECD 2011b: 35-48).

The GE by UNEP (2011a: 629) is regarded as a driver of environmental protection and enhancement: the natural environment is seen as the basis of physical assets and public benefits. Consequently, it must be preserved as the source of economic growth, progress, and human well-being (UNEP 2011a: 16; 146; 628). It is claimed that “by investing in arrangements that protect these services and, where appropriate, enhance them there is opportunity to ensure that the greatest advantage is taken of these services” (UNEP 2011a: 146).

The GER proposes to “overcome a vast array of market, policy, and institutional failures that prevents recognition of the economic significance of this environmental degradation” (UNEP 2011a: 18) so as to halt unsustainable and inefficient usage of important ecosystem services and large “part[s] of the earth’s ecological infrastructure” (UNEP 2011a: 156). Special attention is paid to the protection and preservation of natural assets in agriculture, fisheries, water, and forests: among others, the reduction of soil erosion, biodiversity, and other use impacts and stopping deforestation are important goals of the environmental dimension in the UNEP concept (2011a: 16; 37; 42; 50; 60; 68).

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<sup>43</sup> These market-based mechanisms were already introduced in section 5.1.4. They aim at minimising environmental deterioration by incentivising resource productivity and innovations.

Furthermore, increases in resource efficiency are perceived to be of great extent: i.e. green investments in energy efficiency in the transport and building sectors as well as in industry could result in significantly reduced exploitation of natural capital (UNEP 2011b: 17; 22-23).

In order to incentivise the adequate management of natural capital, the GER proposes both market-based instruments (prices for resource usage and pollution) and regulatory measures. These include proposals for a subsidy reform that favours the subsidisation of environmentally and socially beneficial activities and green technologies (e.g. feed-in tariffs), increasing public expenditure on infrastructure as well as green public procurement (UNEP 2011a: 87-104; 550-551; 563-565; 575). Moreover, the GER promotes the employment of strong environmental policies (e.g. rules, regulations, standards) while guaranteeing coherence across sectors and geographical levels as well as their effective enforcement. Even legal prohibitions can be needed in order to protect the natural resource base (UNEP 2011a: 551-552; 563-569). Despite political and administrative challenges, UNEP proposes to design property laws, zoning regulations, quotas or ecosystem access rights. In order to restrict over-exploitation and to incentivise the sustainable use and management of the resource this is designated e.g. for the forest, fisheries, water, and agriculture sectors (UNEP 2011a: 97; 564-565; 575). Apart from these governance mechanisms, the GER acknowledges the suitability of budgetary activities, such as the payments for the protection of ecosystems in order to conserve and improve the environmental resource basis (UNEP 2011a: 37; 66; 550; 604). Furthermore, the special importance of negotiated or voluntary agreements in the private sector is acknowledged as complement to the governmental regulations although the challenge is to guarantee their efficiency and effectiveness (UNEP 2011a: 563-565; 575).

The Great Transformation proposed by the WBGU is regarded as the only alternative to avoid damage to the natural life-support system – the “natural heritage” for future generations (WBGU 2011: 337). According to the WBGU (2011: 32; 45-46; 62; 109), surpassing the identified guard rails would cause high costs and environmental risks. The WBGU derives the need for protecting the environment and conserving ecosystem services from the belief in the precautionary principle, i.e. the conviction that the transformation is basically driven by anticipation, caution, and knowledge generated in scientific research (WBGU 2011: 21; 106; 321-360).

The most important threat to the natural life-support system is perceived to stem from climate change. Therefore, the WBGU (2011: 21; 27; 35) particularly concentrates on limiting climate change to the internationally acknowledged 2°C guard rail – “the most important benchmark any measures have to consider” (WBGU 2011: 21). Although climate protection can be regarded as the most basic condition for sustainability, and thus future development opportunities (WBGU 2011: 45-46; 62-63), other interrelated and similarly threatening “Earth system megatrends” are identified (WBGU 2011: 33): the loss of ecosystem services and biodiversity, land degradation and desertification, water shortage



and pollution, scarcity of raw materials, and threatening pollutants (WBGU 2011: 33-46). Consequently, the WBGU especially focuses on land-, water-, and energy-intensive activities and the effects these have on the environment.

Although the WBGU acknowledges the importance of carbon pricing as an instrument for regulating and managing the resource usage, this market-based measure alone is regarded as insufficient for inducing the required changes. Market failures make governmental actions necessary: Among others, these include climate protection laws, standards or the threat of the latter leading to voluntary agreements, financial incentive instruments, and information-based measures shall manage the resource use in order to reach a more sustainable development path (WBGU 2011: 172; 176; 181; 184).

Especially sustainable land-use is thought to have a bearing on the conservation of biodiversity and the protection of important ecosystems. Different strategies are proposed that shall guarantee environmental protection: Firstly, the expansion of arable land and deforestation as well as soil degradation must be stopped by implementing sustainable soil and forest management systems and more extensive protected areas. The WBGU (2011: 68; 144; 237; 299; 302-303) recommends sustainable afforestation programmes and the reduction of livestock production – one of the most damaging forms of anthropogenic land use – in order to avoid further expansion of deteriorating land-use. Secondly, certification schemes shall be established that guarantee sustainable extraction especially in forests (WBGU 2011: 122-123; 144; 186-188; 299-304). Thirdly, in order to protect the ecosystems and preserve its biological diversity, e.g. threatened by agriculture or unsustainable forest management, remuneration schemes can be a viable strategy in order to guarantee the provision of “environmental goods”. By directly paying for protective measures, the GT concept seeks to constrain soil and forest degradation (WBGU 2011: 39; 144; 237; 299-301; 323-324; 327).

Ecosystems can be economically valued based on their various functions: provisioning (production of food and feed, biomass, drinking water, genetic resources), regulating (air pollution control, climate, water and soil protection) and cultural (aesthetic value, recreation and tourism, social networks) in order to supply a price signal. [...] Farmers and forest managers are rewarded for providing certain ecosystem services, such as carbon sequestration, water cycle regulation, soil formation or primary production, in order to create economic incentives for their long-term provision (WBGU 2011: 188).

Furthermore, besides strong institutions on international level that shall guarantee and finance sustainable management and exploitation of natural resources and ecosystems in both land-use sectors (e.g. REDD), the GT concept regards integrative environmental approaches in policy-making as very important (WBGU 2011: 46; 299).

In contrast to the other concepts, the WBGU (2011: 118-119; 136; 146; 172; 303; 337) further warns against the potential negative impacts the increased

use of renewable energies could have on the environment. That is to say, the sustainable potential e.g. of bioenergy must not be exceeded in order to avoid soil overuse or water shortages. This effect shall be restricted by an adequate legal framework.

As could be shown, although the rationale for assuring environmental sustainability differs, measures to preserve the natural resource base as well as ecosystems and their functioning feature prominently in all GTC: The GGS and GER mainly build on the reason of protecting natural capital as the most important source for growth and well-being in the future; whereas the GT concept argues from a precautionary, future-oriented perspective so as to protect the natural life-support system from irreversible damages. As in the concept of SD, the role of scientific research for the transformation is especially highlighted in the concept of the WBGU: science shall deliver the required knowledge for transformative action and guide governmental policies and the management of resources.

According to the OECD and UNEP, the implementation of GG or a GE itself is the driver for the preservation and conservation of ecosystems as well as natural resources. It is interesting to note the difference in connotation between the GER and GGS on the one hand and the GT concept on the other: UNEP and the OECD strongly focus on the protection of “natural capital” in order to take the maximum economic advantage of them; whereas the GT concept strongly aims at conserving the environment’s capacity to deliver the ecosystem services as well as natural heritage for future generations. Moreover, it can be stated that the effects on growth in the GGS and GER, which emanate from environmental protection due to increasing investments and innovations, are regarded as more important than the impact on environmental protection as such.

Concerning the resources and ecosystems that shall be protected or restored, the scope of the three GTC differ according to the concepts’ focuses: By providing special chapters on certain ecosystems or natural resources, the WBGU and UNEP cover the areas which are to protect more extensively than the OECD. However, all include concerns e.g. for soil degradation and deforestation, pollution, and over-use of water resources.

The GTC aim for an improved allocation and usage of natural resources in terms of increasing resource productivity and reducing carbon intensity by introducing certain regulations, fiscal instruments or even a national climate law (WBGU). Especially in the GGS and GER, the commodification of environmental goods and services is regarded as the best practice to avoid their misuse and to guarantee their protection most cost-effectively.

Although all GTC consider market-based instruments as very important for incentivising the more efficient usage of natural resource, additional governmental measures – and to a certain degree international action – are proposed. UNEP and the WBGU propose the increased use of protected areas and changes in land-use practices which halt the soil degradation especially in forests. All con-

cepts, even though the GGS to a smaller extent, stress the importance of paying for ecosystem services in order to protect or to restore these systems and its functions.

### **5.2.2. Reduction and Safe Management of Emissions and Pollutants**

With regard to the reduction and safe handling of emissions and pollutants, the GGS especially focuses on the reduction of pollution, such as GHG emissions, by the following measures: putting a quantitative limit and a price on polluting economic activities (taxes and trading schemes), setting up performance standards, well-planned infrastructure programmes, and incentivising technological development (cf. section 5.1.3). Increased use of CCS is envisioned in the GGS in order to curtail GHG (OECD 2011b: 65–66). Special attention is paid to the reduction potential and importance of emissions and pollutants in the water, energy, and transport sectors. The GGS also refers to the re-use of waste as a new source of production (OECD 2011b: 35; 40; 45; 53; 63-72).

According to UNEP (2011a: 505; 294-325), the potential of reducing the negative externalities associated with pollutants, emissions, and waste is exceptionally high when the investments in the GE sectors as well as the market-based and regulatory measures will be realised. Like the OECD concept, the GER aims for the reduction of emissions by pricing polluting activities and even proposes to impose fines in case of non-compliance with respective laws and norms. Where feasible, the construction of CCS facilities is proposed in order to reduce the GHG emissions in the atmosphere. However, the technology is still questioned as a safe handling of the emissions (UNEP 2011a: 264–265).

Especially in the agriculture, manufacturing, and transport sectors the potential for decoupling and reduction of pollutants is highlighted and underlined with the increasing threats posed by a growing world population and related increases in waste production (UNEP 2011a: 17; 53; 251; 256-258; 261-263).

With regard to waste, the GER envisions a “global circular economy” as the overarching goal of the strategies aiming at minimising as well as reusing, recycling, and handling safely any unavoidable waste: Here, UNEP (2011a: 273-274; 294; 298-301) refers to the 3R-strategy (reduction, re-using, and recyclability) as a central component of the transition towards a GE.

Since the WBGU (2011: 33-45) regards anthropogenic pollutant emissions as the major cause for ocean acidification, changes in the ecosystems, the stratospheric ozone layer, and climate change, the GT concept primarily aims for a reduction of these damaging emissions. Besides the reduction of other GHG emissions, pollutants, and waste it is the explicit goal of the GT concept to decrease CO<sub>2</sub> emissions stemming from the use of fossil energy carriers in order to stay within the planetary guard rails (WBGU 2011). The WBGU (2011: 39; 42-45; 120-121; 177) proposes to restructure the major emitting fields of the current economy – the energy sector as well as land-use and current urbanisation patterns – that result in a reduction of CO<sub>2</sub> emissions.

Fossil energy carriers which have the most damaging pollutant effect shall be substituted by renewable or low-carbon energies in order to reduce emissions. In the energy sector, which can be completely decarbonised according to the council's report. This also implies the use of new technologies which artificially withdraw CO<sub>2</sub> from the atmosphere, such as CCS (WBGU 2011: 110; 113-115; 133; 287; 335). Carbon pricing as well as other market-based and regulatory instruments shall set the incentives for the required decarbonisation (WBGU 2011: 113-115; 282-285; 287; 335). The WBGU (2011: 179-180; 312) favours a global climate protection regime that is building on joint restrictions of CO<sub>2</sub> emissions and an allowance trading scheme as the most promising instruments for achieving the emission reduction on a global scale. Thereby, the WBGU (2011: 10-11; 38; 113-114; 179-180; 265; 271-272; 284) draws on the council's earlier work on a global budget for CO<sub>2</sub> emissions from fossil fuel sources—the “budget approach”: “If restricting global warming to a mean temperature change of 2 °C is to succeed [...], then, by the middle of this century, no more than around 750 [Gigatons] of CO<sub>2</sub> from fossil sources may still be released into the atmosphere” (WBGU 2011: 2). This approach strongly builds on environmental acceptability, international fairness and equitable burden sharing (WBGU 2011: 284; 312).<sup>44</sup>

Further restructuring is proposed for the land-use and urbanization patterns as major emitting sectors. Although land-use cannot be completely emission-free e.g. due to the use of nitrogen fertilisers, this sector is regarded to be another important transformation field for the reduction or better absorption of emissions (WBGU 2011: 299-304): The natural carbon sinks shall be restored by stopping land conversion. In the forest sector, this implies afforestation programmes and better forest management. Furthermore, the GT concept perceives huge potential for carbon sequestration by shifting to more sustainable agricultural practices, such as agro-forestry. Also related to land-use, carbon storage capacities shall be enhanced by protecting and renaturalising peatlands (WBGU 2011: 120-122; 144; 301-302). Special attention is paid to the remodelling of the current urbanisation trends with a special focus on energy management, transport facilities, and climate-friendly buildings. According to the WBGU (2011: 138-143; 233; 253; 294-299), this transformation field contains significant potential for increases in efficiency and reduction of energy demand.

Additionally, the GT concept explicitly elaborates on the reduction of direct and indirect waste-related emissions as well as waste by promoting the following: dematerialisation, i.e. the reduction of material throughput in the production process, as well as increasing resource efficiency; taking into account the impact of a product in the whole lifecycle with the goal to minimise the non-useable residues, introducing recycling systems (especially for hazardous waste, such as electronic waste), and reusing parts of used goods (circular economy) (WBGU 2011: 136-137; 143; 145). With regard to the reduction of pollutants that, *inter*

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<sup>44</sup> For all other CO<sub>2</sub> emissions stemming from non-fossil sources or other GHG the council proposes separate regulations (WBGU 2011: 312). See the WBGU Special Report (2009) for a detailed description of the budget approach as measure to guarantee equal burden sharing on the way towards a low-carbon world (cf. section 5.4.2 and 5.4.3 in this study).

*alia*, cause water pollution the WBGU concept proposes the expansion of “green chemistry” (WBGU 2011: 137) and precision-farming in order to reduce the usage of fertilisers in agriculture (WBGU 2011: 41-42; 45; 137; 301-302). Although nuclear energy causes low emissions and thus could be a viable alternative for the low-carbon transformation, it is rejected by the WBGU (2011: 27; 116-117) due to related risks regarding the final storage of nuclear waste.

The reduction of emissions, especially of CO<sub>2</sub> emissions stemming from fossil fuels, is central in all GTC; however, it is the most important element in the WBGU concept. In the GT concept the most rigorous goals of decarbonisation can be found in comparison to the other two GTC. By introducing a price for carbon and trading schemes, setting up other market-based as well as regulatory instruments, the three concepts all aim at incentivising the reduction of fossil fuel emissions in several sectors. The three GTC concentrate on several, partly diverging, sectors: the reduction of and the better natural sequestration of emissions in the land-use sectors, the transformation of the energy sector, and the changes in the transport sector feature prominently in all GTC.

Especially improved waste management has an important role in the GER and the WBGU concept; whereas the strength of the latter lies within the elaborated proposals for a global emissions trading scheme limiting global CO<sub>2</sub> emissions to an environmentally acceptable amount.

Huge differences can be detected with regard to the implementation of new sequestration technologies, such as CCS: in contrast to the GGS, the GER and GT concept critically elaborate on the risks of the new technologies.

Figure 4: The Environmental Dimension of the GTC

	OECD	UNEP	WBGU
<b>Protection and Management of Environment</b>	<ul style="list-style-type: none"> <li>&gt;address environmental deterioration in order to reduce risk to growth and secure human well-being by GG</li> <li>&gt;incentivise increasing resource productivity and reduce damaging impact of economic growth</li> <li>&gt;measures for efficient allocation of natural capital: fiscal and regulatory instruments</li> <li>&gt;guarantee efficient usage by pricing extraction and pollution and setting up of regulations/standards</li> <li>&gt;payments for maintenance of ecosystem services</li> </ul>	<ul style="list-style-type: none"> <li>&gt;GE and green investments are driver of environmental protection</li> <li>&gt;goal: take greatest advantage of natural capital by investing in protection and enhancement</li> <li>&gt;foundation: recognise economic value of environment</li> <li>&gt;increase resource efficiency so as to reduce extraction</li> <li>&gt;market-based and regulatory measures (strong environmental policies); voluntary agreements</li> <li>&gt;restrict over-exploitation by governance mechanisms</li> </ul>	<ul style="list-style-type: none"> <li>&gt;avoid surpassing of planetary guard rails so as to preserve natural life-support system and natural heritage</li> <li>&gt;scientific resource management</li> <li>&gt;avoid negative impact of renewable energies</li> <li>&gt;market-based and regulatory measures (e.g. national climate protection laws)</li> <li>&gt;remuneration schemes for land-use sectors in order to avoid soil degradation and deforestation; protected areas</li> <li>&gt;strong international institutions in the key transformation fields</li> </ul>

**Reduction and Safe Management of Emissions and Pollutants**

- >reduction of GHG emissions by limiting and pricing pollution, setting up performance standards, technological development
- >curtail GHG by CCS
- >reducing and re-using waste

- >payments for maintenance of ecosystem services

- >investments in the GE sectors, market-based, and regulatory measures help reducing negative externalities
- >CCS questioned
- >“global circular economy”: minimise, re-use, and recycle waste; secure safe handling

- >main goal: decarbonisation
- >market-based and regulatory instruments
- >international restrictions and trading scheme (“budget approach”)
- >increase natural carbon sequestration
- >CCS questioned
- >abolish nuclear power plants due to risks
- >dematerialisation, minimise non-reusable residues, recycling (“circular economy”)
- >reduce chemical pollutants

### 5.3. Social Dimension

#### 5.3.1. Fair Access to Basic Goods and Services

The GGS elaborates on the improved access to energy and water by increasing the use of new and improved technologies. Inadequate access to water and sanitation is regarded as a major hindrance for development and a threat to health. Thus, for both water and energy, the access and the improved quality of the goods and services play an important role in the OECD concept (2011b: 24; 65-66; 69-70). It is stated that, e.g. the “lack of quality water services can be a significant constraint on growth” (OECD 2011b: 69). Thus, access to water and energy is less targeted as a social goal, but is rather regarded as an infrastructure investment programme important for GG.

The GER discusses the importance of improving the fair access to water, energy, food, and transport by investing in the greening of these sectors in order to reduce the vulnerability of the poor and, in general, improve the quality of life and well-being of the people. According to UNEP (2011a: 116-117; 120; 124-132), especially in developing countries the transition towards GE can be accelerated by investments in access to water and sanitation services for the poor: “Access to reliable, clean water and adequate sanitation services for all is a foundation of a green economy” (UNEP 2011a: 116). With regard to access to energy, UNEP (2011a: 13; 116; 340) proposes the expansion of renewable energies especially in off-grid situations which can be operated cost-effectively and flexibly. By greening the agriculture and the fisheries sectors in combination with avoiding food waste in developing and developed countries, increased nutrition levels can be attained in a GE (UNEP 2011a: 36; 42; 513; 523-524).

The GER stresses the importance of investments in green buildings in order to provide the people with adequate housings equipped with access to electricity and potable water. Improved and affordable housing conditions, partly embedded in well-planned and sustainable cities, are regarded to be crucial for better access to services (UNEP 2011a: 15; 336; 340; 470-473).

In the WBGU concept (2011: 42; 55; 109; 134; 171-172; 269) fair access to basic goods and services is predominantly concerned with access to energy, food, and to a smaller extent, to clean drinking water and basic sanitation facilities: Lacking access to these basic goods and services has severe social consequences and effects on income-creation activities of the people. According to the WBGU (2011: 25; 58; 79-80; 109), the transformation towards a low-carbon economy and society provides a huge potential for delivering access to these services and goods and, hence, contributing to a “good life” (WBGU 2011: 25): “Fundamental changes in the technological development paths of all countries are necessary in order to provide the chance of achieving elemental development goals like access to food, clean water, basic health care [...] whilst remaining within the planetary boundaries” (WBGU 2011: 109).

In the view of the WBGU (2011: 109; 134; 292-294; 296), the priority of the GT is to end with energy poverty. Achieving global universal access to “clean and safe energy services” by the year 2030 (WBGU 2011: 171) while also ensuring the climate-friendly restructuring of the global energy system are the two decisive targets of the GT concept (WBGU 2011: 158; 313). According to the WBGU concept (2011: 118; 162; 275), the developing countries and rural areas in particular could benefit from the extended use of modern renewable energy.

Furthermore, the GT concept elaborates on the improved access to food for under- and malnourished people worldwide. Food supply finds itself under pressure due to both unsustainable land-use practices causing soil degradation and growing demand for agricultural products caused by growing populations (WBGU 2011: 41; 60; 62; 270). Food security shall be guaranteed by abolishing distribution problems and intensifying sustainability-oriented agriculture (WBGU 2011: 48; 59-60; 236; 268).

Like the GER, the WBGU (2011: 58; 298) emphasises the role of sustainable urbanisation processes because of the inherent development potential and co-benefits regarding improved access to basic goods and services. Moreover, the improved quality of life is an important co-benefit of low-carbon urbanisation.

The satisfaction of human needs and the improving of well-being are of utmost importance in the concept of SD. In the three GTC, the access to basic goods and services plays different roles although all concepts regard it as prerequisite for attaining decent living standards for the people and as obligatory condition for being able to generate income. In general, technological developments on the path towards a more sustainable economy (and society) are thought to have beneficial outcomes for the access to certain basic goods and services.

In the OECD concept, investments in the technologies and infrastructures for energy and water are regarded as an important source for economic growth. Similarly to the GGS, access to freshwater, sanitation, and energy in the GER is regarded as the foundation for GE, whereas investments for the improved provision of these goods and services can in turn accelerate the transition. Furthermore, as in the GT concept, access to food plays an important role in the GER: e.g. by implementing sustainable agricultural practices access to food can be improved significantly. Access to energy features prominently both in the GER and in the WBGU concept: In the latter the access to clean energy even is one of the overarching goals of the GT so as to end with energy poverty.

In contrast to the OECD, the WBGU and UNEP elaborate on the advantages of sustainable urbanisation for the provision of and better access to basic services.

Issues of fairness are not addressed in the GGS since it constitutes a pure investment-oriented strategy for the improved access to these services and goods. Although the GER represents a similar strategy, the improved access to basic goods and services is treated as a question of fairness. The WBGU provides the strongest strategy for guaranteeing fair access to energy by aiming for a universal access which shall be independent from socio-economic factors.

### **5.3.2. Income and Employment**

The GGS stresses a significant job creation potential stemming from the transition towards a greener economy. The creation of new jobs in emerging innovative markets and activities in the initial phase of the transition plays a pivotal role in the concept of the OECD (2011b: 13; 20; 85; 89). A sizeable net employment gain is expected due to the fact that employment gains, e.g. in the renewable energy sector, will outweigh the losses in conventional fossil fuel-based sectors (e.g. transport, energy sector). That said, the GGS also considers that the long-term employment effect of the GG policies on the entire economy will be limited. This is traced back to the potentially pervasive impacts of mitigation policy and indirect effects of green policies, such as carbon pricing, on the labour market (OECD 2011b: 91-95).

Similarly to the GGS, the job creation effect of the transition towards a GE is stressed by UNEP. Through further investments into green sectors, the green investment scenario results in overall employment gains between 2030 and 2050 in comparison to the business as usual scenario. The GER elaborates that those new jobs created, e.g. in the agriculture, building, forestry, transport, and the energy sectors in particular, will exceed the jobs lost in detracting sectors in the transition (UNEP 2011a: 357; 505). Furthermore, the GER highlights that it is not only about job creation in the transition, but rather about creating “truly green jobs” (UNEP 2011b: 14), i.e. to increase the number of decent employment opportunities in GE sectors.<sup>45</sup> According to UNEP (2011a: 24; 247; 280; 310; 357; 629), this implies abolishing child labour, secure a living wage, social

<sup>45</sup> See footnote 24 for UNEP’s earlier work on “Green Jobs” which also influenced the emergence of the GTC.



protection, occupational health and safety, and freedom of association. That is to say, the greening of the waste and building sectors, for example, shall lead to the formalisation of jobs currently belonging to the informal sector. As a result, new and decent jobs are created. This shall contribute significantly to poverty alleviation and improve equity (UNEP 2011a: 292-293; 303; 310; 325; 338; 355-357).

UNEP (2011a: 36; 89; 158; 164; 177; 184) stresses that especially the agriculture, fisheries, and forest sectors are crucial for the income creation in developing countries since the people mostly depend on the use and extraction of natural resources. The GER proposes a two-fold strategy focusing both on improving the opportunities to generate income from small-scale production, such as sustainable agriculture, and on the payment for conservation of resources or side-payments as compensation to the local communities for lost access to protected areas (UNEP 2011a: 103; 170-171).

According to UNEP (2011a: 470–472), a green urbanisation process is beneficial for the provision of employment opportunities and thus also strongly linked with poverty reduction.

The importance of guaranteeing access to productive resources is also stressed in the UNEP concept (2011a: 102; 143; 156; 170; 184; 187; 202; 390-392; 402; 460): access rights to these resources as well as gains from their extraction and protection shall be fairly distributed.

To a much smaller extent, the WBGU concept stresses the positive employment effects as “considerable co-benefits” of the GT (WBGU 2011: 109). Despite the job losses in detracting sectors (WBGU 2011: 179; 182), the investments in low-carbon technologies will result in the creation of new industries and thus are attributed with a significant employment factor (WBGU 2011: 109; 118; 144; 159; 248-249; 266; 303). This co-benefit is especially stressed for the expansion of renewable energies in structurally weak regions in both industrialised and developing countries (WBGU 2011: 109; 118). According to the WBGU (2011: 58), the process of urbanisation implies a huge potential for improved income generation and employment due to better access to basic goods and services in urban areas.

As in the GER, the WBGU assumes that income can be generated by increasing the rewards for protection of ecosystem services and protected areas (WBGU 2011: 188; 236-237).

In the concept of SD, the generation of income and employment play a central role for human well-being and poverty reduction.

All GTC analysed here emphasise the job-creating effect of investments for the transition. Especially the GER and GGS focus on the enormous job creation potential of investments in a green economy; in the WBGU concept, job creation is a positive side-effect of the GT. The three concepts particularly stress the

restructuring of the energy sector and the resultant effects on the labour market, e.g. due to the expansion of renewable energies.

In contrast to the GT concept and with more emphasis than in the GGS, UNEP does not only claim for creating employment opportunities, but rather proposes to significantly increase decent jobs: firstly, by formalising jobs in the informal sectors and, secondly, by guaranteeing social protection and certain working standards. The OECD only addresses this topic as a flanking measure for labour market policies.

Furthermore, sustainable urbanisation processes imply significant employment opportunities as claimed by UNEP and the WBGU. In both concepts the role of sustainable land-use for the creation of income is highlighted as well.

The importance of payment schemes for the protection of ecosystems and natural resources is highlighted in both the GER and the GT concept. Additionally, only the GER elaborates on the access to productive resources that is to be improved and managed more equitably.

Although the three concepts deal with the significant potential of the transformation for creating jobs and generating income by providing access to productive resources, it is not as central as in the concept of SD. Only UNEP includes suggestions for improved distribution of access to and gains from natural resources.

### **5.3.3. Poverty Reduction**

In the view of the OECD, there are important synergies between the GG and poverty reduction, e.g. by creating new jobs poverty can be reduced. The sustainable use of natural capital shall also have positive impacts on the poor people's livelihoods. According to the OECD (2011b: 11; 20; 85-86; 100-101; 103), improved infrastructure (e.g. for water and energy) and the long-term growth could provide income for the world's poor. That being said, poverty reduction is not a goal in itself in the GGS, but rather an aim that demands further policies complementing the economic and environmental policies within the presented framework – particularly in emerging and developing countries (OECD 2011b: 10-11; 35; 115-116).

As the sub-title of the GE concept of UNEP already indicates, the greening of the economy can significantly reduce poverty “on an unprecedented scale, with speed and effectiveness” (UNEP 2011a: 628). Poverty and its impacts are regarded as major social inequities which have to be abolished (UNEP 2011a: 39; 325; 419; 521; 532; 567). Poverty is closely linked with ecological scarcity and deterioration. Thus, UNEP (2011a: 20; 36) aims at addressing both problems simultaneously: firstly, through the creation of green jobs (UNEP 2011a: 273; 306; 321; 323; 418-420; 425); secondly, by investments for a better maintenance of resources, and improved access to the latter (UNEP 2011a: 53; 66; 89-91; 93; 184); and, thirdly, through capital flows from the preservation of natural capital (UNEP 2011a: 37; 66; 158; 167-168; 550; 604).

Furthermore, the process of green urbanisation is regarded to be a crucial driving force in the alleviation of poverty since cities provide employment opportunities as well as better access to basic services (UNEP 2011a: 470–472).

Despite the several links between poverty reduction and the greening of the economy detected by UNEP, it is acknowledged “that moving towards a green economy will not automatically address all poverty issues. A pro-poor orientation must be superimposed on any green economy initiative” (UNEP 2011a: 20).

Poverty reduction plays an important role in the WBGU concept (2011: 159; 223; 293). The low-carbon development and moderate growth can “go hand in hand” with poverty reduction (WBGU 2011: 293). Besides the positive effect of sustainable urbanisation for poverty alleviation, the investments in and expansion of low-carbon technologies and infrastructure will create new jobs and income opportunities what, consequently, can contribute to poverty reduction especially in the newly industrialising and developing countries (WBGU 2011: 109; 159; 179). As already stressed, the WBGU (2011: 109; 171) strongly builds on the impact of providing universal energy access in order to end with energy poverty and contribute to the reduction of poverty in general.

Moreover, the environmental dimension of poverty is stressed (WBGU 2011: 62-63): The prevention of hazardous environmental change can protect the already vulnerable poor from further damages. Unabated climate change is thought to “increase the susceptibility to poverty and social immiseration, thereby not least threatening human security” (WBGU 2011: 62). With regard to this, the WBGU (2011: 48; 50) further underlines the importance of low-carbon development in newly industrialising countries: The fact that most of the world’s poor live in middle-income countries makes a transformation in these fossil fuel-based economies even more urgent.

The WBGU (2011: 292-293; 314; 315) draws a strong link between the GT and international as well as national poverty reduction goals, such as the attainment of the MDG or the upgrading of Poverty Reduction Strategy Papers (PRSP) with sustainable development goals. The GT concept proposes to equally include poverty reduction and low-carbon development goals into a “higher-ranking Green Economy Roadmap” (WBGU 2011: 314). This roadmap could serve as a coherent guideline for international efforts regarding the goal of poverty reduction beside the targets for low-carbon development (WBGU 2011: 164; 314-315). Thus, the WBGU envisions much more institutional changes influencing the reduction of worldwide poverty instead of regarding it as a beneficial side-effect of GE policies and additional poverty reduction policies as proposed in the GER and GGS.

The analysis indicates that poverty reduction can be achievable with the greening of the economy. All GTC see important synergies and complementarities between the greening of the economy and poverty reduction: According to the concepts, the impact of job creation and protecting and improving natural resources on poverty reduction is significant. However, poverty reduction does not feature as prominently as in the concept of SD. The GER and the GGS in particular rather perceive it as a co-benefit of the green policies and measures and

do not cover non-economic factors of poverty. Only the GT concept elaborates on ending with energy poverty in order to contribute to the overarching goal of poverty reduction.

Especially the GER and GT concept focus on the decisive link between poverty reduction and preventing environmental deterioration and degradation: The WBGU also builds its environmental protection imperative on the assumption that the poor are especially exposed to unabated environmental changes that aggravates their vulnerability even more.

However, in order to secure a pro-poor orientation the GER and GGS underline the importance of additional policies for tackling all relevant factors that may alleviate poverty. The WBGU promote institutional changes – both on national and on international level – that can make the transformation pro-poor oriented: in case of the GT concept, the goals of poverty reduction and low-carbon development shall be merged in an overarching Roadmap.

#### **5.3.4. Distributional Aspects**

“Shared prosperity” and distributional impacts of GG are acknowledged in the OECD strategy (2011b: 95), provided that it concerns the labour market or impacts of tax collection and subsidies on the household level.

The GGS pays special attention to those employment opportunities that are at risk in the transition: The higher adjustment costs in the sectors that are contracting have to be attenuated and shared fairly (OECD 2011b: 89–92). Consequently, the adjustment in the labour markets shall be carried out in a smooth and just manner through adequate labour market, training, and educational policies (OECD 2011b: 95). That is to say, the transformation of the labour market shall not be “achieved at the cost of excessive insecurity or inequality for workers” (OECD 2011b: 95).

On the household level, the distributional impacts of the social and tax systems are regarded as crucial. A shift away from personal or corporate income taxes to taxation of the externality<sup>46</sup> is considered an important factor for the continuing equal distribution of income. An exemption from environment-related taxes is refused. The negative impact of abolished subsidies and increasing prices on vulnerable population groups can be lessened on condition that targeted compensation measures (e.g. cash transfer systems) for the increase of energy prices are introduced (OECD 2011b: 10; 12; 35; 38-40; 97-101).

One of the main goals of the measures proposed in the GER is to reach an equitable and fair GE (UNEP 2011a: 146; 533). Consequently, the “equitable distribution of costs and benefits that emerge from new opportunities” in the transition is regarded as crucial (UNEP 2011a: 533). Central to the GER are measures that guarantee the equitable management of resources (e.g. in the

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<sup>46</sup> The GGS proposes, *inter alia*, the internalisation of external costs in order to better reflect the economic value of the natural resource and its use (see section 5.1 and 5.2 in this study).

water, agriculture, forest, and fisheries sectors) as well as the fair distribution of gains from their extraction and fair access to basic services and resources (UNEP 2011a: 102; 143; 156; 170; 184; 187; 202; 390-392; 402; 460).

Fair remuneration, re-skilling of workers, formalisation of employment in the informal sector, and the provision of social assistance are regarded as important for ensuring labour-related fairness (UNEP 2011a: 316; 551; 553; 572- 573; 628). Especially in those sectors where temporal job cuts occur, e.g. due to the replenishment of natural resources or stocks like in the fisheries sector, transitional arrangements have to attenuate the impacts on the workers' livelihoods (UNEP 2011a: 95-98; 628).

As in the OECD concept, UNEP (2011a: 550; 563; 594) recommends attenuating measures when reforming environmentally harmful subsidies since the poor are disproportionately affected by the rise in price of a certain good. The GER proposes "targeted flanking policies", such as welfare transfers, to protect the concerned low-income groups in order to lessen the negative impacts of such reforms (UNEP 2011a: 594).

To a lesser extent, the GT concept elaborates on the distributional impacts related to the labour market due to decreasing sectors or on the compensation measures for "potential decarbonisation losers" (WBGU 2011: 179). The WBGU (2011: 210; 224-226; 317) rather focuses on reaching intragenerational equity on a global level by setting up climate protection policies that are considerate of questions of international fairness. According to the WBGU concept (2011: 272), "the global societies' development opportunities should not diverge too much." This implies ending with social inequalities by establishing the new social contract. This virtual contract is thought to show consideration for fairness, justice, and equity regarding the distribution of global goods as well as compensation mechanisms ensuring the distribution of capabilities for development (WBGU 2011: 210; 226; 272).

The three GTC all include distributional aspects: The just distribution of costs and benefits from the transitions on the labour market is dealt with in all of the concepts; however, mostly the GER and GGS focus on concrete measures to make the transition smooth and fair, e.g. by compensating workers in detracting sectors. Especially the OECD concept heavily bases the acceptance of GG policies on the fair distribution of transitional costs on the labour market.

All concepts, although in the case of the GGS and GER to a greater extent, concentrate on special attenuating measures on the household level that can accompany proposed subsidy and tax reforms: negatively affected groups, i.e. the poor, shall be compensated in order to lessen the impact of removed subsidies, e.g. on fossil fuels.

In contrast to the concepts of UNEP and the OECD, the GT concept has a far more global perspective on questions of distribution. Like the concept of SD, it

deals with intragenerational equity: development opportunities shall be ensured by equitable shares of global CO<sub>2</sub> emissions that are still environmentally viable.

### 5.3.5. Access to and Distribution of Power

Access to the decision-making process is only mentioned in the GGS by referring to the generation of support for the reforms towards green growth: “multi-stakeholder dialogues” shall serve as a means of participation, e.g. to overcome concerns regarding a tax reform (OECD 2011b: 85-87; 100).

Similarly, the GER does not include an increased participation of the population in general. In order to create an effective and enforceable framework of policies and other measures that support the transition to a GE, stakeholder consultation and participation is regarded as crucial since this shall guarantee greater legitimacy (UNEP 2011a: 135; 186; 575). According to UNEP (2011a: 162; 184), good governance of natural resources can be attained through the participation of stakeholders. In the tourism sector it is also acknowledged that the “[g]reen transformation programmes will be more effective if produced by a multi-stakeholder participatory planning process” (UNEP 2011a: 438; 442).

The WBGU concept considers indispensable to build on the citizens’ approval for the transformation and for concrete projects. Thus, it stresses the need for an early and active involvement of the public in the planning process as well as in the approval procedure (WBGU 2011: 209; 239; 277; 279-280).

In contrast to the other concepts, it emphasises the importance of democratic participation and a transition-supportive citizenship by advocating for “a new culture of participation” (WBGU 2011: 205). While empowering the state, citizens and civil society actors shall also be strengthened as key actors in the transformation process. This is regarded as a prerequisite for “establishing legitimate, fair, creative and durable problem solutions [...] for a sustainable transformation” (WBGU 2011: 192). In the view of the WBGU (2011: 192; 203-209; 239; 274; 278-279; 352), democracy constitutes the only legitimate foundation for the GT. The council argues for an active society whose participation is based on knowledge of the required transformation and guided by responsibility for the future generations and the environment they live in. This is also reflected in the fact that the concept strongly emphasises the role of education and science for the GT (WBGU 2011: 204; 213; 217; 269; 352; 355).<sup>47</sup>

In order to guarantee the aforementioned, the WBGU strongly encourages the creation of a social contract that mirrors the new participatory discourse for sustainability between the state, society, and science both on national and on international level (WBGU 2011: 212; 275; 280; 322; 352).

The extent to which participation is included in the GGS and the GER is relatively small in comparison to both the GT and the SD concept. A superficial inclusion in stakeholder dialogues is regarded to be sufficient in order to minimise

<sup>47</sup> For the proposals on how to restructure education for the GT, see section 5.4.4 in this study.

resistance to the required changes and to guarantee legitimacy and effectiveness of the policies.<sup>48</sup> UNEP proposes slightly different forms of inclusion into the decision-making process by referring to the participation of stakeholders in the governance mechanisms for natural resources. However, it fails to indicate how this shall be arranged. Generally speaking, the GER and GGS lack strategies that encourage and strengthen the participation and empowerment of underrepresented and marginalised groups. The inclusion of stakeholders in resource governance is far from satisfactory.

The GT concept also elaborates on the citizens' approval for the GT in general and in concrete projects; however, the WBGU aims much further by calling for increased and informed participation of the citizens in order to build a consensus on the organisation of a low-carbon development. This shall be mastered through the new social contract proposed by the WBGU that is serving as the link between more participation and the proactive government. Hence, the WBGU demands a revolution in participation for the future transformation process and thus even expands the scope of participation demanded in the concept of SD. Democracy is seen as the only possibility to guarantee a fair solution for the transformation by assuring the inclusion, representation and participation of all groups of the societies within the decision-making process.

Figure 5: The Social Dimension of the GTC

	OECD	UNEP	WBGU
<b>Fair Access to Goods and Services</b>	>investments in water and energy infrastructure contribute to improved quality and access	>fair access to water, energy, food, and transport as foundation for GE >investments improve access to goods and accelerates the transition >reduce vulnerability of the poor, improve quality of life >renewable energy: cost-effective and flexible access to energy >sustainable food production: increase nutrition >housing conditions can be improved by GE >urbanization: access to goods and services	>fair access to energy, food, and water so as to improve living conditions >technological development needed in order to achieve access to goods and services >main goal: end with energy poverty >renewable energy: beneficial for developing countries and rural areas >establish food security >co-benefits of urbanisation: improved access to basic goods and services
<b>Income and Employment</b>	>investments result in creation of employment opportunities >new jobs outweigh losses in fossil fuel-	>investments result in creation of employment opportunities >new jobs outweigh losses in fossil fuel-	>job creation as an important co-benefit of the investments required for the GT >income creation: im-

<sup>48</sup> As already could be shown in section 5.3.4, both the OECD and UNEP strongly build on attenuating measures and flanking policies as another important strategy to generate acceptance for the needed changes.

	based sectors	based sectors >urbanisation provides improved employment opportunities >formalisation of jobs in informal sectors by greening of sectors (decent jobs) >income creation: increase small-scale production, introduce PES/ payments for lost protected areas, fair access to productive resources	provide opportunities through “green” urbanisation, introduce PES and payments for lost access to protected areas
<b>Poverty Reduction</b>	>synergies between GG and poverty reduction >improved infrastructure and access to goods and services facilitates income generating activities >poverty reduction demands further policies complementing the GG policies	>GE can reduce poverty effectively and globally >poverty-environment link: improve environment so as to alleviate poverty >create green jobs >role of urbanisation is crucial >add pro-poor policies to the proposed GE policies	>GT result in poverty reduction especially in developing and newly industrialising countries >positive impact of sustainable urbanisation >end with energy poverty as important contribution to overall poverty reduction >poverty-environment link: protect the vulnerable from getting poorer in case of environmental deterioration >institutional links: MDG, PRSP, pro-poor “Green Economy Roadmap”
<b>Distributional Aspects</b>	>labour market adjustments: smooth and just transition >household level: shift towards taxation of externality, compensate low-income groups for increases in prices >acceptance of the GG policies depends on fair distribution of costs and benefits of the transition	>equitable and fair transition >equitable resource management >transitional arrangements on the labour market >household level: attenuating policies for low-income groups	>compensations for losers of decarbonisation >global intragenerational fairness: equitable development opportunities and distribution of global goods through equally shared emission rights
<b>Distribution of Power</b>	>multi-stakeholder dialogues: overcome concerns regarding GG policies through superficial inclusion	>stakeholder consultation and participation: create effective and legitimate GE policies >governance of natural resources	>success of GT depends on the citizens’ approval and acceptance: democratic participation for sustainable development >assure a legitimate and durable solution through social contract >involvement in planning processes >important role of science



## 5.4. Principles and Elements of SD

### 5.4.1. Relation of the Economic, Environmental, and Social Dimensions

The OECD perceives enormous synergies between green economic activities and the preservation of the environment. There are several policies in the economic and the environmental dimensions that mutually reinforce each other. Incentivising innovation and pricing pollution, for example, shall contribute to higher efficiency in resource usage, consequently, resulting in environmental protection. Similarly, there are synergies between these two dimensions and social benefits, especially with regard to job creation, poverty reduction, and improved access to basic goods and services. In turn, the social goals inherent to the GGS are just partly contributing to the attainment of goals belonging to the other two dimensions. However, the analysis in the prior sections shows that social goals are not as important as the goals of the other dimensions since they are rather perceived as co-benefits of the investments in green growth (OECD 2011b: 11; 20; 89; 133). In order to achieve an equality of the goals within the GG policy framework, additional social policies would have to be included (OECD 2011b: 10-11; 35; 115-116).

The GER stresses the mutually reinforcing economic, social, and environmental goals that can be reached by the greening of the economy. It is explicitly claimed that the implementation of GE policies shall have positive effects on the environment, human well-being, and social equity (UNEP 2011a: 16). As could be shown in the previous sections on the three dimensions and as claimed in the sub-title of the GER, implementing a GE shall pave the way towards SD. This would imply an equal balance and integration of all three dimensions in the report. Although UNEP seeks to deliver a strategy that is not focusing “exclusively on eliminating environmental problems and scarcity” by also addressing “concerns of sustainable development with intergenerational equity and eradicating poverty” (UNEP 2011a: 19), it can be stated that the social dimension plays a minor role in comparison to the environmental and economic dimension. The main focus of the GER is “getting the economy right” (UNEP 2011a: 17).

The GT concept strongly builds on interdependent targets regarding economic, social, and political structures both on national and on international level that constitute the basis for the path towards sustainable development (WBGU 2011: 1). The strength of the concept lies within an equal treatment of the three dimensions – in contrast to the strategies published by the OECD and UNEP which mainly aim at restructuring the economy. Especially the role of the social dimension allows for this equality: The WBGU (2011: 203-209; 278-279) makes far-reaching proposals for extending participation and societal empowerment for influencing the GT that are even going beyond the scope of the SD concept.

The integration of social, environmental, and economic goals forms an important part of the SD concept. A predominance of one dimension contradicts the basic idea of SD as an integrative paradigm. Neither the GER nor the GGS fulfill this precondition. Both stress that the strategies primarily focus on restruc-

turing the economy in order to preserve the natural capital on which rely the attainment of social goals and the creation of well-being. Social improvements are rather seen as co-benefits and thus cannot be regarded as equally important goals. The GT concept argues to build on the most important condition for sustainability: climate protection. Although it could be claimed that the environmental dimension is therefore treated with overriding importance, the concept treats the three SD dimensions equally and indicates the possibilities of mutually attaining environmental and developmental goals.

#### **5.4.2. Globality Principle**

The GGS identifies global causes for the increasing environmental degradation: the missing or underpriced value of natural resources and ecosystem services results in the current production and resource consumption patterns that favour environmentally harmful extraction and impedes efforts to increase resource productivity. Consequently, the solution is also global. Furthermore, this rationale originates from the presumption that other economies, especially smaller and those of developing countries could be harmed by the greening of the economies, e.g. in terms of green protectionism (OECD 2011b: 3; 14; 107).

The OECD elaborates a “policy toolkit” that is conceptualised as a universal framework which is adaptable to divergent national circumstances. Thereby, the GGS acknowledges that developed, developing, and emerging countries deal with different challenges (OECD 2011b: 36; 2011a). According to the OECD (2011b: 10), the policy framework for GG “depends on policy and institutional settings, level of development, resource endowments and particular environmental pressure points” (OECD 2011b: 10; 18; 35-36; 38; 105; 117). The following aims shall be pursued in all countries apart from varying national circumstances: to integrate natural capital into decision-making by creating mechanisms that mirror the economic value of natural resources; to improve the human capital within the economy; to design sound macroeconomic, innovation, and competition policies; to protect the rule of law; and to balance social impacts of the transition (OECD 2011b: 35–48). Despite the fact that the GG framework treats all countries equally, the GGS makes reference to the “differential use of the global commons according to different levels of development and comparative advantages” but does not further elaborate on that differentiation (OECD 2011b: 105).

The GGS emphasises the importance of a GG architecture that is conducive to the global management of the transition. Common action is needed to fully and cost-effectively address the challenges ahead as well as to avoid problems of free-riding. Central to this global cooperation are the management of global public goods (e.g. biodiversity) and the fair and controlled access to global commons (e.g. the environment), development cooperation, strengthened cooperation in technology and science, increased global investment flows, and trade (OECD 2011b: 13; 102-107).

The scientific and technological cooperation mainly focuses both on the accelerated development and diffusion of innovative solutions by setting up mechanisms for enhancing technology transfer (patents, IPRs) and on overcoming deficiencies in the receiving countries (e.g. lack of strong environmental policies, openness to trade and FDI) (OECD 2011b: 13-14; 61; 103).

Development cooperation is understood to be one of the key drivers for environmental improvements (OECD 2011b: 14; 104). ODA shall help creating the enabling conditions for GG in developing countries and inducing private investment since it provides important financial resources as well as support mechanism for capacity building in those countries (OECD 2011b: 13-14; 104-105).

In the global management of the transition, national governments have a pivotal role while international organisations do not feature prominently in this transformation concept. Governments have to establish appropriate, coherent national GG strategies: innovation, labour market, and educational policies, regulatory standards, and investments that guarantee stability and credibility beyond electoral cycles (OECD 2011b: 13; 22; 35; 72-74). The inclusion of actors from civil society and the private sector is regarded as important for the management process of the transition, but is not further elaborated.

Similarly to the OECD concept, the one by UNEP perceives the transition as a global task. The underlying causes for environmental mismanagement and depletion are as well of global nature and lead to worldwide capital misallocation. Therefore, the elaborated enabling conditions and the specific sectoral strategies for greening the economy represent a global agenda that avoids explicit differentiation of past responsibilities between developing countries and developed countries (UNEP 2011a: 7; 15-19; 24).

However, the GER acknowledges that the transitions to a GE will alter significantly among the nations (UNEP 2011a: 21; 551; 570) “as it depends on the specifics of each country’s natural and human capital and on its relative level of development” (UNEP 2011a: 21). UNEP (2011a: 629) comments on the developing countries’ right to “move at their own speed, respecting their development objectives, circumstances and constraints” but does not elaborate on it.

The GER proposes two mechanisms that shall strengthen international governance for GE: firstly, to create and improve multilateral environmental agreements including adequate compliance mechanisms for the governance of global commons, and, secondly, to secure beneficial international trade rules and investment frameworks.

The GER acknowledges that developing countries need special assistance in order to fully benefit from the restructuring of the economy. Hence, UNEP (2011a: 629) states that “[d]eveloped nations have a key role to play in building skills and capacity in developing countries and in creating an international market and legal infrastructure for a green economy.” In the section “Supporting actions”, the GER determines measures for countries whose capacities and

institutions, e.g. for research and data collection or for the enforcement of laws and regulations, have to be strengthened in order to implement the GE policies (UNEP 2011a: 20; 570- 573). Furthermore, “resources, technical expertise, training, technology development and diffusion, political backing and other kinds of aid from a broad range of actors” shall be attracted (UNEP 2011a: 570). NGOs, the private sector, and international development organisations can play an important role in the provision of both technical and financial assistance in developing countries (UNEP 2011a: 232; 293; 319-320; 405; 572; 591; 595; 617-620; 622; 628). Global cooperation in the GER also includes technology transfer to and between developing countries (South-South cooperation), additional payments of ODA, and new financing mechanisms, such as schemes for emissions trading or remuneration for ecosystem services which enable financial transfers between developed and developing countries.

According to UNEP (2011a: 630), “[m]oving towards a green economy will require world leaders, civil society and leading businesses to collaboratively engage in this transition”. However, as could be shown in the previous sections, the GER attaches great importance on governments and the private sector and fails to indicate how this collaboration with other stakeholders could look like. Similar to the OECD, UNEP (2011a: 622) focuses on governments which have a decisive role in the GER as trigger and facilitator for the transition.

Similarly, the private sector’s importance is stressed in the concept published by UNEP as primary investor and innovator as well as partly self-regulating partner on the pathway towards a green economy (UNEP 2011a: 551-553; 572; 550; 589-590; 628).

As in the GGS, the GER fails to include NGOs in the governance of the transition at the international level. Although they are referred to as important collaborators or supporters (e.g. for capacity building and empowerment in the agriculture, forest, and waste sectors), their role in the GER is relatively weak in comparison to other powerful actors such as businesses and governments (UNEP 2011a: 66-67; 167; 170; 323-324).

In the view of the WBGU (2011: 31), the environmental degradation and climate change have their roots in the misuse and overconsumption of natural resources and ecosystems caused by humankind. Therefore, a global economic, societal, and environmental transformation is regarded as the solution to the anthropogenic damages of the natural life-support system.

The GT concept follows a dual strategy by stressing the importance of both national and joint international action in the global change process: The states have to strengthen their alignment to the transformation target, e.g. in the form of national climate protection laws and international cooperation in order to secure development opportunities by avoiding climate change through decarbonisation (WBGU 2011: 27; 83; 91; 223-228; 313; 316-318). Nothing less than a new role model for statehood is envisioned in the WBGU concept (2011: 203-215; 278-282): The “proactive state” does not only provide the adequate frame-

work conditions so as to incentivise the private sector to invest and innovate, but rather guarantees change on the governmental level by actively pursuing knowledge-based transformation policies and encouraging “change agents” working towards a low-carbon society (WBGU 2011: 79; 243). The increasing governmental “interventionism must be offset by a ‘more’ in citizen involvement” (WBGU 2011: 204).<sup>49</sup>

Correspondingly, the GT will require a “revolution in international cooperation” (WBGU 2011: 19) between states that take account of common global interests and cede national short-term interests for the benefit of a successful global transformation (WBGU 2011: 1). According to the WBGU (2011: 209-239; 310-318), increased cooperation can be achieved on different ambition levels: by strengthening existing or creating new international institutions and regimes in the three transformation fields as well as in climate protection in general that guide and control national actions towards a low-carbon economy and society (WBGU 2011: 209-239; 310-318). The proposals include a global climate protection regime, the creation of the UN Council for SD as a new form of political will formation on the international level, and international cooperation in form of strategic alliances and partnerships in the three key areas (WBGU 2011: 316). Ideally, significant structural changes in international cooperation can be reached through a new, global social contract in favour of global sustainability: This contract builds on the inclusion of states, civil society, and the scientific community as global governance actors. It encourages future, environmental, and international responsibility, namely for the interests of other members of the international community and institutionalises global distribution and compensation mechanisms for a fair burden sharing (WBGU 2011: 79-80; 260-261; 276-278). In addition to that, legitimacy for global sustainable strategies must be secured by shaping “transnational democratic structures” (WBGU 2011: 20).

The social contract includes the principle of common but differentiated responsibilities: The GT concept takes into account that developed, developing, and newly industrialising countries have different responsibilities of causing the current environmental crisis and also different roles in and capabilities for coping with the transformation (WBGU 2011: 27; 107; 192). The council stresses that in the medium-term all countries have to decarbonise although the pressure to act immediately is primarily put on developed and newly industrialising countries (WBGU 2011: 179; 269). One mechanism to attain an equitable burden sharing in the future decarbonisation process is the “budget approach” (WBGU 2011: 284; 312).<sup>50</sup> The WBGU recommends the equitable distribution of a certain global CO<sub>2</sub> budget on a per capita basis. Additionally, the equitably shared emission rights are thought to be accompanied by additional compensation mechanisms in developing countries – thus, paying attention to the historical responsibility of industrialised countries (WBGU 2011: 37; 210; 225-226; 272; 284-285; 305; 307; 310). By implementing these additional international supporting measures, the WBGU concept (2011: 161-165; 185; 290-292; 297) aims

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<sup>49</sup> The civil society’s empowerment has already been subject to analysis in section 5.3.5 in this study.

<sup>50</sup> See footnote 44 on the budget approach.

at supporting and fastening the transformation in poorer countries. These include capacity building, low-carbon technology transfer, and ODA or new mechanisms, such as the Green Climate Fund and a global emissions trading scheme in addition to the already transferred resources (WBGU 2011: 163; 185; 302; 307; 310-312). Hence, the WBGU (2011: 62) seeks to “allow [for] the catch-up development of poorer countries, equally guided by the criteria of global sustainability”, i.e. assuring the right to development within the planetary boundaries.

The globality principle of SD implies the recognition of global causes and solutions to the environmental crisis, the recognition of different responsibilities for the crisis and capabilities for solving it, and the strengthening of international cooperation and global governance for SD.

Similarly, the three GTC detect global causes for the environmental degradation and depletion. Both the GER and the GGS proceed on the assumption that economic causes (i.e. misvaluation and misallocation of natural capital) led to the environmental crisis. The worldwide introduction of GG policies and the global GE are perceived as the only solution: The adequate valuation of natural capital and other green measures can halt current unsustainable growth patterns. Contrarily to that, the GT concept detects anthropogenic causes for climate change; thus, the solution implies significant behavioural and institutional changes that go beyond market-based mechanisms.

According to the principle of common but differentiated responsibilities inherent to SD, developed countries are supposed to assume responsibility for the environmental changes caused by their past development paths. Consequently, they are thought to take a lead in the changes while committing themselves to support the developing countries that are given the right to development in line with sustainability. A differentiation between the responsibilities of developing and industrialised countries cannot be found in the concept of the OECD. The GGS elaborates a universal strategy which, at its best, shall be implemented on a global scale with only slight differences between countries. UNEP includes a stronger responsibility of industrialised countries for shaping the GE and supporting the developing countries. However, from both the GGS and the GER it can be concluded that all countries have the right to further development which can be even strengthened by greening the economy. A GE is regarded as the only possibility to secure economic growth and well-being without divesting the right to development. Hence, both strategies offer a global infrastructure building upon financial, institutional, and technical support since developing countries lack important resources and capabilities. That is to say, the GER and the GGS stress the importance of the developed countries' transfers towards the developing countries in order to strengthen their potential to manage the transition adequately. Although both include short remarks about the respect for the developing countries' capabilities as well as special circumstances and the resultant right for the differential use of the global commons (GGS) or different timeframes for the transition (GER), these two GTC fail to acknowledge the principle of common but differentiated responsibilities anchored in the concept

of SD. The GT concept takes the different responsibilities and capabilities into consideration by building its strategy on the implementation of a global emissions budget and several complementary measures in order to make up for their past development.

To a varying degree all GTC stress the importance of global cooperation: The OECD mainly focuses on supporting measures for creating the conditions for GG policies. The GGS aims for a global GG architecture that merely builds on current cooperation structures, such as development cooperation, increased trade, and technology transfer. Additionally, the GER emphasises slight institutional changes such as the strengthening of multilateral environmental agreements. In the concept of SD, global governance plays a very important role. From the analysis of the transformation concepts by UNEP and the OECD it can be concluded that, in contrast to UNEP, the OECD pays no attention to the strengthening of global governance for the transition. UNEP proposes strong collaboration of several actors, but lacks explanations for their improved inclusion, e.g. of non-governmental actors. Solely the GT concept includes demands for increased and structurally changed international cooperation. The social contract shall facilitate the cooperative governance of the global change process. The proactive states – as one actor among other global governance actors – and a responsible civil society as well as scientists are encouraged to participate in the global governance of the GT.

#### **5.4.3. Intergenerational Equity and Justice**

Within the GGS, intergenerational equity shall be ensured by conserving natural capital so as to guarantee both for economic growth and for well-being in the future. Trade-offs between the current and future generations are tackled only at the margin by calculating “the impacts of a decline in natural capital for current and future generations” in terms of economic costs and benefits (OECD 2011b: 9-10; 20; 23; 29; 31; 48).

The concept of UNEP (2011a: 19; 22; 118) aims for the integration of future generations’ interests into policy-making in order to guarantee for future growth as well as increasing welfare. It is imperative to improve “human well-being and reducing social inequity over the long term, while not exposing future generations to significant environmental risks and ecological scarcities” (UNEP 2011a: 552). Hence, concerns of intragenerational equity are implicitly included in the preservation and improvement of natural resources and ecosystems: It is argued that the potentially higher benefits of resource protection or rebuilding in the future outweigh short-term earnings for the present generation (UNEP 2011a: 84; 101). According to UNEP (2011a: 19; 22; 24; 48; 118; 179; 248; 552), today’s investments in the transition, economic development in the short and medium term, and the beneficial usage of the environment are seen as the most powerful means to ensure “that future generations are left no worse off than current generations” (UNEP 2011a: 17).

The WBGU concept includes strong concerns for intergenerational equity. It bases its “ethical imperative” for radical changes on the knowledge of the planetary guard rails and the deteriorating impacts the trespassing of these limits is likely to have. This would cause irreversible consequences for the environment and for the individual freedom and opportunities of future generations (WBGU 2011: 3; 10; 80; 332):

Self-imposing restrictions today [...] guarantee future options for action which in all probability will, if we wait any longer, disappear. Taking a closer look, we must therefore conclude that restrictions which today are initially perceived as a relinquishment could actually result in taking some of the burden off the people and societies of the future without subjecting today's generation to unbearable restrictions and immeasurable costs (WBGU 2011: 80).

The GT concept aims for intergenerational equity and thus strongly encourages long-term and cross-generational thinking of all relevant actors by building on their environmental and future responsibility which stems from the knowledge about the earth changes (WBGU 2011: 78; 91; 231; 352-353). Thus, the barriers of higher costs of long-term decisions in the short term shall be overcome by providing scientific knowledge and incentives for change (WBGU 2011: 78).

Furthermore, the WBGU (2011: 79-80; 210; 226; 272; 276-278) explicitly advocates for maintaining the capabilities for development of future generations by demanding an equitable distribution of emission rights and the envisaged compensation mechanisms.

The notably strong concern for future generations in the WBGU concept is reflected in the creation of a deliberative “future chamber” within the parliamentary legislative procedure on all global governance levels that shall guarantee for intergenerational equity (WBGU 2011: 218). In the course of the civil society's empowerment for participating in the decision-making for the transition, the representation of future citizens and their interests in “greater sustainability of present-day politics” shall be improved as well (WBGU 2011: 215).

Within the concept of SD, equity between the current and future generations is of utmost importance. The ability of coming generations to satisfy their needs shall not be compromised by today's way of living. All GTC, although to a varying degree, include concerns for the future generations' interests by conserving and enhancing the environmental goods and services.

Both the GGS and the GER assume that only the green economy can secure the preservation and improvement both of the natural resource base and of the ecosystems and their functioning fundamental for current and future generations' welfare.

In contrast to this, the WBGU concept does not only base the need for the transformation on an environmental rationale, but rather includes an ethical imperative as well. The GT concept strongly reflects on the development opportu-



nities of future generations which are reminiscent of the ability to meet needs of future generations in the concept of SD.

In order to incorporate future generation's interests in present decision-making, the three GTC draw on different strategies. The OECD and UNEP implicitly include future generations into current decision-making by balancing costs and benefits of environmental protection. The WBGU concept contains the strongest standpoint for intergenerational equity and fairness: it does not only build today's decision-making on scientific knowledge of future environmental changes and a general future and environmental responsibility of all relevant actors, but also proposes extended representation and participation of presumed future interests in the legislative procedure.

#### **5.4.4. Role of Education for the Green Transformation**

Education for the green transformation does not play a role in the GGS. Consumer-oriented measures are the only educational elements in the concept. These shall better inform about the consequences of environmental deterioration of specific activities or cleaner alternatives. The measures are thought to increase the effectiveness of the whole GG reform (OECD 2011b: 35; 49-50).

As in the GGS, the UNEP concept (2011a: 67; 136; 279-280) aims at better informing the consumers, e.g. regarding food, water, and manufacturing products. The GER also includes further educational measures in state education or in firms in order to train the population for the transition towards a green economy (UNEP 2011a: 280; 482; 577).

The WBGU concept (2011: 106; 352-360) puts more emphasis on education since it "represents an important precondition for a transformation towards sustainability" (WBGU 2011: 79). At all educational levels, the "education for the transformation" shall lay the "foundations for each individual's knowledge-based self-concept, thereby contributing to the establishment of the social preconditions needed for the transformation" (WBGU 2011: 352). This implies a two-fold education approach which shall not be a mere extension of today's practices: On the one hand, by providing more general "education for participation" ("*transformation education*"), values and visions that can guide the people's actions towards sustainability can be created through education. This shall also include reflections on scientific exploration and the elaborated solutions. On the other hand, education plays an important role by delivering understanding for specific alternatives to cope with certain environmental problems (e.g. encouraging more sustainable eating-habits in the field of "*transformative education*") (WBGU 2011: 23; 352). Thereby, the WBGU (2011: 352) aims for a paradigm shift in education by establishing new educational practices which "communicate the basic principles of responsible behaviour to as many members of the global community as possible". This in turn shall enable the people to take informed decisions and participate in the knowledge creation and the paths towards a low-carbon society in their role as change agents: "People can only comprehend the transformative power of their actions if they see themselves as

an active factor. Respective educational structures are an essential precondition for this” (WBGU 2011: 23).

When comparing the three GTC, the OECD concept contains the weakest position of education for the transformation by merely focusing on consumer-oriented information measures in order to make the GG reform more efficient. The GER proposes only slight changes for the education in schools and companies and similarly highlights the importance of informative campaigns for consumers so as to train parts of the population for the transition. In comparison to the GER and GGS, the WBGU concept proposes the most radical shift in education for the transformation: In the GT concept, education is regarded as the foundation for a society-driven transformation and thus shall enable the people to participate responsibly in the change process. Thus the WBGU envisions a very encompassing role of education for the transformation in which society does not only play a role as consumers, but rather as proactive co-creator of education for the transformation and the transformation itself. This strong position of education within the WBGU concept even goes beyond the vision of education for SD.

Figure 6: Principles and Elements of SD within the GTC

	OECD	UNEP	WBGU
<b>Relation of the Dimensions</b>	<ul style="list-style-type: none"> <li>&gt;strong links between environmental and economic dimension</li> <li>&gt;inequality between dimensions: social dimension less important</li> </ul>	<ul style="list-style-type: none"> <li>&gt;strong links between environmental and economic dimension</li> <li>&gt;social improvements result from “getting the economy right”</li> <li>&gt;inequality between dimensions: social dimension less important</li> </ul>	<ul style="list-style-type: none"> <li>&gt;interdependence of economic, environmental, and social goals</li> <li>&gt;equality of dimensions</li> </ul>
<b>Globality Principle</b>	<ul style="list-style-type: none"> <li>&gt;national strategies implemented on a global scale</li> <li>&gt;universal policy toolbox adaptable to respective national circumstances</li> <li>&gt;GG architecture: management of global commons and global public goods, increased financial and technology transfers</li> <li>&gt;actors: strong focus on governments, inclusion of civil society and private sector important but not further indicated</li> </ul>	<ul style="list-style-type: none"> <li>&gt;global GE agenda, national policies vary according to capital stocks and level of development</li> <li>&gt;international cooperation: multilateral environmental agreements, beneficial trade rules and investment frameworks</li> <li>&gt;acknowledges “key role” of developed countries for creating the conditions for GE (internationally and in developing countries), technology and financial transfers</li> <li>&gt;actors: strong focus on governments; collaboration of states, private sector, and civil society important, but</li> </ul>	<ul style="list-style-type: none"> <li>&gt;dual focus: national and international strategies</li> <li>&gt;national policies have to align to GT goals, create “proactive state” balanced by increased participation</li> <li>&gt;international cooperation: focus on common goal, cede national interests</li> <li>&gt;institutional changes on international level (transnational democracy, new institutions, etc.), global social contract in order to create legitimate solutions</li> <li>&gt;common but differentiated responsibilities: different timeframes for transformation, equitable burden sharing for</li> </ul>

		not further elaborated	future decarbonisation >taking into account responsibility of developed countries (compensation mechanisms): secure the catch-up of developing countries within the scope of sustainability
<b>Intergenerational Equity</b>	<ul style="list-style-type: none"> <li>&gt;conserve natural capital as foundation for future growth and well-being</li> <li>&gt;cost-benefit calculation: impacts of decline in natural capital</li> </ul>	<ul style="list-style-type: none"> <li>&gt;future generations shall not be exposed to significant environmental risks or decline in natural capital</li> <li>&gt;GE regarded as the guarantee for well-being in the future</li> </ul>	<ul style="list-style-type: none"> <li>&gt;strong concern for intragenerational equity: secure future development opportunities</li> <li>&gt;encourage long-term and intergenerational thinking (knowledge and incentives for change), environmental and future responsibilities</li> <li>&gt;equitable share of remaining CO<sub>2</sub> budget</li> <li>&gt;future chamber”: better representation of future generations’ interests</li> </ul>
<b>Education for Transformation</b>	<ul style="list-style-type: none"> <li>&gt;consumer-oriented educational measures so as to increase effectiveness of transition</li> </ul>	<ul style="list-style-type: none"> <li>&gt;consumer-oriented educational measures (food, water, manufacturing goods, etc.)</li> <li>&gt;training the population for GE: educational measures in state schools and firms</li> </ul>	<ul style="list-style-type: none"> <li>&gt;precondition for GT (informed participation, future and environmental responsibilities)</li> <li>&gt;reform of current education so as to lay the foundation for the GT at all educational levels</li> <li>&gt; “transformation education” and “transformative education”</li> </ul>

## 6. Conclusion

The concept of sustainable development (SD) – as coined by the Brundtland Commission and the United Nations Conference on Environment and Development (UNCED) in 1992 – has evolved as a global development paradigm that seeks to integrate environmental, social, and economic concerns in a global and long-term perspective. SD takes into account the interests of both present and future generations so as to assure intra- and intergenerational equality with regard to the satisfaction of needs. The solutions to the environmental crisis are manifold and, *inter alia*, include changing the quality of economic growth and consumption-production patterns so that these respect the principle of sustainability by altering socio-economic structures, eradicate poverty, and reduce the pressure that population growth puts on the environment. This is thought to guarantee sustained growth and development both in developing and devel-

oped countries. Furthermore, SD shows special consideration to participation, global partnership and governance, and education for the changes ahead.

Particularly the UNCED paid attention to the responsibilities of developed countries due to the impacts their development paths had on the environment. Consequently, the developed countries shall make available the financial resources and technologies for the developing countries' development. However, the Rio Documents also established the common responsibility for the protection of nature and for achieving SD.

During the last years, several concepts aiming for a "greener" and more sustainable economy have been published – especially in light of the financial and the climate crisis and Rio+20. Similar to the concept of SD, most of these green transformation concepts (GTC) aim at restructuring the economic system which still threatens the environment. The GTC published by United Nations Environment Programme (UNEP), the Organisation for Economic Co-operation and Development (OECD), and the German Advisory Council on Global Change (WBGU) were found to be eligible for this comparative analysis.

As could be shown, previous studies lack theoretically founded criteria for the analysis of the new transformation concepts. Therefore, the scientific contribution of this study consists of a systematic comparison of three of these GTC through the lens of SD. The analytical framework that served for the analysis has been derived from the prior review of the concept of SD. It contains four analytical units for the comparison of the GTC that proved to be relevant for the understanding of SD: the economic, environmental, and social dimension of SD as well as the most important principles and elements of SD subsumed in a fourth analytical unit.

After having conducted the analysis of those units, it can be argued that none of the GTC is fulfilling the complete set of criteria. However, the GTC do not claim to substitute the concept of SD, but rather elaborate on essential elements of development that takes place within the planetary boundaries while also guaranteeing human well-being.

With regard to the economic dimension, it can be concluded that all GTC are basically in line with the goals of SD. In contrast to the other two concepts, the WBGU concept for the Great Transformation (GT) questions the imperative of economic growth and thus proposes only moderate growth rates as a means to facilitate social progress. The Green Growth Strategy (GGS) by the OECD and the Green Economy Report (GER) by UNEP are explicit pro-growth strategies. However, and this stands in contrast to SD, the three concepts acknowledge limits to growth set by the so-called planetary boundaries. The concept of SD has been criticised for assuming that growth of the limits (to growth) is possible. In the GTC a shift towards "growth within the limits" (WBGU) or "chances of growth" can be detected.

The integration of environmental and economic goals in the GTC is as important as in the concept of SD. The GER and GGS mainly focus on the relation of the economic and the environmental dimension. The internalisation of environmental costs, i.e. to better reflect the price of certain goods and services, shall have decisive influences on economic decision-making and is regarded as the prerequisite for incentivising innovation and investments in the GE. Both the GER and the GGS can be regarded as green investment and innovation strategies whose aims are to fuel economic growth and well-being.

The GT concept has another focus: it highlights the role of mitigating climate change as absolute precondition for development. Rather than “getting the economy right”, the GT concept advocates a precautionary, future-oriented protection both of the natural heritage and of development opportunities for present and future generations. With regard to the required far-reaching decarbonisation, the GT concept goes beyond the scope of SD and the other GTC. The WBGU does not only aim for internalisation of environmental and social costs of economic activities – also a very important factor in the GT concept – but rather claims for structural changes that shall lead to environmental protection.

The social dimension of SD includes goals of intragenerational equity and social cohesion: employment opportunities and income generation that guarantee poverty reduction, fair access to goods, resources, and power are the sub-goals that were analysed in the social dimension. The comparison shows that both the OECD and UNEP expect considerable consequences for human well-being by investing in the protection of natural capital. The potential for job creation, reducing poverty, and increasing well-being are assumed to be significant. However, these results can rather be classed as advantageous co-benefits of the investment strategies proposed in the two reports. In order to fully meet social goals of SD or to implement a green economy that is pro-poor, additional policies would have to be set up. Issues of equity and fairness mainly play a role in the labour market transition. Instruments for improved distribution of benefits from the transition are primarily a means to assure acceptance for the transition. This is also reflected in the deficient inclusion of stakeholders in decision-making. The GTC published by the WBGU is focusing on some of the social sub-goals of SD and is even going beyond the scope of the latter when contemplating the proposed levels of participation and questions of intragenerational fairness. The GT concept strongly aims at eradicating energy poverty as an important precondition for economic activities, fairness and well-being. Furthermore, the ambition for implementing a global budget for emissions that is equitably shared among the world’s population reflects the importance of a fair transformation even more. The most important social goal of the GT concept is the empowerment of civil society and citizens in the transformation. Basically, it can be argued that the WBGU concept is about getting democratic participation right.

In the critique of the GTC, it became apparent that the social dimension is rather neglected in the concepts of UNEP and the OECD. After having conducted the analysis on the basis of the criteria derived from the concept of SD, the criti-

cism can be verified. When considering solely the criteria belonging to the three dimensions of SD and their relation, it can be argued that only the WBGU concept converges with the concept of SD for the most parts.

This picture can be even more confirmed when including the conformity of the GTC with the most important principles of SD: With regard to the globality principle, it can be concluded that only the GER and more strongly the WBGU consider the special responsibilities of industrialised countries for making up for the development gains they could achieve at the expense of both the environment and the possibilities to develop today or in the future. That is to say, assuming this responsibility means to support developing countries for example through financial or technology transfer and increased cooperation. Global governance that shall manage the transformation process is only part of the GT concept which calls for even more participation of non-state actors in form of a new social contract basing on transnational democratic structures. The claim to balance the development opportunities of today's and future generations is considered in all GTC by protecting the environment in order to assure future development. However, as became apparent, only the GT concept includes the concern for future generations on an institutional basis: a future chamber shall guarantee the representation of the (assumed) future generations' interests in a sustainable policy-making today. This proposal exceeds the consideration of needs of future generations of the concept of SD.

Furthermore, the role of education is highly relevant for achieving the required changes. In contrast to the GER and GGS, the GT concept proposes that education and science have to undergo a radical change in order to serve as the most basic precondition for participation in the transformation. The WBGU concept elaborates strategies that go beyond the scope of the concept of SD.

Summing up the analysis of the GTC on the background of the concept of SD, it can be stated that the GER and GGS neglect or discount important social sub-goals that are important components of SD. Although it focuses much more on reaching social goals, the GT concepts does not take into account all those social concerns that are relevant for SD. However, and this is extending the prevalent critique, the GER and even more the GGS do not build on the most important principles of the concept of SD. This could be proven in particular for the principle of common but differentiated responsibilities and the claim for inclusive global governance of the change process. In contrast to that, the WBGU concept even goes beyond the scope of SD principles by, *inter alia*, proposing structural changes for international cooperation and democratic participation in the transformation process, the inclusion of intra- and intergenerational fairness, equity, and responsibility in today's decision-making, and a strengthened role of science and education for the GT. Especially the inclusion of future generations' interests and the unresolved question of SD who could plead for their interests and rights can get new impetus from the GT concept since it includes important proposals how to improve the representation of coming generations.

These proposals made in the GT concept could serve for further developing the concept of SD by not only emphasising the need for a sustainable, low-carbon economy, but by implementing a low-carbon society that can and must assume responsibility for the future and the environment. Thus, future research should especially focus on the further development of SD and the GTC by taking into account the added value of the GTC and the criticism of both the SD paradigm and the new transformation concepts.

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