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GREEN GROWTH and GREEN ECONOMY

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Content

Introduction

Sustainable development has been the overarching goal of the international community since the UN Conference on Environment and Development (UNCED) in 1992. Amongst numerous commitments, the Conference called upon governments to develop national strategies for sustainable development, incorporating policy measures outlined in the Rio Declaration and Agenda 21. Despite the efforts of many governments around the world to implement such strategies as well as international cooperation to support national governments, there are continuing concerns over global economic and environmental developments in many countries. These have been intensified by recent prolonged global energy, food and financial crises, and underscored by continued warnings from global scientists that society is in danger of transgressing a number of planetary boundaries or ecological limits.

With governments today seeking effective ways to lead their nations out of these related crises whilst also taking into account these ecological limits, green growth / green economy (in its various forms) has been proposed as a means for catalysing renewed national policy development and international cooperation and support for sustainable development. The concepts have received significant international attention over the past few years as a tool to address the 2008 financial crisis as well as one of two themes for the 2012 UN Conference on Sustainable Development (Rio+20).

Many international organisations as the United Nations Environment Program (UNEP), the UN Department of Economic and Social Affairs (UNDESA), the United Nations Conference on Trade and Development (UNCTAD), the International Labour Organisation (ILO), the World Bank, the Organisation for Economic Cooperation and Development (OECD), the Global Green Growth Institute (GGGI), the Green Economy Coalition, Stakeholder Forum, the Green Growth Leaders and many others have begun to deal with these concepts.

Principally, two most important concepts were formulated:

- green economy, formulated by UNEP, and
- green growth, formulated by OECD.

Sustainable development provides an important context for green growth and green economy. These concepts have not been conceived as a replacements for sustainable development, but rather should be considered a subset of them. It is narrower in scope, entailing an operational policy agenda that can

help achieve concrete, measurable progress at the interface between the economy and the environment. It provides a strong focus on fostering the necessary conditions for innovation, investment and competition that can give rise to new sources of economic growth – consistent with resilient ecosystems.

Both concepts are very similar, and it would be more effective to have one common concept. Despite the growing international interest there has not been yet agreed one concept.

This textbook introduces both concepts and related environmental problems and economic sectors. The textbook is written for students studying Environmental management and related disciplines.

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Radoslava Kanianska

1 Integrated environmental assessment

The need to build environmental considerations into decision-making is a basic necessity. Without the ability to monitor and assess changing environmental trends and their interactions with human development, navigating the sea of global change would be reduced to reactive crisis management – hardly an effective way to tackle policy issues with such profound relevance for the planet (UNEP, 2009).

Integrated Environmental Assessment (IEA) is defined as the process of producing and communicating future-oriented, policy-relevant information on key interactions between the natural environment and human society.

Within Integrated Environmental Assessment is proposed to use of a framework, which distinguish **driving forces** (D), **pressures** (P), **states** (S), **impacts** (I) and **response** (R). This became known as the **DPSIR model** and has since been more widely adopted, acting as an integrated approach for reporting (fig. 1).

The DPSIR model is used as a communication tool to structure information about the interactions between society and the environment. As the model can capture the cause-effect relationships between the economic, social and environmental sectors, it has been widely applied to analyse the interacting processes of human-environmental systems (Pinto et al., 2013). DPSIR model originated from the Pressure-State-Response (PSR) framework, which was developed by the Organisation for Economic Cooperation and Development (OECD, 1993). Later it was elaborated by European Environment Agency (Burkhard, Müller, 2008). According to this systems analysis view, social and economic developments exert *pressure* on the environment and, as a consequence, the *state* of the environment changes. This leads to *impact* on e.g. human health, ecosystems and materials that may elicit a societal *response* that feeds back on the driving forces, on the pressure or on the state or impacts directly, through adaptation or curative action. Environmental indicators should reflect all elements of the chain between human activities, their environmental impacts, and the societal responses to these impacts.

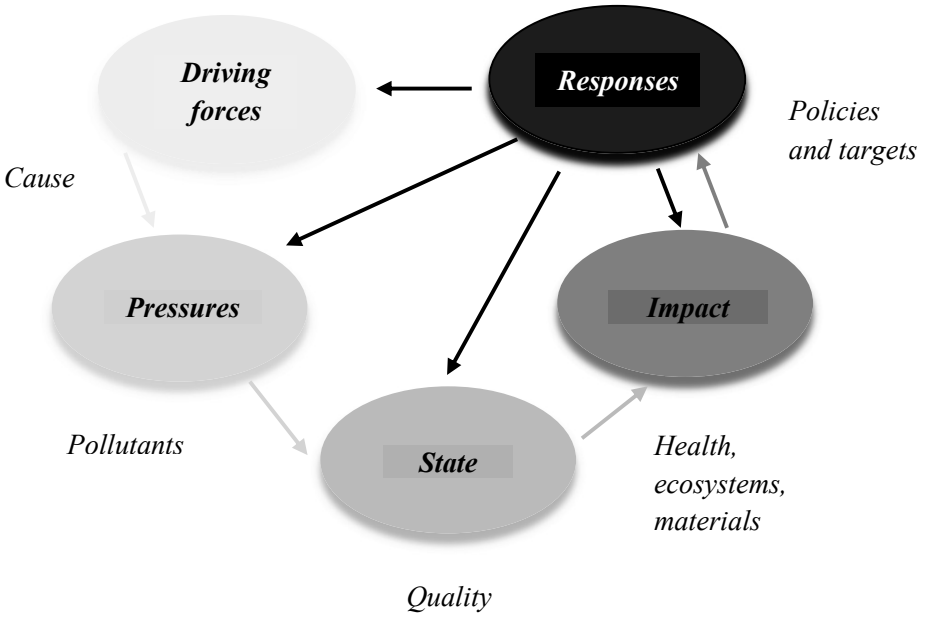


Figure 1 *DPSIR assessment framework*

Indicators for ***Driving forces*** describe the social, demographic and economic developments in societies and the corresponding changes in lifestyles, overall levels of consumption and production patterns. Primary driving forces are population growth and developments in the needs and activities of individuals. These primary driving forces provoke changes in the overall levels of production and consumption. Through these changes in production and consumption, the driving forces exert pressure on the environment. Driving forces can be slow variables, with long turnover times, or fast variables, with short turnover times. Biophysical drivers may be as important as human drivers. In a macroeconomic context, production or consumption processes are structured according to economic sectors (e.g. agriculture, energy, industry, transport, households). Indicators of driving forces can be:

- Population (number, age structure, education levels, political stability)
- Transport (persons, goods; road, water, air, off-road)
- Energy use (energy factors per type of activity, fuel types, technology)
- Power plants (types of plants, age structure, fuel types)
- Industry (types of plants, age structure, resource types)
- Refineries/Mining (types of plant/mining, age structure)

- Agriculture (number of animals, types of crops, stables, fertilisers)
- Landfills (type, age)
- Sewage systems (types)
- Non-industrial sectors
- Land use.

Pressure indicators describe developments in release of substances (emissions), physical and biological agents, the use of resources and the use of land by human activities. The pressures exerted by society are transported and transformed in a variety of natural processes to manifest themselves in changes in environmental conditions. Examples of pressure indicators are:

- Use of resources
- Emissions (per driving force for numerous compounds)
- Direct emissions to air, water and soil
- Indirect emissions to air, water and soil
- Production of waste
- Production of noise
- Radiation
- Vibration.

As a result of pressures, the state of the environment is affected; that is, the quality of the various environmental compartments (air, water, soil, etc.) in relation to the functions that these compartments fulfil. The ***state of the environment*** is thus the combination of the physical, chemical and biological conditions. State indicators give a description of the quantity and quality of physical phenomena (such as temperature), biological phenomena (such as fish stocks) and chemical phenomena (such as atmospheric CO_2-concentrations) in a certain area.

State indicators may be:

- Air quality (national, regional, local, urban, etc.)
- Water quality (rivers, lakes, seas, coastal zones, groundwater)
- Soil quality (national, local, natural areas, agricultural areas)
- Ecosystems (biodiversity, vegetation, soil organisms, water organisms)
- Humans (health)
- Soil use.

Due to pressure on the environment the state of the environment changes. These changes then have impacts on the functions of the environment, such as human and ecosystem health, resources availability, losses of manufactured capital, and biodiversity. ***Impact*** indicators are used to describe changes in these conditions. Examples of impact indicators are:

- Climate change
- Loss of biodiversity
- Human health, human morbidity / mortality or well-being,
- Ecosystem / habitat health.

Response indicators refer to responses by groups (and individuals) in society, as well as governments attempts to prevent, compensate, ameliorate or adapt to changes in the state of the environment. Some societal responses may be regarded as negative driving forces, since they aim at redirecting prevailing trends in consumption and production patterns. Other responses aim at raising the efficiency of products and processes, through stimulating the development and penetration of clean technologies (Gabrielsen, Bosch, 2003). Examples of response indicators are:

- Policy response
- Environmental legislation
- Economic measures
- Science, technology and innovation
- Education.

1.1 State of the European environment

While EU environmental policy has delivered many improvements recently, substantial challenges remain in three key areas of the **7th Environment Action Programme**:

- protecting the natural capital that supports economic prosperity and human well-being;
- stimulating resource-efficient, low-carbon economic and social development;
- safeguarding people from environmental health risks.

Europe's natural capital is not yet being protected, conserved and enhanced in line with the ambitions of the 7th Environment Action Programme. Reduced

pollution has significantly improved the quality of Europe's air and water. But loss of soil functions, land degradation and climate change remain major concerns, threatening the flows of environmental goods and services that underpin Europe's economic output and well-being.

A high proportion of protected species (60%) and habitat types (77%) are considered to be in unfavourable conservation status, and Europe is not on track to meet its overall target of halting biodiversity loss by 2020, even though some more specific targets are being met. Looking ahead, climate change impacts are projected to intensify and the underlying drivers of biodiversity loss are expected to persist.

Turning to resource efficiency and the low-carbon society, the short-term trends are more encouraging. **European greenhouse gas emissions have decreased by 19% since 1990** despite a 45% increase in economic output. Other environmental pressures have also decoupled in absolute terms from economic growth. **Fossil fuel use has declined**, as have emissions of some pollutants from transport and industry. More recently, the EU's total resource use has declined by 19% since 2007, **less waste is being generated and recycling rates have improved** in nearly every country.

Regarding environmental risks to health, there have been marked **improvements in the quality of drinking water and bathing water** in recent decades and some hazardous pollutants have been reduced. However, despite some improvements in air quality, air and noise pollution continue to cause **serious health impacts, particularly in urban areas**. In 2011, about 430 000 premature deaths in the EU were attributed to fine particulate matter ($PM_{2.5}$). Exposure to environmental noise is estimated to contribute to at least 10 000 premature deaths due to coronary heart disease and strokes each year. And growing use of chemicals, particularly in consumer products, has been associated with an observed increase of endocrine diseases and disorders in humans.

The outlook for environmental health risks in coming decades is uncertain but raises concern in some areas. Projected improvements in air quality, for example, are not expected to be sufficient to prevent continuing harm to health and the environment, while health impacts resulting from climate change are expected to worsen.

Europe has made progress in reducing some key environmental pressures, but often these improvements have not yet translated into improved ecosystem resilience or reduced risks to health and well-being. Furthermore, the long-

term outlook is often less positive than recent trends might suggest. Many pressures remain considerable in absolute terms despite recent reductions. For example, fossil fuels still account for three-quarters of the EU energy supply, imposing a heavy burden on ecosystems through climate change, acidification and eutrophication impacts.

Perhaps the most difficult challenges for European environmental governance arise from the fact that environmental drivers, trends and impacts **are increasingly globalised**. A variety of long-term **megatrends today affect Europe's environment**, consumption patterns and living standards. For example, the escalating resource use and emissions that have accompanied global economic growth in recent decades have offset the benefits of Europe's success in cutting greenhouse gas emissions and pollution, as well as creating new risks. Globalisation of supply chains also means that many impacts of Europe's production and consumption occur in other parts of the world, where European businesses, consumers and policymakers have relatively limited knowledge, incentives and scope to influence them. These are reasons why it is necessary to drew attention to the urgent need for Europe to shift towards a much more integrated approach to addressing persistent, systemic environmental challenges. It identified **the transition towards a green economy** as one of the changes needed to secure the long-term sustainability of Europe and its neighbourhood (EEA, 2015).

2 Sustainable development

Sustainable development has been defined in many ways, but the most frequently quoted definition is from *Our Common Future*, also known as the Brundtland Report: *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."*

2.1 Sustainable development in international relations

In 1992, the first conference - United Nations Conference on Environment and Development (UNCED), commonly referred to as the **Rio Conference or Earth Summit**, succeeded in raising public awareness of the need to integrate environment and development. The conference drew 109 heads of state to Rio de Janeiro, Brazil, to address what were dubbed urgent problems of environmental protection and socio-economic development. Major outcomes of the conference include Agenda 21, Climate Change Convention, and a Convention on Biological Diversity. It also created new international institutions, among them the Commission on Sustainable Development.

Ten years later, **Earth Summit 2002 (Rio+10)** was held in Johannesburg, South Africa with the goal of again bringing together leaders from government, business and NGOs to agree on a range of measures toward similar goals. At Rio+10, sustainable development was recognized as an overarching goal for institutions at the national, regional and international levels. Major outcomes of that conference include the Johannesburg Declaration and almost 300 international partnership initiatives meant to help achieve the Millenium Development Goals. The **Millennium Development Goals** are eight international development goals that were established following the Millenium Summit of the United Nations in 2000, the goals follow:

1. To eradicate extreme poverty and hunger
2. To achieve universal primary education
3. To promote gender equality and empowering women
4. To reduce child mortality rates
5. To improve maternal health
6. To combat HIV/AIDS, malaria, and other diseases
7. **To ensure environmental sustainability**
8. To develop a global partnership for development.

The **United Nations Conference on Sustainable Development** (**UNCSD**), also known as **Rio 2012 (Rio+20** or **Earth Summit 2012)** was the third international conference on sustainable development aimed at reconciling the economic and environmental goals of the global community was hosted by Brazil in Rio de Janeiro in June 2012. The primary result of the conference was the nonbinding document, **The Future We Want** (UN, 2012). In it, the heads of state of the 192 governments in attendance renewed their political commitment to sustainable development and declared their commitment to the promotion of a sustainable future. The document largely reaffirms previous action plans like Agenda 21. In 2015, the United Nations General Assembly adopted post-2015 development agenda **Transforming our world: the 2030 Agenda for Sustainable Development**. The Agenda includes **17 Sustainable Development Goals**:

Goal 1. End poverty in all its forms everywhere
Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3. Ensure healthy lives and promote well-being for all at all ages
Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5. Achieve gender equality and empower all women and girls
Goal 6. Ensure availability and sustainable management of water and sanitation for all
Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10. Reduce inequality within and among countries
Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12. Ensure sustainable consumption and production patterns
Goal 13. Take urgent action to combat climate change and its impacts
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development

2.2 Sustainable development in the European Union

Sustainable development is a fundamental and overarching objective of the European Union, aiming to continuously improve the quality of life and wellbeing for present and future generations, by linking economic development, protection of the environment and social justice.

The **EU sustainable development strategy**, launched by the European Council in Gothenburg in 2001 and renewed in June 2006, aims for the continuous improvement of quality of life for current and future generations. The 2006 EU Sustainable Development Strategy (EU SDS) sets out a single, coherent strategy on how the EU will more effectively meet the challenges of sustainable development. It reaffirms the overall aim of achieving a continuous improvement in the quality of life of citizens through sustainable communities that manage and use resources efficiently and tap the ecological and social innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion.

An objective, statistical picture of progress towards the goals and objectives of the EU sustainable development strategy provides the Eurostat monitoring report, based on the EU set of sustainable development indicators. It is published every two years and is intended to contribute to the biennial review on the implementation of the strategy by the European Council (EUROSTAT, EC, 2011).

3 Green initiatives

Green initiatives have the potential to address economic and environmental challenges and open up new sources of growth. A return to "business as usual" would be unwise and ultimately unsustainable, involving risks that could impose human costs and constraints on economic growth and development. It could result in increased water scarcity, resource bottlenecks, air and water pollution, climate change and biodiversity loss which would be irreversible; thus the need for strategies to achieve greener growth.

Green concepts are considered to be a subset of sustainable development. Both concepts are very similar, in their goals, principals and applied tools.

Main actors playing important role in green initiatives are (UNDESA, 2012a):

- United Nations institutions:
  - United Nations Environment Program (UNEP),
  - United Nations Department of Economic and Social Affairs (UNDESA),
  - United nations conference on Trade and Development (UNCTAD),
  - Food and Agriculture organisation of the United Nations(FAO),
- Organisation for Economic Cooperation and Development (OECD),
- World Bank (WB),
- Global Green Growth Institute (GGGI),
- Green Economy Coalition (GEC).

These institutions have proposed various green concepts. To the most important among them belong:

- **green economy,** formulated by UNEP, and
- **green growth,** formulated by OECD.

3.1 Green initiatives – background

Since the beginning of anthropocene the economic output (measured as gross domestic product) per capita increased about 15 times, in absolute terms even over 120 times (Hák et al., 2015). In the 20th century the world population

grew 4 times, economic output 22 times and fossil fuel consumption 14 times (UNEP, 2011a). The resilience of a wide range of environmental systems is now being tested by the requirements of a rapidly growing global population and increased levels of economic activity.

In 2008 the world witnessed **the worst financial crisis** of our lifetime, triggering the start of the most severe recession since the Great Depression of the 1930s. In 2009 the number of the world's unemployed could rise up to 50 million over the 2007 level. Every one percent fall in growth in developing economies translates into an additional 20 million people consigned to poverty. This happens at a time when economic inequality globally and within countries has been on the rise, widening the gap between the haves and the have-nots.

As governments devise a new international financial architecture to prevent future crises of this scale and find ways to jump start economic recovery, they need also to recognise and address the risks from **another brewing crisis** with sweeping impact – **climate change**. The current level of atmospheric CO_2 concentration is already at an ecological threshold if no drastic actions are taken immediately. The world's poor are especially vulnerable to climate-induced rising sea levels, coastal erosion, and frequent storms. Around 14 percent of the population and 21 percent of urban dwellers in developing countries live in low-elevation coastal zones that are exposed to these risks. Sixty percent of the world's largest urban areas with a population over five million are located within 100 km of the coast. This includes 12 out of 16 cities worldwide with populations greater than 10 million. Indeed, the world today is in the grip of **multiple crises**. The International Energy Agency (IEA) predicts that the price of oil may reach US$200 per barrel by 2030 due to rapidly increasing demand in contrast to increasingly constrained supply and, at such levels many developing economies may no longer be able to afford oil imports.

Another crisis exists for food. To feed a growing population, the world's food production must double by 2050. As regards to food security, we are seeing neither widespread understanding of the nature of the problem, nor globally collaborative solutions for how we shall feed a population of 9 billion by 2050.

Biodiversity and ecosystem services, which ultimately determine the future sustainability of agricultural productivity, are eroding rapidly. This erosion is particularly damaging for subsistence farmers and pastoralists who depend

predominantly on ecosystem services such as the regular and free flow of water and nutrients from forests to aquifers to their fields.

Last, but not least, is the **persisting water crisis**. One in five people in the developing world lacks access to sufficient clean water. At the same time demand for water for competitive uses is growing and water availability in many parts of the world will increasingly be affected by climate change (changing patterns of precipitation, melting glaciers, droughts). These global crises are severely impacting our ability to sustain prosperity in the world and to achieve the Millennium Development Goals (MDGs). They compound and exacerbate persistent social problems of job losses, socio-economic insecurity and poverty which threaten social stability in developed, as well as developing, countries (UNEP, 2009).

4 Green growth

The concept of green growth has **its origins in the Asia and Pacific Region**. At the Fifth Ministerial Conference on Environment and Development (MCED) held in March 2005 in Seoul, 52 Governments and other stakeholders from Asia and the Pacific agreed to move beyond the sustainable development rhetoric and pursue a path of "green growth". To do so, they adopted a Ministerial declaration (the Seoul Initiative Network on Green Growth) and a regional implementation plan for sustainable development. This commenced a broader vision of green growth as a regional initiative of UNESCAP, where it is viewed as a key strategy for achieving sustainable development as well as the Millennium Development Goals (in particular 2 and 7 relating to poverty reduction and environmental sustainability) (UNESCAP, 2012).

Main green growth principles were adopted and further processed by OECD. In June 2009, Ministers from 34 countries signed a Green Growth Declaration, declaring that they will: "Strengthen their efforts to pursue green growth strategies as part of their responses to the crisis and beyond, acknowledging that green and growth can go hand-in-hand." They endorsed a mandate for the OECD to develop a **Green Growth Strategy**, bringing together economic, environmental, social, technological, and development aspects into a comprehensive framework. The Strategy responds to that mandate. The 'Towards Green Growth' report by the OECD introduces the organisation's Green Growth Strategy that provides a framework for how countries can achieve economic growth and development while at the same time combating climate change and preventing costly environmental degradation and the inefficient use of resources. The strategy comprises a number of reports, including *Towards Green Growth; Towards Green Growth – Monitoring Progress: OECD Indicators;* and *Tools for Delivering Green Growth.* The strategy provides a 'lens' for re-examining the current economic growth paradigm whilst at the same time offering an actionable policy framework for policy makers in advanced, emerging and developing economies. The OECD states that a return to the 'business-as-usual' approach as the world economy emerges from the financial crisis would be unwise and indeed unsustainable and would impose human costs and eventually constraints on economic growth and development. In summary, the strategy states the reasons why a green growth strategy is critical, then provides a framework for green growth and continues with options for promotion of the transition. Similarly to the UNEP Green Economy report, the OECD strategy presents options for measuring progress against green growth and begins to explore delivery mechanisms.

In May 2010, at its sixty-sixth session, UNESCAP countries (UNESCAP – United Nations economic and Social Commission for Asia and the Pacific) adopted the Incheon Declaration on Green Growth. Later that year, support to pursue green growth was also stated in the 6th MCED Declaration in Astana in October 2010. The main focus of green growth in this context was for developing countries in Asia and the Pacific region to harmonise economic growth with environmental sustainability, while improving the eco-efficiency of economic growth and enhancing the synergy between environment and economy. In June 2010, the Republic of Korea was instrumental in the establishment of the Global Green Growth Institute (GGGI) as a non-profit foundation (which was elevated to a new international organization at the Rio+20 Conference in June 2012).

In November 2010, at the G20 Seoul Summit, leaders also recognized green growth as an inherent part of sustainable development which could enable countries to leapfrog old technologies in many sectors. They agreed to take steps to create enabling environments for the development of energy efficiency and clean energy technologies. This was also clearly evident in the response of G20 countries to the global financial crisis and recession of 2008-09, where some governments adopted expansionary policies that incorporated a "green fiscal" component.

In 2012, the Mexican Presidency of the G20 introduced 'inclusive green growth' as a cross-cutting priority on the G20 development agenda. A number of other international organisations, think tanks and academics have also turned their attention to green growth, including the World Bank8 and the Green Growth Leaders. In February 2012, the World Bank along with UNEP, OECD and the GGGI launched a new international knowledge-sharing platform in Mexico – the **Green Growth Knowledge Platform** (GGKP) – bringing together under the same roof the major international organizations supporting and promoting both green growth and green economy. The GGKP aims to enhance and expand efforts to identify and address major knowledge gaps in green growth theory and practice, and to help countries design and implement policies to move towards a green economy.

4.1 Green growth – definition

There is no internationally agreed definition of green growth and at least thirteen separate definitions were identified in recent publications (UNDESA, 2012b).

According to the OECD (2011b) ***green growth*** *means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies. To do this it must catalyse investment and innovation which will underpin sustained growth and give rise to new economic opportunities.*

Classical growth theory (Solow, 1956) assumes that output Y is produced using technology and human capital A, physical capital K, and labour L. The relationship often reads:

$Y = f(A, K, L)$.

Output growth is explained by growth in production factors K and L, and growth in productivity A. Growth in labour L is explained by population growth, labour force participation and improvements in health and education. Growth in K is explained by investment, and growth models assume that a share of output is used to increase the stock of capital K. Growth in A is explained by technological change, including changes in organization and practices, and by social capital improvement (better institutions, social cohesion, etc.).

In some growth theory models (e.g., the Solow model of 1956), labour and total productivity growth is exogenous. In others models (Mankiw et al., 1992), productivity growth is endogenous and depends on investments in education, research and development, on the scale of output and on learning by doing. Economic policies can influence accumulation of physical capital, social capital, and human capital to maximize output or to maximize the growth in output (i.e. GDP growth).

In this approach, the environment has no productive role, although it can enter through the utility function through its amenity value. The idea that **economic production is directly dependent on the stock of natural resources and on environmental quality** has been around at least since Malthus (Malthus, 1965) and further developed in a well-developed environmental economics literature.

The environment becomes "natural capital", directly needed for growth. And environmental management becomes a productive investment, directly comparable to investment in physical capital. A failure to manage the environment results in the depreciation and destruction of natural capital, with direct impacts on output. We thus have:

$Y = f(A, K, L, E)$.

Natural capital, encompassing natural resource stocks, land and ecosystems, is often undervalued and mismanaged. This imposes costs to the economy and human well-being. Even where outputs derived from its exploitation are priced in markets, the scarcity of natural resource stocks may not be fully reflected in the value of goods and services arising from their exploitation. Identifying and addressing where this is the case presents opportunities for improvements in efficiency that constitute net gains for society (OECD, 2011a; WB, 2012).

4.2 Green growth – goals and principles

The **overarching goal** is to establish incentives or institutions that increase well-being by improving resource management and boosting productivity; enticing economic activity to take place where it is of best advantage to society over the long-term; leading to new ways of meeting these first two objectives, *i.e*. innovation.

A green growth strategy is centred on mutually reinforcing aspects of economic and environmental policy. It takes into account the full value of natural capital as a factor of production and its role in growth. It focuses on cost-effective ways of attenuating environmental pressures to effect a transition towards new patterns of growth that will avoid crossing critical local, regional and global environmental thresholds. Innovation will play a key role.
Green growth has the potential to address economic and environmental challenges and open up new sources of growth through the following channels:

- **Productivity.** Incentives for greater efficiency in the use of resources and natural assets: enhancing productivity, reducing waste and energy consumption and making resources available to highest value use.

- **Innovation.** Opportunities for innovation, spurred by policies and framework conditions that allow for new ways of addressing environmental problems.
- **New markets.** Creation of new markets by stimulating demand for green technologies, goods, and services; creating potential for new job opportunities.
- **Confidence.** Boosting investor confidence through greater predictability and stability around how governments are going to deal with major environmental issues.
- **Stability.** More balanced macroeconomic conditions, reduced resource price volatility and supporting fiscal consolidation through, for instance, reviewing the composition and efficiency of public spending and increasing revenues through the pricing of pollution.

There is no "one-size-fits-all" prescription for implementing strategies for green growth. Greening the growth path of an economy depends on policy and institutional settings, level of development, resource endowments and particular environmental pressure points. Advanced, emerging, and developing countries will face different challenges and opportunities, as will countries with differing economic and political circumstances.

5 Green economy

The term green economy was first coined **in a pioneering 1989 report for the Government of the United Kingdom** by a group of leading environmental economists, entitled *Blueprint for a Green Economy* (Pearce et al, 1989). The report was commissioned to advise the UK Government if there was a consensus definition to the term "sustainable development" and the implications of sustainable development for the measurement of economic progress and the appraisal of projects and policies. Apart from in the title of the report, there is no further reference to green economy and it appears that the term was used as an afterthought by the authors.

Whilst the concept of green economy has only recently gained significant international attention, green economy policies have been discussed and analysed for some decades by economists and academics, particularly in the fields of environmental and ecological economics. Green economy policy measures have also been discussed at length in international negotiations, including UNCED in Rio in 1992. For example, the Rio Declaration included principles promoting:

- the internalisation of environmental costs and the use of economic instruments (Principle 16) as well as
- eliminating unsustainable consumption and production (Principle 8).

Agenda 21 further elaborated on these principles and called for the development of national strategies for sustainable development incorporating measures for:

- integrating environment and development,
- providing effective legal and regulatory frameworks,
- making effective use of economic instruments and market and other incentives, and
- establishing systems for integrated environmental and economic accounting.

In 2008, **the term green economy was revived** in the context of discussions on the policy response to multiple global crises. In the context of the financial crisis and concerns of a global recession, UNEP championed the idea of "green stimulus packages" and identified specific areas where large-scale public investment could kick-start a "green economy". It inspired several

governments to implement significant 'green stimulus' packages as part of their economic recovery effort (Atkisson, ISHES, 2012).

In October 2008, **UNEP launched its Green Economy Initiative** to provide analysis and policy support for investment in green sectors and for greening resource- and/or pollution-intensive sectors. As part of this Initiative, UNEP commissioned one of the original authors of *Blueprint for a Green Economy* to prepare a report entitled a ***Global Green New Deal*** (GGND) (UNEP, 2009), which proposed a mix of policy actions that would stimulate economic recovery and at the same time improve the sustainability of the world economy. The GGND called on governments to allocate a significant share of stimulus funding to green sectors and set out three objectives:

- economic recovery,
- poverty eradication,
- reduced carbon emissions and ecosystem degradation;

it also proposed a framework for green stimulus programs as well as supportive domestic and international policies. In December 2011, UNEMG prepared a report entitled a *Working Towards a Balanced and Inclusive Green Economy* (UNEMG, 2011).

The concept has received significant international attention over the past few years as one of two themes for the 2012 UN Conference on Sustainable Development (Rio+20). Despite the growing international interest in green economy, negotiations among Member States on the concept in the lead up to Rio+20 were challenging. This was partly due to the lack of an internationally agreed definition or universal principles for green economy, the emergence of interrelated but different terminology and concepts over recent years (such as green growth, low carbon development, sustainable economy, steady-state economy etc.), a lack of clarity around what green economy policy measures encompass and how they integrate with national priorities and objectives relating to economic growth and poverty eradication, as well as a perceived lack of experience in designing, implementing and reviewing the costs and benefits of green economy policies.

5.1 Green economy – definition

There is no internationally agreed definition of green economy and at least nine separate definitions were identified in recent publications (UNDESA, 2012b).

According to the UNEP (2011) ***green economy*** *is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In its simplest expression, a green economy can be thought of as one which is low carbon, resource efficient and socially inclusive.*

While addressing the twin challenge of boosting resource efficiency and maintaining ecosystem resilience, there is a clear need to integrate a third focus: human well-being. This aspect is important because the benefits we derive from the environment and the harms that we suffer due its degradation are not always reflected in market prices and therefore require separate consideration. Equally important, there is a need to ensure an equitable distribution of the benefits and costs of economic restructuring (EEA, 2013). The concept of a green economy recognises that ecosystems, the economy and human wellbeing (and the respective types of natural, produced, social and human capital) are intrinsically linked (fig. 2).

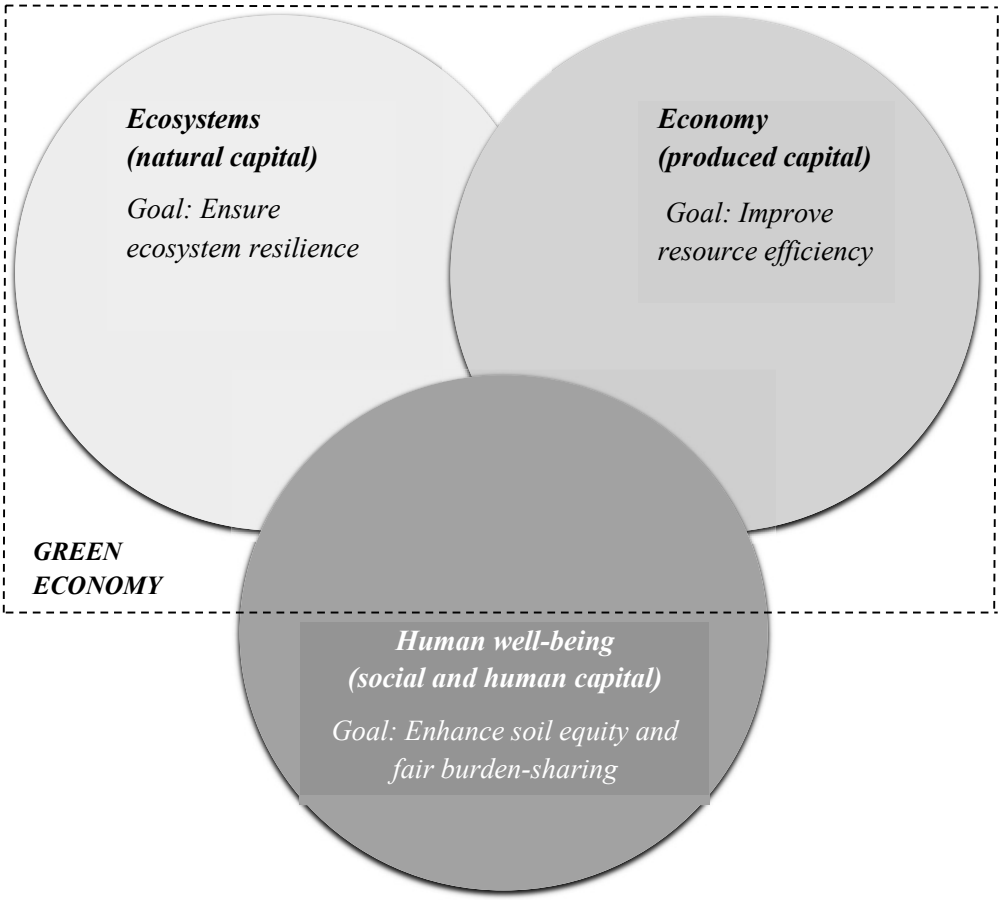


Figure 2 *Green economy concept in the context of sustainable development*

Key natural resources to underpin human health and well-being are:

- food resources,
- water resources,
- material resources,
- energy resources.

5.2 Green economy – goals and principles

Main green economy goals are:

- preserve, sustain, and restore the natural environment,
- protect and nurture public health,
- increase social justice through green economics,
- strengthen local independent businesses and institutions,
- reduce poverty by creating good green collar jobs.

The most common green economy principles are UNDESA (2012b):

1. The green economy is a means for achieving sustainable development.
2. The green economy should create decent work and green jobs.
3. The green economy is resource and energy efficient.
4. The green economy respects planetary boundaries or ecological limits or scarcity.
5. The green economy uses integrated decision making.
6. The green economy measures progress beyond GDP using appropriate indicators/metrics.
7. The green economy is equitable, fair and just – between and within countries and between generations.
8. The green economy protects biodiversity and ecosystems.
9. The green economy delivers poverty reduction, well-being, livelihoods, social protection and access to essential services.
10. The green economy improves governance and the rule of law. It is inclusive; democratic; participatory; accountable; transparent; and stable.
11. The green economy internalises externalities.

6 Green initiatives and environmental problems

Current environmental problems that our world is facing are:

- climate change,
- biodiversity decline,
- natural resources depletion and ecosystem services degradation,
- negative consumption and production patterns, and
- growing cities.

6.1 Climate change

Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (UN, 1992a).

Global climate change threatens to disrupt the well-being of society, undermine economic development and alter the natural environment, making it a key policy concern of the 21st century. In 1988, the Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). The IPCC reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. IPCC Assessment reports cover the full scientific, technical and socio-economic assessment of climate change, generally in four parts – one for each of the Working Groups plus a Synthesis Report. The IPCC is currently in its Sixth Assessment cycle. The Fifth Assessment Report (IPCC, 2014) observed that human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen. Changes in many extreme weather and climate events have been observed since about 1950. Anthropogenic greenhouse gas emissions have increased since the pre-industrial era, driven largely by economic and population growth, and are now higher than ever. This has led to atmospheric concentrations of carbon dioxide, methane and nitrous oxide that are unprecedented in at least the last 800,000 years. Their effects, together with those of other anthropogenic drivers, have been detected throughout the

climate system and are extremely likely to have been the dominant cause of the observed waring since the mid-20th century. Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system. Many aspects of climate change and associated impacts will continue for centuries, even if anthropogenic emissions of greenhouse gases are stopped. Therefor the ultimate objective of the United Nations Framework Convention on Climate Change including Kyoto Protocol and Paris Agreement in accordance with green initiatives objectives is to achieve, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

There are adopted two main approaches:

- **Climate change mitigation** – Economic models and quantitative assessments of climate change mitigation scenarios and their impacts on the economy play a key role in informing policy makers of costs, benefits and potential tradeoffs. The analyses assess the environmental effectiveness and the associated regional and global costs of more fragmented carbon markets The analysis also shows how global mitigation costs can be limited through the use of international offsets and through linking what are otherwise fragmented carbon markets (OECD, 2011e).
- **Adaptation to climate change -** Efforts to reduce GHG emissions need to move hand-in-hand with policies and incentives to adapt to the impacts of climate change. How much adaptation might cost, and how large its benefits might be, are issues that are increasingly relevant both for on-the-ground projects and in international contexts. Societies have always faced environmental risks and climatic impacts, and have developed a wide range of economic, social and technical measures to cope with such risks. These include insurance, protective infrastructure, natural disaster warning and response measures, and agricultural and water management techniques (OECD, 2013c).

6.2 Biodiversity

Biological diversity means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic

ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (UN, 1992b).

Biodiversity is fundamental to sustaining life, providing critical ecosystem services such as food provisioning, water purification, flood and drought control, nutrient cycling, and climate regulation, amongst many others. These services are essential to support human well-being and economic growth. Yet despite the significant economic, social and cultural values of biodiversity and ecosystem services, biodiversity worldwide is being lost, and in some areas at an accelerating rate. Without renewed efforts to halt the loss of biodiversity, a further 10% of biodiversity (measured in Terrestrial Mean Species Abundance) will be lost by 2050, from 2010 levels.

Main drivers of projected global biodiversity loss are:

- land use change and management (*e.g.* for pasture, food crops and bioenergy),
- commercial forestry,
- infrastructure development,
- habitat encroachment,
- fragmentation,
- invasive alien species,
- pollution (*e.g*. nitrogen deposition),
- climate change.

The objectives of the Convention on Biological Diversity in accordance with green initiatives objectives are:

- the **conservation of biological diversity**,
- the **sustainable use of its components** and
- the **fair and equitable sharing of the benefits** arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding.

Key policy needs identified for biodiversity include:

- adopting more ambitious policy measures and scaling up private-sector engagement,

- mainstreaming biodiversity into other policy areas,
- reforming environmentally harmful subsidies,
- improving the quantity and quality of data to inform biodiversity policy (OECD, 2012a).

6.3 Natural resources and ecosystem services

Natural resources include fossil and mineral natural resources, materials from the natural environment and arable lands. The services offered by ecosystem and biodiversity are essential. The living systems provide food, fibres, main active substances for medicines and meets our most essential needs. Despite the survival of human societies depending entirely on services rendered by the ecosystems, they have not been assessed monetarily and are therefore rarely or insufficiently taken into account by our economic models (RF, 2010).

Natural capital, encompassing natural resource stocks, land and ecosystems, **is often undervalued and mismanaged.** This imposes costs to the economy and human well-being. Even where outputs derived from its exploitation are priced in markets, the scarcity of natural resource stocks may not be fully reflected in the value of goods and services arising from their exploitation. Identifying and addressing where this is the case presents opportunities for improvements in efficiency that constitute net gains for society (OECD, 2011a; WB, 2012).

Natural resources and many ecosystems are **facing mounting pressures** from:

- rapid population growth,
- economic development,
- climate change,
- biodiversity loss and
- environment pollution.

Valuation and environmental accounting can help to improve the economic structure and decision making in this field. To restore the natural capital and ecosystem services the Ecosystem Management Approach (EMA) is necessary. The EMA is process to conserve and improve ecosystem health that sustains ecosystem services for human well-being. Ecosystem Management can help retain the balance between economic growth, societal

development and ecosystem health to ensure long-term sustainability. The Ecosystem Management Approach concept has evolved in the last 40 years since 1972, from the early purpose of ecosystem conservation and pollution control (i.e. Stockholm Declaration in 1972) to a much broader applicability in decision-making processes for sustainable development (i.e. Rio Declaration in 1992). The most recent applications of the Ecosystem Management approach are Ecosystem-Based Adaptation (EBA) and Reducing Emissions from Deforestation and forest Degradation (REDD+), both of which have received worldwide attention (UNEP, 2011b).

6.4 Consumption and production

To live sustainably, the Earth's natural resources must be used at a rate at which they can be replenished. However, our consumer-driven society is putting enormous pressure on the planet. Europe's environmental footprint is one of the largest on the planet. If the rest of the world lived like Europeans, it would require the resources of more than two earths to support them. The way we produce and consume is contributing to many of today's environmental problems, such as global warming, pollution, the depletion of natural resources and biodiversity loss. **Unsustainable consumption and production patterns** are increasingly affecting the natural environment, society, the economy, and business. We need to live more sustainably. That means doing more with less.

Sustainable consumption and production means using natural resources and energy more efficiently and reducing greenhouse gas emissions and other environmental impacts. It is all about producing and using products and services in a way that is least harmful to the environment. The aim is to meet our basic needs for goods and services while bringing about a better quality of life and also ensuring that there are sufficient resources left for future generations. Consuming sustainably concerns our lifestyle, buying behaviour and how we use and dispose of products and services. Sustainable production focuses on reducing the environmental impacts of production processes and designing better product (EC, 2010b).

Based on analyses **OECD** (2013c) **recommended**:

- Measures that increase consumer access to greener choices, such as investment infrastructure (e.g. public transport or recycling services) are important complements to policies that make green choices cheaper.

- Water efficiency investments could provide an important means of improving water conservation,
- Scaling up public information and educational campaigns is critical for raising household awareness of costs and charges and increasing understanding of climate change (OECD, 2013b).

EU measures on sustainable consumption and production focus on four main objectives:

- better products,
- smarter consumption,
- leaner and cleaner production,
- supporting global efforts (EC, 2010b).

6.5 Cities

Cities play large roles in the economic and environmental performance of countries. They are critical drivers of national growth. Today, for the first time in human history, over half of the world´s population lives in urban areas. By the end of the century, this share is projected to rise to around 85 %, out of a world population of about 10 billion.

Urban green growth is fostering economic growth and development through urban activities that reduce environmental impact, for example low air pollution and CO_2 emissions; low consumption of natural resources including water, energy and undeveloped land; and the protection of ecological services**.**

OECD **measures leading to urban green growth** are:

- Increase in green jobs, energy- efficiency retrofits of buildings,
- Increase in a city´s attractiveness to firms and skilled human capital, increasing the efficiency of the transport system,
- Fostering green technology research and development and innovation,
- Increase in the value of urban land, including infill development and eco-districts.

A major challenge to pursuing green growth in cities is raising the revenues required. Many urban revenue sources can be designed to either stimulate or discourage green growth cities (OECD, 2013a).

7 Green initiatives and economic sectors

Green initiatives are looking for improvements in economic sectors leading to improvement of their environmental impact. Main economic sectors that need greening are:

- agriculture,
- energy,
- industry,
- transport,
- tourism.

7.1 Agriculture

Greening the agriculture is essential if the food and nutrition requirements of future generations are to be met. This implies that productivity growth must be increased in a sustainable manner, well functioning markets must provide clear price signals that reflect the scarcity value of natural resources, and property rights must be defined so as to encourage optimal use of resources, both individually and collectively.

The relationship between agriculture and green growth is complex. The food and agricultural sectors can generate both environmental harm and conserve ecosystem services. This is because the sector both depends on and impacts natural resources (land, water, and biodiversity) in the production process. Climate change presents challenges and opportunities for the agricultural sector in reducing greenhouse gas emissions, in carbon sequestration, and the need for adaptation. Moreover, resource endowments and environmental absorptive capacities vary widely across countries and regions, and impacts can differ in the short and long run and at different stages of production and consumption. Thus the context is critical.

The objective of green-growth strategy aims to ensure that enough food is provided, efficiently and sustainably, for a growing population. This means increasing output while:

- managing scarce natural resources,
- reducing the carbon intensity and adverse environmental impacts throughout the food chain,
- enhancing the provision of environmental services such as carbon sequestration, flood and drought control,

- conserving biodiversity.

A **comprehensive and coherent strategy** is needed:

- **To increase productivity in a sustainable manner**: Increasing resource use efficiency throughout the supply chain will not only ensure more production relative to inputs used, but also conserve scarce natural resources and deal with waste. This means according higher priority to research, development, innovation, education and information applied to the agriculture and food sectors.
- **To ensure that well-functioning markets provide the right signals**: Prices that reflect the scarcity value of natural resources as well as the positive and negative environmental impacts of the food and agriculture system will contribute to resource use efficiency. This means reducing economically and environmentally harmful subsidies while encouraging environmentally friendly measures and consumer information; improving the functioning of markets, taking account of social consequences; further integrating domestic and global markets, bearing in mind the impacts of production trade on the environment and of environmental policies on production and trade; applying the polluter pays principle through charges and regulations; providing incentives for the supply of environmental goods and services; and reducing waste and post-harvest losses.
- **To establish and enforce well defined property rights**: Property rights help ensure optimal resource use, in particular for marine resources, land and forests, greenhouse gas emissions, and air and water quality. When resources are essentially free to private participants it can encourage over-exploitation, resulting in environmentally and socially sub-optimal outcomes. This is a complex area and is increasingly of a global rather than purely domestic nature, and requires further attention (OECD, 2011b).

7.2 Energy

Energy is a fundamental input to economic activity. A major transformation is required in the way we produce, deliver and consume energy. The energy sector poses a particular challenge in the context of green growth due to its size, complexity, path dependency and reliance on long-lived assets. The current energy system is highly dependent on fossil fuels, whose combustion accounted for 84 % of global greenhouse gas emissions in 2009. Global demand for energy is rapidly increasing, due to population and economic

growth, especially in large emerging countries, which will account for 90% of energy demand growth to 2035. At the same time, nearly 20% of the global population lack access to electricity.

A large-scale transformation of the global energy sector is possible, though it will require significant investment.

Overall, there are four key elements that provide the economic rationale for applying green growth strategies to the energy sector:

- **Economic costs of environmental damage and poorly managed natural resources**: Failing to address environmental concerns and not managing natural resources effectively poses risks to long-term economic growth, for example, via the growing scarcity and rising price costs of increased environmental damage of conventional fossil fuels and to well-being through the impairment of human health caused by pollution, for example.
- **Innovation to achieve environmental and economic objectives**: Innovation is fundamental to the objectives of green growth in that it can help to decouple environmental damage from economic growth. It is also at the core of economic objectives such as productivity growth and job creation. Innovation is particularly important in the energy industry, as we search for forms of energy that impose fewer environmental costs and for ways of improving efficiency in use as prices rise.
- **Synergies between environmental and productivity growth objectives**: Improved resource productivity and energy efficiency, through innovation or deployment of energy technology or processes, supports decoupling between economic growth, environmental damage and resource degradation.
- **Opportunities for new markets and industries**: Shifting toward green growth in the energy sector will require new technologies, fuel sources, processes and services that can spur new markets and new industries. Firms that are proactive in the face of these changes will be well-positioned to both contribute to and benefit from them

Policies will need to take into account the inter-relationships between economic sectors, transports, land-use patterns, social welfare and environmental integrity. A range of mutually reinforcing **measures is required** to address market failures and barriers, and create the enabling policy conditions for large scale private-sector investment. This includes:

- rationalising and phasing-out inefficient fossil fuel,
- setting a price signal to value externalities,
- establishing sound market and regulatory frameworks,
- radically improving energy efficiency,
- fostering innovation (OECD, 2011c).

7.3 Industry

Manufacturing industries have the **potential to become a driving force** for realising a sustainable society by introducing:

- efficient production practices and
- developing products and services that help reduce negative impacts.

This will require them to adopt a more holistic business approach that places environmental and social aspects on an equal footing with economic concerns. Their efforts to improve environmental performance have been shifting from "end-of-pipe" pollution control to:

- **a focus on product life cycles** and
- **integrated environmental strategies** and management systems.

Furthermore, efforts are increasingly made to create closed-loop, circular production systems in which discarded products are used as new resources for production (OECD, 2010).

Many companies and a few governments have started to use the term **eco-innovation** to describe the contributions of business to sustainable development while improving competitiveness.

Eco-innovation can be generally defined as **innovation that results in a reduction of environmental impact,** no matter whether or not that effect is intended. Various eco-innovation activities can be analysed along three dimensions:

- targets (the focus areas of eco-innovation: products, processes, marketing methods, organisations and institutions),
- mechanisms (the ways in which changes are made in the targets: modification, redesign, alternatives and creation),
- impacts (effects of eco-innovation on the environment).

Innovation plays a key role in moving manufacturing industries towards sustainable production, and the evolution of sustainable manufacturing initiatives has been facilitated by eco-innovation. Multi-level eco-innovation processes are often referred to as **system innovation** – innovation characterised by shifts in how society functions and how its needs are met. Key policy actions to drive green innovation are:

- support for private investment in innovation,
- support for general-purpose technologies,
- fostering the growth of new entrepreneurial firms,
- facilitating the transition to green growth in small and medium-sized enterprises,
- strengthen markets for green innovation,
- change consumer behaviour (OECD, 2011d).

7.4 Transport

Urban mobility is rapidly becoming one of the greatest challenges facing developed and developing countries alike. Transport is estimated to be responsible for nearly a quarter of global energy-related CO_2. There are also rising concerns about its impact on the quality of urban life, including social inequities, and about the effects of its pollution on health and buildings.

Overall **demand for transport activity is growing** rapidly, and it is predicted to roughly double between 2005 and 2050. In 2050, two-thirds of the global vehicle fleet is expected to be in non-OECD countries. At the same time technological improvements such as fuel-efficient vehicles and alternative power sources have not developed rapidly enough to cope with the consequence of this growth.

Sustainable transport ensures that our transport systems meet society's economic, social and environmental needs whilst minimising their undesirable impacts on the economy, society and the environment (EUROSTAT, 2013).

There is a growing consensus on the need for more sustainable patterns of transport activities. This requires:

- a fundamental shift in investment patterns, based on the principles of avoiding or reducing trips through integrated land-use and transport planning,

- a shift to more environmentally friendly modes of transport and improving vehicles and fuels, which is seen as a priority to reduce urban air pollution and greenhouse gas emissions.

In order to reduce volumes of traffic and emissions, regulations and standards, environmental friendly technologies and concepts for public transport and 'green cities' have to be implemented. UNEP supports governments and partners in implementing policies, technologies and investments that lead to low-carbon, green transport on the ground (UNEP, 2013).

7.5 Tourism

Tourism is one of the most **promising drivers of growth** for the world economy and key to driving the defining trends of the transition to a green economy. Due to tourism´s cross-cutting nature and close connections to numerous sectors at destination and international levels, even small improvements toward greater sustainability will have important impacts in the shift towards more sustainable, cleaner and low-carbon economic growth.

Like many other sectors, tourism faces a range of significant sustainability-related challenges. However, with growing awareness of the necessity and value of conserving unique natural, social and cultural assets, there is increasing motivation from both the private and public sectors to invest in improving tourism´s sustainability.

Innovation and in particular green innovation have a fundamental role to play in improving sustainability and maximising the potential environmental, social and cultural benefits of tourism in the transition to a green economy.

The following have been identified as potential areas of policy focus to improve diffusion, strengthen markets and change consumer attitudes to green innovation in the tourism sector are:

- A more strategic approach to fostering innovation and a cleaner more sustainable environment will require horizontal and vertical policy co-ordination, and closer integration of multiple policies, *e.g.* transport, energy, and environment; which is particular important to tourism, due to its cross-cutting nature.

- Improving the overall business environment for innovation is essential to green innovation and requires implementation of a broad-based innovation strategy.
- Stable and long-term market signals, based on the pricing of the environmental externalities, are core for a strong and comprehensive strategy for green growth and for green innovation.
- Well-designed demand-side policies, such as public procurement, standards and regulation can help to support the development of markets for green innovation, in particular in areas where price signals are ineffective.
- Policies to foster green innovation will benefit from continued evaluation and monitoring, to improve their effectiveness and efficiency over time, with any changes resulting from evaluation needing to be balanced against the benefits of policy stability over time.
- Governments could play an important role in better educating the public and tourism businesses concerning the environmental and financial benefits associated with adopting and supporting green innovation in tourism services.
- Education and incentives as factors for success, thus highlighting potential areas of focus for government policy responses (OECD, 2012b).

8 Policy tools for delivering green initiatives

8.1 Policy tools for delivering on green economy

UNDESA (2012c), based on analyses of important international organisation (UN, WB, OECD), proposed six categories that cover the breadth of green economy and complementary policy measures addressing all three dimensions of sustainable development and using an intuitive format based around "6 Is":

- Internalising,
- Incentivising,
- Institutions,
- Investment,
- Information,
- Inclusion.

Within these six categories were identified also sub-categories enables to explore the range of policy measures and most common instruments that are being proposed by practitioners and experts to transition towards greener economies (tab. 1).

Table 1 Typology of green economy measure

Policy categories	Policy sub-categories
1/ **Internalising** (externalities)	1. Taxes, charges, fees, levies on 'bads' (i.e. pollution, resource use or proxy) 2. Cap-and-trade permit or certificate systems
2/ **Incentivising**	3. Investment incentives – low-interest loans; micro-financing; tax exemptions etc. 4. Subsidies, feed-in tariffs and other direct support for 'goods' 5. Removing policy-induced distortions and perverse incentives (e.g. harmful subsidies) 6. Leveraging finance – PPPs, long-term guarantees, phased out support, removal of barriers to FDI, lower administrative burden, credit guarantees
3/ **Institutions**	7. Regulations – norms, standards, info disclosure, labelling, prohibitions, fines and enforcement, mandatory targets 8. Property right and access right laws, including

	IPR 9. Governance & institutional capacities – accountability, transparency, enforcement, anticorruption 10. Integrated planning, decision-making and resource management - EIA/SEA, IWRM, ICZM, LCA, MCA/CBA, disaster preparedness, other diagnostic tools
4/ **Investment** (in natural capital, agriculture, human capital, infrastructure, and innovation).	11. Sustainable public procurement 12. Investment in natural capital – PES, protected areas, direct management and rehabilitation 13. Investment in sustainable agriculture 14. Investment in human capital – capacity building, training, skills 15. Investment in infrastructure – energy, water, transport, waste, ICT 16. Investment in innovation – R&D, deployment, information sharing
5/ **Information**	17. Voluntary approaches – information provision, labelling, CSR, targets, agreements, educational initiatives 18. Measuring progress – green accounting, green targets and indicators, carbon inventories
6/ **Inclusion**	19. Labour market policies – skills (re-)training, job search assistance, income support and benefits 20. Social protection floors – unemployment insurance and pensions, cash transfers, compensation for price increases, health care

8.2 Policy tools for delivering on green growth

A range of policy options are available for addressing green growth constraints. OECD (2011c) proposed tool kit suitable for delivering on green growth (tab. 2).

Table 2 Possible policies to address green growth constraints

Green growth constraints	Policy options
1/ Inadequate infrastructure	Taxes, tariffs, transfers, public-private partnerships
2/ Low human and social capital and poor institutional quality	Taxes, subsidy reform/removal
3/ Incomplete property rights, subsidies	Review and reform or remove
4/ Regulatory uncertainty	Set targets, create independent governance systems
5/ Information externalities and split incentives	Labelling, voluntary approaches, subsidies, technology and performance standards
6/Environmental externalities	Taxes, tradable permits, subsidies
7/ Low returns on research and development	R&D subsidies and tax incentives, focus on general-purpose technologies
8/ Network effects	Strengthen competition in network industries, subsidies for new projects
9/ Barriers to competition	Reform regulation, reduce government monopoly

In most countries, new institutional arrangements will need to be established to guide the development of green growth strategies and to overcome the institutional inertia and silos that exist around economic and environmental policy making. For many developing countries, this will involve significant capacity building for integrating environmental issues into national development planning processes, including Poverty Reduction Strategies (PRSPs). In OECD countries, the primary focus will need to be on establishing governance structures at the highest levels of government and on ensuring co-ordination between different areas and levels of govern.

9 Monitoring green growth progress

Policies that promote green growth need to be founded on a good understanding. They need to be supported with appropriate information to monitor progress and gauge results. Monitoring progress towards green growth requires indicators based on internationally comparable data. These need to be embedded in a conceptual framework and selected according to well specified criteria. Ultimately, they need to be capable of sending clear messages which speak to policy makers and the public at large.

Key principles in selecting indicators to monitor progress with green growth are:

- **Policy relevance** - The indicator set should have a clear policy relevance, and in particular:
    - provide a balanced coverage of the key features of green growth with a focus on those that are of common interest to OECD member and partner countries,
    - be easy to interpret and transparent, *i.e.* users should be able to assess the significance of the values associated with the indicators and their changes over time,
    - provide a basis for comparisons across countries,
    - lend itself to being adapted to different national contexts, and analysed at different levels of detail or aggregation.
- **Analytical soundness**:
    - The indicators should be analytically sound and benefit from a consensus about their validity. They should further lend themselves to being linked to economic and environmental modelling and forecasting.
- **Measurability:**
    - The indicators should be based on data that are available or that can be made available at a reasonable cost, and that are of known quality and regularly updated.

OECD (2012d) proposed 4 inter-related groups of indicators:

- indicators monitoring the **environmental and resource productivity** of production and consumption,
- indicators describing the **natural asset base**,
- indicators monitoring the environmental dimension of **quality of life**,

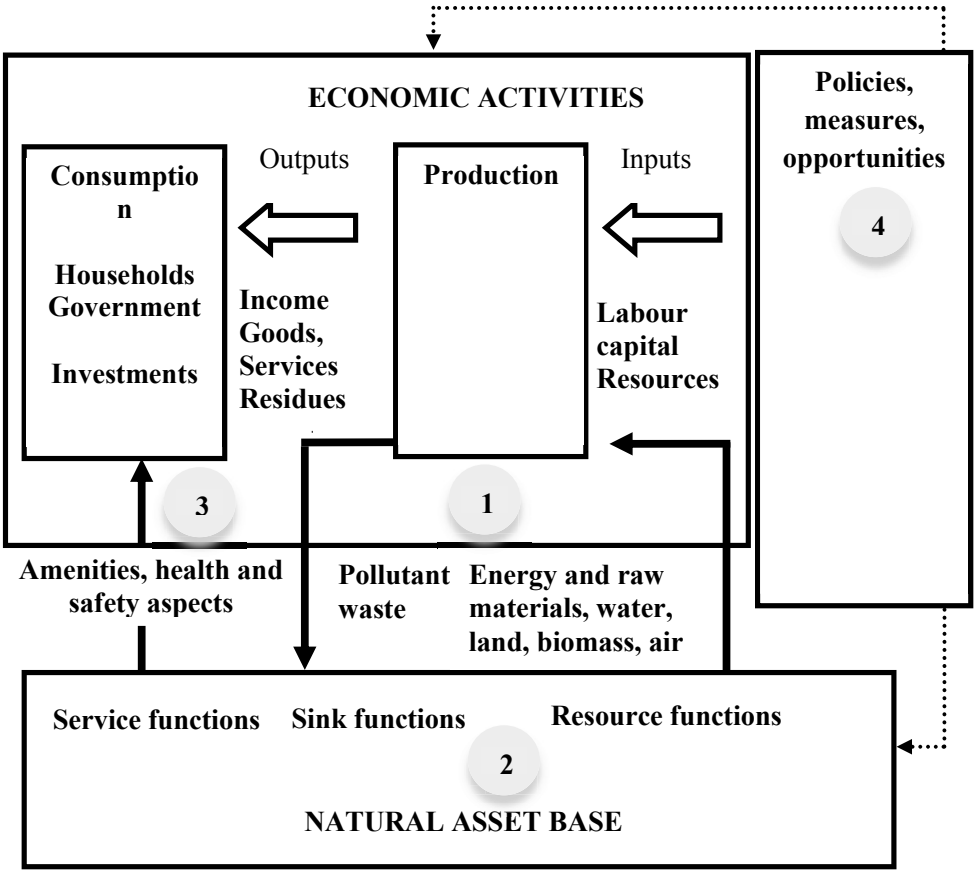
- indicators describing **policy responses and economic opportunities** (tab. 3, fig. 3).

They are complemented with generic indicators describing the socio-economic context and characteristics of growth.

Table 3 Indicator group and topics covered

Group of indicator	Covered topics
1/ The environmental and resource productivity of the economy	Carbon and energy productivity Resource productivity: materials, nutrients, water Multi-factor productivity
2/ The natural asset base	Renewable stocks: water, forest, fish resources Non-renewable stocks: mineral resources Biodiversity and ecosystems
3/ The environmental dimension of quality of life	Environmental health and risks Environmental services and amenities
4/ Economic opportunities and policy responses	Technology and innovation Environmental goods & services International financial flows Prices and transfers, skills and training Regulations and management approaches
Socio-economic context and characteristics of growth	Economic growth and structure Productivity and trade Labour markets, education and income Socio-demographic patterns

A central element of green growth is the **environmental and resource efficiency of production and consumption.** Progress can be monitored by relating the use of environmental services in production (use of natural resources and materials, including energy, generation of pollutants and other residuals) to the output generated and by tracking decoupling in trends of production and environmental services.



1. Indicators monitoring the environmental and resource productivity of production and consumption
2. Indicators describing the natural asset base
3. Indicators monitoring the environmental dimension of quality of life
4. Indicators describing policy responses and economic opportunities

Figure 3 *Socio-economic relations and groups of green growth indicators*

The main issues of importance to green growth include:

- **Carbon and energy productivity** that characterises among others interactions with the climate system and the global carbon cycle, and the environmental and economic efficiency with which energy resources are used in production and consumption, and that inform about the results of policies that promote low carbon technologies and cleaner energy.
- **Resource productivity** that characterises the environmental and economic efficiency with which natural resources and materials are

used in production and consumption, and that inform about the results of policies and measures that promote resource productivity and sustainable materials management in all sectors. Important resources and materials include: mineral resources (metallic minerals, industrial minerals, construction minerals); biotic resources (food, feed, wood); water; and nutrients that reflect among others interactions with nutrient cycles and food production systems. Other issues of importance include consumer behaviour, and household and government consumption patterns.

Natural resources are a major foundation of economic activity and human welfare. Their stocks are part of the natural capital and they provide raw materials, energy carriers, water, air, land and soil, and support the provision of environmental and social services that are necessary to develop man-made, human and social capital (see box next page). The extraction and consumption of resources affects the quality of life and well-being of both current and future generations. This includes oil and gas extraction, mining, fishing and forestry. Progress can be monitored by looking at stocks of environmental assets, along with flows of environmental services, and by using indicators that reflect the extent to which the asset base is being maintained in terms of quantity, quality or value. The main issues of importance to green growth include:

- **The availability and quality of renewable natural resource stocks** including freshwater, forest, fish.
- **The availability and accessibility of non-renewable natural resources stocks** in particular mineral resources, including metals, industrial minerals and fossil energy carriers.
- **The biological diversity and ecosystems** including species and habitat diversity, and the productivity of land and soil resources.

Environmental outcomes are important determinants of **health status and well-being**. They provide an example where production and income growth may not be accompanied by a rise in overall well-being. The main aspects of importance to green growth include:

- **Human exposure to environmental pollution and environmental risks**, the associated effects on human health and on quality of life, and the related health costs and impacts on human capital.
- **Public access to environmental services and amenities** that characterises the level and type of access that different groups of

people have to environmental services such as clean water, sanitation, green space, or public transport.

The main issues of importance to green growth dealt with **economic opportunities and policy responses** are:

- Technology development and innovation,
- Production of environmental goods and services,
- International financial flows,
- Prices and financial transfers.

Ideally, indicators on economic instruments should be complemented by indicators on regulations. However, data availability and comparability of regulations across countries hamper the construction of such indicators.

10 Green initiatives in the European Union

The European Union has not processed common green strategy. But a range of elements of the green economy concept are relatively well integrated in the EU strategic documents, such as (Mazza, Brink, 2012):

- *EUROPE 2020: A European strategy for smart, sustainable and inclusive growth (COM(2010) 2020),*
- *Roadmap for moving to a competitive low carbon economy in 2050 (COM(2011) 112),*
- *Our life insurance, our natural capital: an EU biodiversity strategy to 2020 (COM(2011) 244),*
- *Roadmap to a Resource Efficient Europe (COM(2011) 571),*
- *General Union Environment Action Programme to 2020: Living well, within the limits of our planet (COM(2012) 710).*

Some key elements of the green economy, most notably the aim for absolute decoupling between value creation (growth) and resource use, to grow within limits and stay below critical environmental thresholds, while largely absent from the Europe 2020 strategy and the Resource Efficiency Roadmap, are more fully addressed by sector specific strategies and policies such as the biodiversity strategy.

10.1 EUROPE 2020: A European strategy for smart, sustainable and inclusive growth

Europe 2020 puts forward three mutually reinforcing priorities:

- Smart growth: developing an economy based on knowledge and innovation.
- **Sustainable growth**: promoting a more resource efficient, greener and more competitive economy.
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

The Commission is putting forward seven flagship initiatives to catalyse progress under each priority theme:

- "Innovation Union" to improve framework conditions and access to finance for research and innovation so as to ensure that innovative

ideas can be turned into products and services that create growth and jobs.

- "Youth on the move" to enhance the performance of education systems and to facilitate the entry of young people to the labour market.
- "A digital agenda for Europe" to speed up the roll-out of high-speed internet and reap the benefits of a digital single market for households and firms.
- "Resource efficient Europe" to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency.
- "An industrial policy for the globalisation era" to improve the business environment, notably for SMEs, and to support the development of a strong and sustainable industrial base able to compete globally.
- "An agenda for new skills and jobs" to modernise labour markets and empower people by developing their of skills throughout the lifecycle with a view to increase labour participation and better match labour supply and demand, including through labour mobility.
- "European platform against poverty" to ensure social and territorial cohesion such that the benefits of growth and jobs are widely shared and people experiencing poverty and social exclusion are enabled to live in dignity and take an active part in society (EC, 2010).

10.2 Roadmap for moving to a competitive low carbon economy in 2050

The transition towards a competitive low carbon economy means that the EU should prepare for reductions in its *domestic* emissions by 80% by 2050 compared to 1990. Electricity will play a central role in the low carbon economy. The analysis shows that it can almost totally eliminate CO_2 emissions by 2050, and offers the prospect of partially replacing fossil fuels in transport and heating.

The share of low carbon technologies in the electricity mix is estimated to increase from around 45% today to around 60% in 2020, including through meeting the renewable energy target, to 75 to 80% in 2030, and nearly 100% in 2050.

Given that the central role of electricity in the low carbon economy requires significant use of renewables, many of which have variable output, considerable investments in networks are required to ensure continuity of supply at all times. Investment in smart grids is a key enabler for a low carbon electricity system, notably facilitating demand-side efficiency, larger shares of renewables and distributed generation and enabling electrification of transport (EC, 2011a).

10.3 Our life insurance, our natural capital: an EU biodiversity strategy to 2020

In the EU, only 17 % of habitats and species and 11 % of key ecosystems protected under EU
legislation are in a favourable state[3]. This is in spite of action taken to combat biodiversity
loss, particularly since the EU 2010 biodiversity target was set in 2001.

The benefits of these actions have been outweighed by continued and growing pressures on Europe's biodiversity:

- land-use change,
- over-exploitation of biodiversity and its components,
- the spread of invasive alien species,
- pollution and
- climate change

have either remained constant or are increasing. Indirect drivers, such as population growth, limited awareness about biodiversity and the fact that biodiversity's economic value is not reflected in decision making are also taking a heavy toll on biodiversity.
The strategy is aimed at halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss. It is an integral part of the Europe 2020 Strategy, and in particular the resource efficient Europe flagship initiative.

The 2020 biodiversity strategy includes six mutually supportive and inter-dependent targets:

1. To halt the deterioration in the status of all species and habitats covered by EU nature legislation and achieve a significant and

measurable improvement in their status so that, by 2020, compared to current assessments.
2. By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15 % of degraded ecosystems.
3. By 2020, maximise areas under agriculture across grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP so as to ensure the conservation of biodiversity. By 2020, Forest Management Plans or equivalent instruments, in line with Sustainable Forest Management are in place for all forests that are publicly owned and for forest holdings above a certain size.
4. To achieve a population age and size distribution indicative of a healthy stock, through fisheries management with no significant adverse impacts on other stocks, species and ecosystems.
5. By 2020, Invasive Alien Species and their pathways are identified and prioritised, priority species are controlled or eradicated, and pathways are managed to prevent the introduction and establishment of new IAS.
6. By 2020, the EU has stepped up its contribution to averting global biodiversity loss (EC, 2011b).

10.4 Roadmap to a Resource Efficient Europe

The Roadmap builds upon and complements the other initiatives under the flagship Europe 2020 Strategy, in particular the policy achievements towards a low carbon economy, and takes into account progress made on the 2005 Thematic Strategy on the Sustainable Use of Natural Resources and the EU's strategy on sustainable development. The Roadmap should also be seen in the context of worldwide efforts to achieve a transition towards a green economy.

Over the 20th century, the world increased its fossil fuel use by a factor of 12, whilst extracting 34 times more material resources. Today in the EU, each person consumes 16 tonnes of materials annually, of which 6 tonnes are wasted, with half going to landfill. Trends show, however, that the era of plentiful and cheap resources is over. Businesses are facing rising costs for essential raw materials and minerals, their scarcity and price volatility are having a damaging effect on the economy. Sources of minerals, metals and energy, as well as stocks of fish, timber, water, fertile soils, clean air, biomass, biodiversity are all under pressure, as is the stability of the climate

system. Whilst demand for food, feed and fibre may increase by 70% by 2050, 60% of the world's major ecosystems that help produce these resources have already been degraded or are used unsustainably.

Europe has enjoyed many decades of growth in wealth and wellbeing, based on intensive use of resources. But today it faces the dual challenge of stimulating the growth needed to provide jobs and well-being to its citizens, and of ensuring that the quality of this growth leads to a sustainable future. To tackle these challenges and turn them into opportunities **economy will require a fundamental transformation within a generation** – in energy, industry, agriculture, fisheries and transport systems, and in producer and consumer behaviour.

The vision of the roadmap is that by 2050 the EU´s economy has grown in a way that respect resource constraints and planetary boundaries, thus contributing to global economic transformation. Our economy is competitive, inclusive and provides a high standard of living with much lower environmental impacts. All resources are sustainably managed, from raw materials to energy, water, air, land and soil. Climate change milestones have been reached, while biodiversity and the ecosystem services it underpins have been protected, valued and substantially restored (EC, 2011a).

10.5 General Union Environment Action Programme to 2020: Living well, within the limits of our planet

The Union has set itself the objective of becoming a smart, sustainable and inclusive economy by 2020 with a set of policies and actions aimed at making it a low-carbon and resource-efficient economy. Successive environment action programmes have provided the framework for Union action in the field of the environment since 1973. The Sixth Community Environment Action Programme ended in July 2012, but many measures and actions launched under that programme continue to be implemented.

The 7th Environment Action Programme shall have the **following priority objectives**:

- to protect, conserve and enhance the Union's natural capital;
- to turn the Union into a resource-efficient, green and competitive low-carbon economy;
- to safeguard the Union's citizens from environment-related pressures and risks to health and well-being;

- to maximise the benefits of Union environment legislation by improving implementation;
- to improve the knowledge and evidence base for Union environment policy;
- to secure investment for environment and climate policy and address environmental externalities;
- to improve environmental integration and policy coherence;
- to enhance the sustainability of the Union's cities;
- to increase the Union's effectiveness in addressing international environmental and climate-related challenges (EC, 2012).

11 Green initiatives in selected countries

International experience with green initiatives policy development is rapidly expanding across the globe. Over the period 2010 to 2011, green economy scoping studies were completed in 25 different countries under UNEP's Green Economy Initiative. The Global Green Growth Institute is currently supporting the development of national green growth plans in twelve countries. The GGGI has partnered with respective national governments as well as a number of other organisations. The European Commission also recently funded a study on green economy options in the Eastern Partnership Countries, a study is currently underway looking at green growth policies for Mediterranean Countries, and the UN Economic Commission for Africa recently prepared a discussion paper with UNEP on green economy implications for African countries.

The OECD is also providing regular guidance that is tailored to the needs of individual countries through its core advice in country-specific reviews. Countries like the Czech Republic, Denmark Korea and the Netherlands have already applied the OECD green growth measurement framework and indicators to their specific national contexts to assess their state of green growth. A number of countries have now published national green economy strategies or roadmaps. The Republic of Korea has been a front-runner in these efforts, finalising its *National Strategy for Green Growth* and *Five Year Plan* in 2009 (UNDESA, 2012c).

Other national green economy strategies are also starting to emerge, including France's *National Sustainable Development Strategy: Towards a Green and Fair Economy* (RF, 2010), and Great Britain´s *Green Economy* (EAC, 2012).

11.1 France – National sustainable development strategy 2010 - 2013: Towards a Green and Fair Economy

The French strategy sets out to maintain the balance between the environmental, social and economic aspects of sustainable development, to reconcile the rights of present and future generations and to structure the national and local issues coherently. The cultural aspect is a deciding factor in this respect. It must be taken into account and incorporated through heritage, architecture, access to knowledge, information and cultural diversity if the National Sustainable Development Strategy 2010-2013 is to succeed.

The NSDS proposes a common architecture to all players in the Nation - public and private - to help them structure their own sustainable development projects around strategic choices and indicators decided by a wide consensus. Its main purpose is to ensure the coherence and complementarity of France's international and European commitments and national, cross-cutting and sectorial policies.

By developing a decarbonised economy using far fewer resources, the national strategy is to make France a major player in the green economy, which is, alone, compatible with the development of emerging countries, whilst pursuing a goal of social justice and equity.

It hinges for this purpose on **nine strategic challenges**, in line with our European commitments, which must be taken up to **move towards a green and equitable economy**:

- **sustainable consumption and production,** thanks to responsible consumers and producers who take the entire life cycle of products and services into account;
- **the knowledge society** by developing information, lifelong training, education and access to culture and by increased support for research and innovation, which conditions our competitiveness and therefore the durability of our economic and social model;
- **governance**, which must make it easier for us to adapt to the change and help our society to evolve by involving all stakeholders;
- **climate change and energy** which demand great rigour and moderation in our consumptions, the development of renewable energies and the adaptation of territories by watching over the situation of vulnerable people and activities;
- **sustainable transport and mobility** by encouraging modal shift, complementarity and the least polluting means of transport, by setting out to reduce commuting and develop pioneering systems meeting the needs of economic and ecological efficiency and social cohesion;
- **conservation and sustainable management of biodiversity and natural resources** by relying on improved knowledge – and recognition - of their contribution to our most fundamental needs, on a more moderate and eco-innovative economy, town planning and organisations;
- **public health, risk prevention and management** by paying special attention to the quality of environments and to potential social inequalities;

- **demography, immigration and social inclusion** which all have a decisive impact on the economy and equilibrium of our social protection systems, by setting out to combat all exclusions due to age, poverty, insufficient education and training and by focusing on the multi-cultural aspect of the French society;
- **the international challenges of sustainable development and the fight against global poverty** by supporting the strengthening of international governance to better incorporate the requirements of a sustainable development, by contributing to food and energy safety in the most deprived countries (RF, 2010).

11.2 Great Britain – Green Economy

On coming to power in 2010, t**he Government set its ambition to "build a new economy from the rubble of the old**: that supported sustainable growth and enterprise, balanced across all regions and all industries, and promoted the green industries essential for the future". The Department for Environment, Food and Rural Affairs is charged with coordinating efforts across Government on the green economy.

In the UK, the **Government's *National Ecosystem Assessment*** found that gains in agricultural production and national development over the past half-century had resulted in a rapid decline in ecosystems. It also found that the UK is "increasingly drawing on the services of overseas ecosystems to support its own economic growth", with over one third of the biomass (food, fibre, timber, biofuels etc.) used in the UK being imported. Demand for oil and gas show no sign of reducing in the future and will be increasing, met by imports. The Government expects that "access to critical natural resources such as water and minerals could be constrained in the future", for example recent export restrictions on 'rare earth' elements by China have constrained supplies, and the availability of some of these materials is already having an impact on UK businesses. Emissions in the UK jumped by 3.2% in 2010.

The Government examined the efforts at building a green economy; an economy that more closely reflects sustainable development. The Government needs to take the longer-term view. The whole economy needs to be green and **traditional sectors of the economy will need to be transformed**. To achieve this, the Government's overall strategy must be improved by:

- **Revising its definition of a green economy** to include all three pillars of sustainable development, including social considerations, well-being, and environmental limits.
- **Creating a dedicated unit to examine the relationship between growth, prosperity and quality of life.** A greater understanding is needed of how best to generate economic activity and jobs, while at the same time promoting sustainability and living within environmental limits.
- **Setting out a clear trajectory to a green economy** with targets, and action required from business in key areas such as resource efficiency, emissions and waste reduction. Transparent reporting arrangements will be integral.
- **Agreeing a basket of indicators and targets** against which regular reporting should be completed and the success of the Government's approach gauged.

The Government should also bolster its current policy levers in three areas, by:

- **Strengthening roles**
  - Delegating to an independent body (the Committee on Climate Change), a role in setting tariffs and charges aimed at reducing emissions.
  - Tasking an independent body (the Office for Budget Responsibility) with an extended mandate or the Natural Capital Committee with an obligation to report publicly, to examine the linkages between the state of natural capital and economic policy.
  - Strengthening the role of the Green Economy Council.
- **Improving strategy**
  - Quantifying those 'environmental limits' that are most affected by economic activity in the UK, and building those limits into a green economy strategy.
  - Setting out a date by which the Government will publish its definition of an environmental tax.
  - Setting out how data on natural capital in the National Accounts would be used in policy development and assessing progress towards a green economy; and developing targets for improving the state of the environment.
  - Producing a green skills strategy to ensure that skills and training are adequate to meet the aspirations of green economy policies.

  - Setting out how it intends to use government procurement expenditure to develop markets for green goods and services, and what specific changes it intends to make to meet the requirements of the Public Services.
  - Testing the effectiveness of voluntary guidance for businesses on how to measure their impacts on natural capital and exploring what further research is needed.
- **Setting minimum standards**
  - Introducing mandatory emissions reporting by business as soon as possible.
  - Developing with stakeholders and business minimum sustainability standards which could attract wide acceptance.
  - Developing indicators and targets by which progress towards a green economy can be measured (EAC, 2012).

References

1. Atkisson, A, ISHES. 2012. *Life Beyond Growth*. ISIS Academy, 2012.
2. Burkhard, B., Müller, F. 2008. Driver-pressure-state-impact-response. In: Jorgensen, S.E., Fath, B.D., editors. Ecological indicators. Vol. 2 of Encyclopedia of Ecology. Oxford: Elsevier; 2008. p. 967-970.
3. EAC, 2012. *A Green Economy. Twelfth report*. UK, 2012, [on-line] [cit. 2016-11-20] *http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/1025/102502.htm*
4. EEA, 2015. The European environment – state and outlook 2015: an integrated assessment of the European Environment. [on-line] [cit. 2016-11-20] *http://www.eea.europa.eu/soer*
5. EEA, 2013. Towards a green economy in Europe. EU environmental policy targets and objectives 2010 – 2050. EEA Report, No. 8/2013. 52 pp.
6. EC, 2012. COM(2012) 710, *Decision of the European Parliament and of the Council on a General Union Environment Action Programme to 2020 „Living well, within the limits of our planet*, 2012. [on-line] [cit. 2016-11-20] *http://new.eur-lex.europa.eu/legal-content/SK/TXT/?qid=1383483881299&uri=CELEX:52012PC0710*
7. EC, 2011a. COM(2011) 571, *Communication from the Commission to the European Parliament, the Council, the European economic and Social Committee and the Committee of the Regions, Roadmap to a Resource Efficient Europe.,* 2011. [on-line] [cit. 2016-11-20] *http://new.eur-lex.europa.eu/legal-content/SK/TXT/?qid=1383482940932&uri=CELEX:52011DC0571*
8. EC, 2011b. COM(2011) 244, *Communication from the Commission to the European Parliament, the Council, the European economic and Social Committee and the Committee of the Regions, Our life insurance, our natural capital: an EU biodiversity strategy to 2020*, 2011. [on-line] [cit. 2016-11-20] *http://new.eur-lex.europa.eu/legal-content/SK/TXT/?qid=1383482364692&uri=CELEX:52011DC0244*
9. EC, 2010. COM(2010) 2020, *Communication from the Commission, EUROPE 2020 – A strategy for smart, sustainable and inclusive growth*, 2011. [on-line] [cit. 2016-11-20] *http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52010DC2020:en:NOT*
10. EUROSTAT, 2013. *Theme 7: Sustainable transport*, 2013. [on-line] [cit. 2016-11-20]

http://epp.eurostat.ec.europa.eu/portal/page/portal/sdi/indicators/theme7

11. EUROSTAT, EC, 2011. *Sustainable development in the EU, 2011 monitoring report of the EU sustainable development strategy*. 2011. [on-line] [cit. 2016-11-20] *http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-31-11-224/EN/KS-31-11-224-EN.PDF*
12. Gabrielsen, P., Bosch, P. 2003. Environmental indicators: typology and use in reporting. Copenhagen: EEA; 2003. 19 pp.
13. Hák, T.,Kovanda, J., Nondek, L., Vačkář, D., Weinzettel, J. 2015. *Metabolzimus společnosti, material, energie a ekosystémy*. Praha: Karolinum, 289 p., ISBN 978-80-246-2799-I.
14. IPCC. 2014. Climate Change 2014. Synthesis report. Summary for Policymaker. 32 pp.
15. Malthus,T. R. 1965. First essay on population. New-York: Kelley. (Original work published 1798).
16. Mankiw, N. G., Romer, D., Weil, D. N. 1992. A contribution to the empirics of economic growth. *Quarterly Journal of Economics*, 107, p. 407-437.
17. Mazza, L., Brink, P. 2012. *Green Economy in the European Union*. UNEP, 2012, 12 pp. [on-line] [cit. 2016-11-20] *http://www.ieep.eu/work-areas/global-issues-and-external-action/2012/07/green-economy-in-the-european-union*
18. OECD, 2013a. *Green Growth in Cities. OECD Green Growth Studies*. OECD, 2013,136 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/greengrowth/greening-cities-regions/green-growth-in-cities.htm#MainIssues*
19. OECD, 2013b. *Greening Household Behaviour, Overview from the 2011 Survey. OECD Studies on Environmental Policy and Household Behaviour.* OECD, 2013,308 pp. [on-line] [cit. 2016-11-20] *http://www.keepeek.com/Digital-Asset-Management/oecd/environment/greening-household-behaviour_9789264181373-en#page1*
20. OECD, 2013c. *Recent OECD work on Adaptation to Climate change.* OECD, 2013,24 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/env/cc/*
21. OECD, 2012a. *Recent OECD work on Biodiversity.* OECD, 2012, 28 pp.[on-line] [cit. 2016-11-20] *http://www.oecd.org/env/resources/Biodiversity%20Brochure%20Aug%202012%20WEB.pdf*

22. OECD, 2012b. *OECD Tourism Papers Green Innovation in Tourism Services* OECD, 2012, 77 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/greengrowth/greeninnovationtourism.htm*
23. OECD, 2011a. *Towards Green Growth*. OECD, 144 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/greengrowth/48224539.pdf*
24. OECD, 2011b. *Food and Agriculture. OECD Green Growth Studies*. OECD, 2011. 86 pp. [on-line] [cit. 2016-11-20] *http://www.keepeek.com/Digital-Asset-Management/oecd/agriculture-and-food/food-and-agriculture_9789264107250-en#page1*
25. OECD, 2011c. *Energy. OECD Green Growth Studies*. OECD, 2011. 106 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/greengrowth/greening-energy/49157219.pdf*
26. OECD, 2011d. *Fostering Innovation for Green Growth. OECD Green Growth Studies*. OECD, 2011. 130 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/australia/fosteringinnovationforgreengrowth.htm*
27. OECD, 2011e. *Recent OECD work on Climate change.* OECD, 2011, 84 pp. [on-line] [cit. 2016-11-20] *http://www.oecd.org/env/cc/*
28. OECD, 2010. *Eco-Innovation in Industry: Enabling Green Growth*, OECD, 2010, 276 pp. [on-line] [cit. 2016-11-20] *http://browse.oecdbookshop.org/oecd/pdfs/browseit/9209061E.PDF*
29. OECD, 1993. OECD core set of indicators for environmental performance reviews. OECD Environmental Directorate Monographs no. 83. OECD, 1993. 39 pp.
30. Pearce, D., Markandya, A., Barbier, B. 1989. *Blueprint for a green economy.* Earth scan, London, Great Britain, 1989, 192 pp, ISBN 1 85383 066 6.
31. Pinto, R., de Jonge, V.N., Neto, J.M., Domingos, T., Marques, J.C., Patrício, J. 2013. Towards a DPSIR driven integration of ecological value, water uses and ecosystem services for extuarine systems. Ocean Coast Manage. 2013;**72**: 64-79.
32. Republic Frances, 2010. *National Sustainable Development Strategy 2010-2012 – Towards a green and fair economy*. RF, 2010, 60 pp. [on-line] [cit. 2016-11-20] *http://www.developpement-durable.gouv.fr/spip.php?page=article&id_article=21743*
33. Solow, R. M. 1956. A contribution to the theory of economic growth. *Quarterly Journal of Economics*, 70, 1956, p. 65-94.
34. UN, 2012. *The future we want.* 2012. [on-line] [cit. 2016-11-20] *https://rio20.un.org/sites/rio20.un.org/files/a-conf.216l-1_english.pdf.pdf*
35. UN, 1992a. *Convention on Climate Change.* UN, 1992. 30 pp. [on-line] [cit. 2016-11-20] *http://unfccc.int/resource/docs/convkp/conveng.pdf*

36. UN, 1992b. *Convention on Biological Diversity*. UN, 1992. 30 pp. [on-line] [cit. 2016-11-20] *http://www.cbd.int/convention/text/default.shtml*

37. UNDESA, 2012a. *A guidebook to the Green economy. Issue 1: Green economy, Green growth, and Low-Carbon development – history, definitions and a guide to recent publication.* UNDESA, 2012, 65 pp. [on-line] [cit. 2016-11-20] *http://sustainabledevelopment.un.org/content/documents/GE%20Guidebook.pdf*

38. UNDESA, 2012b. *A guidebook to the Green economy. Issue 2: Exploring green economy principles.* UNDESA, 2012, 24 pp. [on-line] [cit. 2016-11-20] *http://sustainabledevelopment.un.org/content/documents/743GE%20Issue%20nr%202.pdf*

39. UNDESA, 2012c. *A guidebook to the Green economy. Issue 3: Exploring green economy policies and international experience with national strategies*. UNDESA, 2012, 65 pp. [on-line] [cit. 2016-11-20] *http://sustainabledevelopment.un.org/content/documents/738GE%20Publication.pdf*

40. UNEMG, 2011. *Working towards a Balanced and Inclusive Green economy:* A United Nations System-wide Perspective. UN, 2011, 204 pp. [on-line] [cit. 2016-11-20] *http://www.zaragoza.es/contenidos/medioambiente/onu/1209-eng.pdf*

41. UNEP, 2013. *Sustainable Transport and Air Pollution*. UNEP, 2013. [on-line] [cit. 2016-11-20] *http://www.unep.org/resourceefficiency/Policy/ResourceEfficientCities/FocusAreas/SustainableTransportandAirPollution/tabid/101667/Default.aspx*

42. UNEP, 2011. *Towards a Green Economy: Pathway to Sustainable Development and Poverty reduction. A synthesis for Policy Makers*. UNEP Nairobi. [on-line] [cit. 2016-11-20] *http://www.unep.org/greeneconomy/portals/88/documents/ger/GER_synthesis_en.pdf*

43. UNEP, 2011b. *Restoring the natural foundation to sustain a Green Economy. A century-long journey for Ecosystem Management.* UNEP, 2011, 30 pp. [on-line] [cit. 2016-11-20] *https://water.tallyfox.com/documents/restoring-natural-foundation-sustain-green-economy-unep-2011*

44. UNEP, 2009. *Global Green New Deal.* UNEP, 2009. 155 pp. [on-line] [cit. 2016-11-20] *http://www.sefalliance.org/fileadmin/media/sefalliance/docs/Resources/Green_Economy/GGND_Final_Report.pdf*

45. UNEP, 2009. Integrated Environmental Assessment. Training manual. 28 pp.
46. World Bank. 2012. *Inclusive Green Growth: The pathway to Sustainable development*. World Bank, Washington, DC. 2012. [online] [cit. 2016-11-20] *https://openknowledge.worldbank.org/handle/10986/6058*

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List of international organisations dealing with green initiatives

OECD - Organisation for Economic Cooperation and Development
http://www.oecd.org/, http://www.oecd.org/greengrowth/

UN Organisations:
UNEP - United Nations Environment Program
http://www.unep.org
UNEP – EMG – United Nations Environment Program – Environment Management Group *http://www.unemg.org/*
UNDESA – United Nations Department of Economic and Social Affairs
http://www.un.org/en/development/desa/index.html
UNCTAD – United Nations Conference on Trade and Development
http://unctad.org/en/Pages/Home.aspx
FAO – Food and Agriculture Organisation of the United Nations
http://www.fao.org/home/en/
UNESCO – United Nations Educational Scientific and Culture Organisation
http://en.unesco.org/
UN Commission on Sustainable Development
http://sustainabledevelopment.un.org/csd.html
UNSCAP – United Nations Economic and Social Commission for Asia and the Pacific *http://www.unescap.org/*
(Green growth glossary: http://www.greengrowth.org/?q=glossary-page)
UNSDKN – United Nations Sustainable Development Knowledge Platform
http://sustainabledevelopment.un.org/memberstates.html
United Nations Global Compact *http://www.unglobalcompact.org/*

Others:
ANPED – Northern Alliance for Sustainability *http://www.anped.org/*
GRID – Arendal *http://www.grida.no/*
EEA – European Environment Agency *http://www.eea.europa.eu/sk*
GGGI – Global Green Growth Institute *http://gggi.org/*
WRI – World Resources Institute *http://www.wri.org/*
GEC – Green Economy Coalition *http://www.greeneconomycoalition.org/*
ICTSD – International Centre for Trade and Sustainable Development *http://ictsd.org/*
IEA – International Energy Agency *http://www.iea.org/*
IMO – International Maritime Organisation
http://www.imo.org/Pages/home.aspx
ILO – International Labour Organisation *http://www.ilo.org/global/lang--en/index.htm*
ICC – International Chamber of Commerce *http://www.iccwbo.org/about-icc/*
ITUC – International Trade union Confederation *http://www.ituc-csi.org/?lang=en*
PC – Pardee Center *http://www.bu.edu/pardee/about/*
AfDB – African Development Bank *http://www.afdb.org/en/*
WB – World Bank *http://www.worldbank.org/*
WFC – World Fish Center *http://www.worldfishcenter.org/welcome-worldfish*

List of abbreviations

AfDB	African Development Bank
CBD	Convention on Biological Diversity
EAC	Environmental Audit Committee
EAP	Environmental Action Programme
EC	European Commission
EEA	European Environment Agency
EK	European Commission
EPaR	European Parliament and Council of the European Union
EU	European Union
EUROSTAT	Statistical Office of the European Communities
GEC	Green Economy Coalition
GGKP	Green Growth Knowledge Platform
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
GMO	Genetically Modified Organisms
IPBES	Intergovernmental Science-policy Platform on Biodiversity and ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
LCDS	Low Carbon Development Strategy
LEDS	Low Emission Development Strategy
MCED	Ministerial Conference on Environment and Development
OECD	Organisation for Economic Cooperation and Development
REACH	Integrated system for registering, evaluating, authorising and placing restrictions on chemical substances
RES	Renewable Energy Sources
SEEA	System of Environmental and Economic Accounting
UN	United Nations
UNCTAD	United nations conference on Trade and Development
UNDESA	United Nations Department of Economic and Social Affairs
UNEMG	United Nations Environment Management Group
UNEP	United Nations Environment Program
WB	World Bank

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