



Measuring Progress towards an Inclusive
GREEN economy



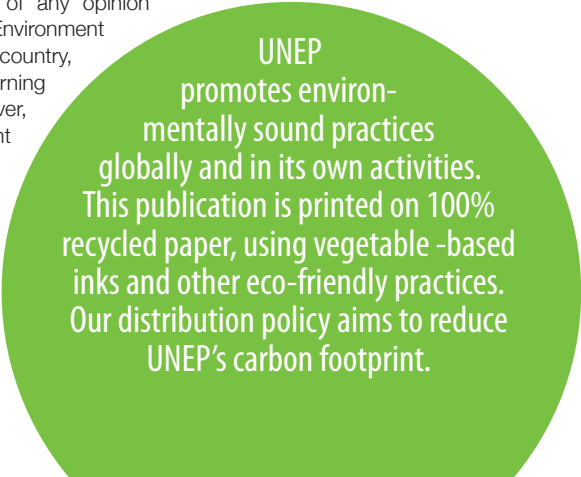
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CONTENTS

List of acronyms and abbreviations	4
Foreword	5
Executive summary	6
I. Introduction	7
II. Indicators for environmental issues and targets.....	9
III. Indicators for green economy policy interventions	12
IV. Indicators for green economy policy impacts on well-being and equity.....	15
4.1 Well-being indicators.....	16
4.2 Social equity indicators.....	18
V. Examples of policy instruments and related indicators	21
5.1 Incentives	21
5.2 Public procurement.....	21
5.3 Regulation	21
5.4 Education, training and skills development	22
VI. Data needs and capacity-building.....	23
VII. Way forward.....	25
References	27

Box

Box 1 : The United Nations System of Environmental-Economic Accounting	14
Box 2 : Developing a Green Economy Index	18
Box 3 : The environmental goods and services sector	21
Box 4 : Challenges of composite indicators	24

Tables

Table 1 : The DPSIR framework	14
Table 2 : Illustrative environmental issues and related indicators	15
Table 3 : Illustrative green economy policy interventions and related indicators.....	17
Table 4 : Examples of well-being and equity.....	20

LIST OF ACRONYMS AND ABBREVIATIONS

Btu	British thermal unit, a traditional unit of energy
DPSIR	Driving force – Pressure – State – Impact – Response
EGSS	Environmental goods and services sector
FAO	Food and Agriculture Organization of the United Nations
GDI	Gender-related Development Index
GDP	Gross Domestic Product
GHG	Greenhouse gas
ha	Hectare
HDI	Human Development Index
ICTs	Information and Communication Technologies
IEA	International Energy Agency
IILS	International Institute for Labour Studies
IISD	International Institute for Sustainable Development
ILO	International Labour Organization
IOE	International Organisation of Employers
IRP	International Resource Panel
ITUC	International Trade Union Confederation
MDGs	Millennium Development Goals
OECD	Organisation for Economic Co-operation and Development
PM₁₀	Particulate matter (smaller than 10 microns)
R&D	Research and development
SEEA	United Nations System of Environmental-Economic Accounting
SNA	System of National Accounts
UNCSD	United Nations Commission on Sustainable Development
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNSD	United Nations Statistics Division

FOREWORD

The 2012 United Nations Conference on Sustainable Development (UNCSD), or “Rio+20 Summit”, confirmed that if countries, communities and businesses are seriously committed to moving towards a green economy to achieve sustainable development and poverty eradication, then they should consider establishing new measures and metrics that not only reflect these goals, but also inspire action.

Green economy indicators are useful tools for informing policy decisions. They also provide a mirror on the journey to an environmentally stable, economically sound and equitable society. That said, there is no single destination on this journey. There are many pathways depending on a country’s endowments, priorities and policies.

While there are already many indicators in existence today that can help measure progress towards a green economy, the United Nations Statistical Commission has been asked by the Summit to work with UN bodies, including UNEP and other organizations, to identify new approaches. This stream of work is underway.

This publication intends to foster a better understanding and utilization of green economy indicators. “Measuring Progress Towards a Green Economy” is a practical guidebook that looks at how indicators can be used in a way that specifically supports and tracks green economy policies.

For UNEP, it is natural to take environmental issues as the entry point for moving the world onto a green economy trajectory. Environmental indicators reflect the critical issues that must be addressed as well as help identify key areas where policy interventions are needed to achieve low carbon, resource efficient, inclusive development.

UNEP hopes that this publication will assist policymakers and other stakeholders realize how indicators can help them advance their green economy agendas, and we look forward to contributing further to this global effort.

Achim Steiner

Under-Secretary-General of the United Nations
and Executive Director of UNEP

EXECUTIVE SUMMARY

For the United Nations Environment Programme (UNEP), a green economy is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. Various indicators are already available to reflect these different aspects and illustrate the extent to which progress has been made.

A green economy is also considered as a vehicle to deliver sustainable development rather than a destination in itself. Accordingly, indicators are useful measures in the context of making green economy policies aimed at achieving sustainable development. Governments may choose environmental, economic or social issues as an entry point to adopting a green economy approach. For UNEP, however, it is natural to start from an environmental perspective.

Indicators are needed to bring attention to priority issues, set targets and track progress. From a global point of view, broad indicators could cover the areas of climate change, ecosystem management, resource efficiency, and chemicals and waste management. Within each of these areas, a few leading indicators could be identified. Under climate change, for example, the leading indicators could include carbon emissions, the share of renewable energy in the power supply and energy consumption per capita.

Once targets are established, policies are needed to create incentives and boundaries to achieve the desired outcome. In the green economy approach, a core policy instrument is the shift in investment towards green activities, supported by other enabling conditions such as fiscal reform, pricing policy, government procurement and training for green skills. Indicators are needed to show and track these policy inputs. Under fiscal policy, for example, indicators could show changes in subsidy levels for fossil fuels, water and fisheries.

Policies in a green economy approach are expected to not only address environmental issues, but also contribute to human well-being and social equity.

Major components of well-being and social equity in connection with green economy policy interventions may include: employment, the growth of the environmental goods and services sector (EGSS), total wealth including human capital, natural capital and produced capital, access to key resources such as clean energy, water and sanitation, and health. Investing in clean technology, for example, is expected to generate jobs and income from the growth of the EGSS. Investing in ecosystem restoration is expected to enhance the value of natural capital, while training in green skills will help build human capital, adding to the total wealth of nations.

For many countries, notably those in developing regions, it will be necessary to enhance capacity to collect and evaluate data in order to use indicators that support green economy policymaking. Technical assistance and capacity-building will be required to address the special needs of these countries and to support the development of the necessary information systems. UNEP is committed to meeting this demand for capacity development through its ongoing research and advisory services.

I. Introduction

In October 2008, UNEP launched a Green Economy Initiative consisting of research, partnerships and advisory services for governments. The objective is to motivate policymakers to support increased investments in environmentally significant sectors such as renewable energy, clean technologies, energy-efficient buildings, public transport, waste management and recycling, and sustainable management of land, water, forests, fisheries and eco-tourism. To achieve this objective, the initiative focuses on demonstrating the contributions that green investments can make to the growth of income and jobs, and to improved access by the poor to clean energy, safe water and sanitation, apart from reducing environmental pressure.

As many countries are now embracing the green economy approach and designing related strategies, policies and investments, the issue of measurement has arisen. How can countries measure a green economy? This answer lies in part in the question, which is what is a green economy?

According to UNEP's definition of green economy, which includes increased human well-being and social equity, as well as reduced environmental risks and ecological scarcities, these factors need to be measured in a more comprehensive manner. There are already a number of existing indicators that cover these areas. These indicators include, but are not limited to, the indicators of the Millennium Development Goals (MDGs), the set of Sustainable Development Indicators, the Human Development Index (HDI), biophysical capacity, ecological footprints, greenhouse gas (GHG) emissions measures, ambient air and water pollution indicators, measures of the stocks of natural capital, indicators of natural resource and energy productivity.

As illustrated in a United Nations inter-agency report on green economy¹ and in the inter-governmental negotiations of the Rio+20 outcome document, there is also a growing consensus that a green economy should be a means to achieving sustainable development and

poverty eradication. Therefore, the measurement of a green economy need not only focus on the state of a green economy and how it is reached; it can also focus on the way a green economy as an approach is applied in policymaking processes to deliver on this global agenda.

A major operational element of a green economy approach is its emphasis on shifting policies and public and private investments towards clean technologies, and strengthening ecosystem services, the natural resource base, education, health services and institutions to ensure social protection and equity. These policies and investments are also expected to generate income and jobs. The corresponding investment, income and job indicators, as well as policies such as subsidies and taxes, are largely available to capture such operational dimensions of a green economy.

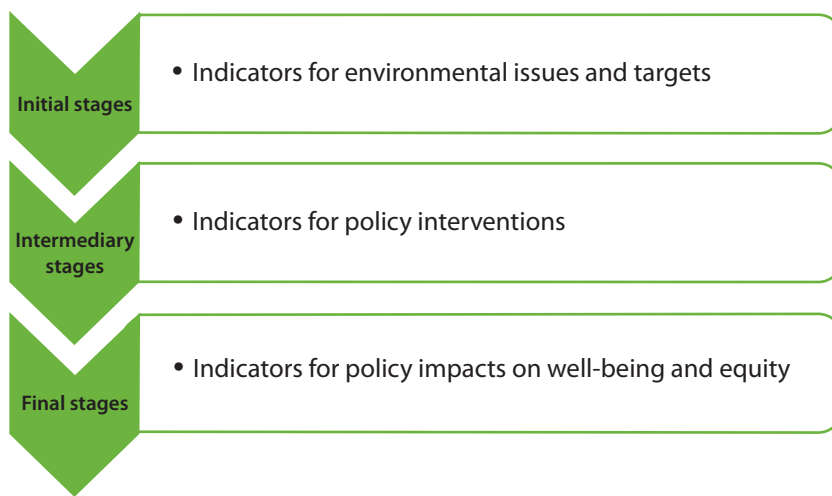
This booklet introduces a framework for the use of indicators in developing and tracking green economy policies as illustrated in Figure 1. The objective is to provide guidance on the role of indicators in major stages of policymaking, using environmental issues as an illustrative entry point. Section 2 introduces the indicators for environmental issues and targets. Section 3 discusses indicators for environmental policy interventions. Section 4 focuses on indicators that show the impacts of policy interventions on well-being and social equity beyond the environmental realm. Examples of policies and the indicators that can be utilized to evaluate them are presented in Section 5. Data needs and capacity-building issues are highlighted in Section 6, and the final section points to the next steps that could facilitate the use of this framework.

Although the framework proposed in this brochure could be generally applied to countries in different regions and at different stages of development, the indicators illustrated here could and should be customized by all governments to meet their respective needs when embarking on a green economy approach. As each

¹ United Nations Environment Management Group, 2011.

country faces unique issues that are heavily influenced by local factors, the elaboration of how investments are to be undertaken, directed or stimulated needs to be tailored to local political, economic and institutional circumstances. Similarly, broad policy outcomes affecting well-being and social equity need to be defined and measured according to the local socio-economic and environmental context.

Figure 1: Indicators at different stages of green economy policies



II. Indicators for environmental issues and targets

Policymakers respond to priority issues, problems and opportunities that cover a range of environmental, economic and social realms, along with their interconnections. Indicators are a tool to identify, prioritize and track issues. They provide information on the historical and current state of the system, and highlight trends that can shed light on causality to better detect key drivers and pressures. The issue of climate change, for example, is reflected in the average temperature increase over the years, changes in precipitation patterns and increasing sea levels; its drivers are reflected in carbon concentrations and emissions.

Indicators identifying underlying causes are often used to analyse policy issues. In the case of climate change, a core indicator is the concentration of carbon dioxide in the atmosphere, which is in turn simultaneously influenced by its sources (e.g., burning of fossil fuels, energy consumption) and carbon sinks (e.g., forests, or biomass in general, and soils). For an issue to become a priority in a policymaking process, it needs to be properly explained and substantiated. Bundling it with other policy issues is also helpful so that various issues can be addressed through a single gateway: (a) helping policymakers reduce the number of competing policy issues (i.e. the government capacity to address policy issues is not unlimited) and (b) helping create synergy in policy formulation and evaluation (i.e. possibly solving two, or more, problems with one intervention).

From the perspective of UNEP, which has the mandate to lead on global environmental issues, the starting point to address a green economy approach is the environment. An economy cannot be green without addressing environmental issues in their various manifestations at different geographic levels. Any organization or government, however, may well choose economic or social issues as its entry point, which is fully consistent with the green economy approach. The most fundamental requirement of this approach is that policies addressing

sustainability issues be designed in a way that generates co-benefits across the three domains of sustainable development.

Most, if not all, environmental issues have economic causes. A major framework for representing and quantifying the relationship between the economy and the environment is the United Nations System of Environmental-Economic Accounting (SEEA)² (see Box 1). The Driving force – Pressure – State – Impact – Response (DPSIR) framework originally developed by the European Environment Agency, the Organisation for Economic Co-operation and Development (OECD) and UNCSD is another way of relating environmental impacts to economic activity (see Table 1 and Figure 2), and is also adopted by UNEP for the identification and categorization of Sustainable Consumption and Production indicators.³ It provides a step-by-step description of the causal chain between economic activity and impacts, such as loss of biodiversity, ecosystem degradation, diminished human welfare and well-being.

A report by the International Resource Panel (IRP),⁴ for example, reviews and summarizes scientific work relevant to the environmental impacts of resource consumption and economic activities using the DPSIR framework as a basis. It identifies two major drivers of environmental pressure:

1. Agriculture and food consumption. These are identified as two of the most important drivers of environmental pressure, especially due to habitat change, climate change, water use and toxic emissions.
2. The use of fossil energy carriers for heating, transportation, metal refining and the production of manufactured goods. The use of these energy sources causes a wide range of emissions-related impacts.

² United Nations Statistics Division, 2012.

³ UNEP, 2008.

⁴ UNEP, 2010.

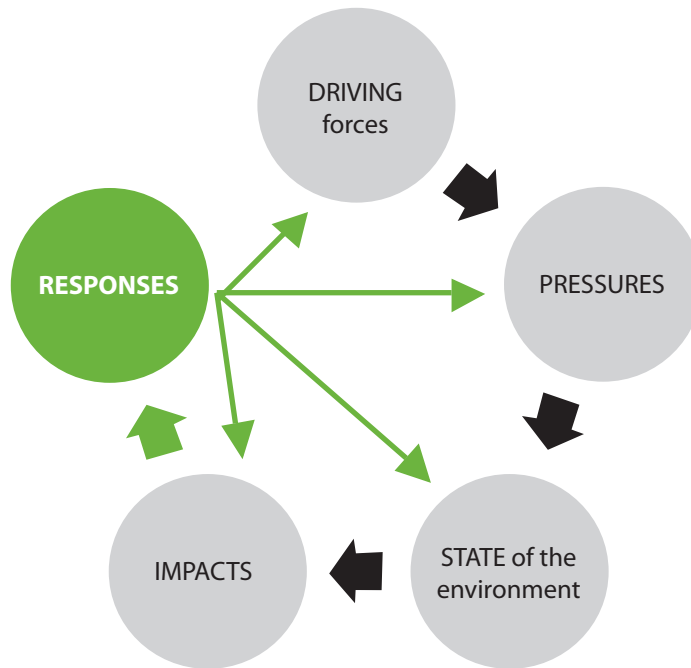
Box 1. The United Nations System of Environmental-Economic Accounting

The SEEA sets the statistical standards for collecting and integrating economic and environmental data for analysis of the green economy and sustainability. The SEEA does not propose any single headline indicator; rather it offers a multi-purpose system - with many different analytical applications - that generates a range of indicators. The SEEA provides an agreed system for components, such as material flow accounts, input-output tables, as well as land and water use accounts, all of which provide the basis for measuring indicators such as energy and resource use at sectoral and economy-wide scales. The SEEA also provides a framework to integrate information from different sources and on the basis of which consistent indicators - comparable across countries and over time - can be derived and disseminated.

Table 1: The DPSIR framework

Group	Indicators	Assessment
Driving forces	Energy and food demand, resulting from population and income, driving consumption	Indicators of energy and food demand, on a per capita basis or as a share of economic activity - if not in absolute terms - should be monitored. Policy interventions would reduce consumption through investments in resource efficiency.
Pressures	Natural resource use, such as fossil fuels, land and water, and emissions	Indicators for the consumption of natural resources (e.g., fossil fuels and land) should decline as a result of investment in resource efficiency on the demand side, as well as due to the savings (i.e., recycling and reuse of waste) in the production processes. This includes agriculture, where interventions aimed at curbing pre-harvest loss also increase yields through ecological practices.
State of the environment	Natural resource stocks, influenced by inflows (natural growth or replenishment) and outflows (production)	Indicators for natural resource stocks (e.g., fossil fuels, fisheries and forestland) should be monitored as reduced consumption (due to lowered demand and reduced losses) will affect their depletion and health.
Environmental impact	Impact of pressures, such as climate change (driven by GHG emission concentrations in the atmosphere) and natural resource depletion	In a green economy, environmental impact indicators will show progress at several levels: avoiding a decline in ecosystem services, supporting the growth of ecosystem goods and guaranteeing more sustainable production, or allowing reserves for future generations. As an example, greater forestlands would increase carbon sequestration, and a decreased use of fossil fuels would reduce emissions, mitigating the concentration of CO ₂ in the atmosphere.

Figure 2 : A graphical representation of the DPSIR framework



When policymakers decide to address certain issues, they need to set targets for the formulation of policy options. For example, if the issue is air quality, then the target could be to reduce pollution from particulate matter (PM₁₀). If the issue is climate change mitigation, indicators for carbon emissions and their key drivers (e.g., fossil fuel consumption and deforestation) can be used to set a specific emissions reduction target

(e.g., per cent reduction of GHG compared to 1990 levels as was done under the Kyoto Protocol). Table 2 provides an illustration of some of the major environmental issues and related indicators that could help formulate policies to address such issues, and covers a variety of themes, including climate change mitigation and adaptation as well as sustainable consumption and production.

Table 2: Illustrative environmental issues and related indicators

Issues	Indicators
Climate change	<ul style="list-style-type: none"> Carbon emissions (ton/year) Renewable energy (share of power supply) (%) Energy consumption per capita (Btu/person)
Ecosystem management	<ul style="list-style-type: none"> Forestland (ha) Water stress (%) Land and marine conservation area (ha)
Resource efficiency	<ul style="list-style-type: none"> Energy productivity (Btu/USD) Material productivity (ton/USD) Water productivity (m³/USD) CO₂ productivity (ton/USD)
Chemicals and waste management	<ul style="list-style-type: none"> Waste collection (%) Waste recycling and reuse (%) Waste generation (ton/year) or landfill area (ha)

III. Indicators for green economy policy interventions

In the green economy approach, policy interventions focus on ways to change the flow of investments to address issues and achieve targets aimed at reducing environmental degradation and improving human well-being and social equity. For example, the reform of fossil fuel subsidies (to be indicated by the percentage reduction over time, among other possibilities) is one option that can induce investment in renewable energy, while achieving the policy target of reducing GHG emissions. Another option is to increase public investment and leverage private investment in renewable energy (to be indicated by the level of investment). Table 3 provides some examples of green economy policy interventions and related indicators.

For example, climate change mitigation policy interventions include the use of demand and supply instruments in the energy sector to limit GHG emissions. On the demand side, growth in energy consumption could be curbed through energy conservation (e.g., behavioural change) or by investing in energy efficiency (e.g., installing more efficient appliances and/or light bulbs). On the supply side, renewable energy could be used for power generation or more efficient thermal power plants could be built. Indicators can be used to depict and assess the current state of affairs (e.g., how much renewable energy is being used for power

generation and at what cost), and the extent to which these interventions can effectively contribute to mitigating the issue (e.g., how much CO₂ emissions are reduced by investing in renewable energy for power generation, and at what cost relative to other possible interventions). It should be noted, however, that synergies among different issues exist and policy interventions can be designed to achieve multiple benefits. For example, investing in renewable energy could be designed to give a particular emphasis to rural access to renewable energy, which can contribute to poverty eradication and a reduction in carbon emissions.

A major advantage of using indicators representing policy interventions is the support they provide in estimating and assessing the adequacy of the potential cost and performance of various policy options that could be used to solve the issues at hand. Costs relate to investment needed to achieve desired targets and their allocation across key sectors and actors (e.g., public and private sectors) in the economy. Thus, it is crucial to evaluate the required investment under an investment strategy (i.e. capital investment), particularly when a government intends to promote private investment through the implementation of subsidies or new regulations (e.g., mandates). Furthermore, the performance of the investment has to be carefully monitored and assessed, taking into account

Table 3: Illustrative green economy policy interventions and related indicators

Policy	Indicators
Green investment	<ul style="list-style-type: none"> R&D investment (% of GDP) EGSS investment (USD/year)
Green fiscal reform	<ul style="list-style-type: none"> Fossil fuel, water and fishery subsidies (USD or %) Fossil fuel taxation (USD or %) Renewable energy incentive (USD or %)
Pricing externalities and valuing ecosystem service	<ul style="list-style-type: none"> Carbon price (USD/ton) Value of ecosystem services (e.g., water provision)
Green procurement	<ul style="list-style-type: none"> Expenditure in sustainable procurement (USD/year and %) CO₂ and material productivity of government operations (ton/USD)
Green job skill training	<ul style="list-style-type: none"> Training expenditure (USD/year and % of GDP) Number of people trained (person/year)

the potential to deliver (e.g., the maximum theoretical energy savings brought about by a new technology, as well as its potential uptake in the market). Finally, the net cost/savings of the intervention should be estimated, comparing upfront investment and benefits (including avoided costs) accrued over time. The use of simulation models for integrated analysis could support the assessment of expected impacts and results; it could also carry out a quantitative risk and uncertainty analysis.⁵

A cost-benefit analysis is necessary to evaluate the net investment required to reach set targets, by actor or sector or across the whole economy. This analysis would generally compare investment and benefits (including avoided costs), depending on the issue to be solved. Using the climate change mitigation policy example, the adoption of energy-efficient technology requires upfront investments, but will reduce energy consumption and expenditure while potentially creating new jobs. Benefits and avoided costs can be compared using historical and current performance indicators with the aim to assess whether the investment is economical (i.e. it generates positive returns), and how it can be shared between the public and private sector, and other main actors impacted by the intervention.

However, at the macroeconomic level, the microeconomic concept of cost needs to be correctly understood. At the economy-wide level, a dollar spent is a dollar earned;

what needs to be considered is where to spend the dollar so that it generates the highest return in environmental, social and economic terms. The green economy approach is about identifying and investing those areas where the highest multiple benefits can be generated.

Once the investment required is estimated, policymakers can design options to allocate the amount across key economic sectors. Options include capital investment, incentives and regulations. Indicators can be used to evaluate the best policy option (or mix of policies) that would not excessively impact a single actor (e.g., households). For instance, regulations (e.g., mandates), in the absence of incentives, imply that the private sector would be required to place all the investment needed to comply with the law (e.g., a mandate for the share of renewable energy in power generation, or standards for vehicle fuel efficiency). Household investment and disposable income indicators could be used to evaluate whether the new policy would require a considerable reallocation of resources (possibly reducing consumption and savings) that could lead to negative economic impacts. In such a case, incentives could be introduced by the government. The effectiveness of such an intervention could be evaluated and monitored by using indicators for government accounts, particularly those related to annual deficit and debt.

Box 2. Developing a Green Economy Index

The Global Green Economy Index (GGEI) is a synthetic indicator that informs on national and city level green economies, in terms of performances and perceptions. The methodology comprises an assessment based on the opinions of expert practitioners on green economy at the global level. These perceptions are compared to an objective, data-based, national green economy performance index. Both measures are conducted along four primary dimensions: leadership, domestic policy, cleantech investment and green tourism. The coverage of the index in terms of green economy sectors and countries may be improved. (See also Box 4 for more information on the challenges of creating and using composite indicators.)

Other green economy related indexes are provided by the NASDAQ OMX Group. This company offers a set of green economy indexes tracking environmental-economic activities for different sectors. The core index of this family is the all-inclusive NASDAQ OMX Green Economy Global Benchmark Index (QGREEN). It measures the performance of stocks related to economic activities in areas such as pollution mitigation, renewable energy generation, energy efficiency and advanced materials. The indexes cover a large number of environmental-economic activities. Their main target is investors.

⁵ Integrated simulation models, such as Threshold T21 developed by the Millennium Institute and used for the analysis of the impact of green economy investment in the Green Economy Report (UNEP, 2011), can support a cross-sectoral assessment of the costs and impacts of green economy interventions – concretely informing policy formulation and evaluation.

IV. Indicators for green economy policy impacts on well-being and equity

At the policy formulation stage, different policy options need to be presented with their respective expected outcomes across the environmental, social and economic domains. The indicators for these outcomes are additional to the primary targets associated with the initial issues identified. For example, if the policy target is reducing CO₂ emissions per unit of GDP by a certain percentage over some period and one of the policy options is to invest one per cent of GDP in solar and wind energy technologies each year for the next 10 years, then the projected outcome indicators include not only the emission reduction target, but also other effects that can result from this intervention, such as changes to income and jobs. If the green economy is accepted as an approach for sustainable development and poverty eradication, then the existing framework for sustainable development indicators and indicators for the MDGs provide a sound basis for the broad outcome indicators in connection with green economy policy interventions.⁶

Consistent with the green economy strategy, which is cross-sectoral by nature, the estimation of the impact of policy interventions on well-being and equity should originate from integrated monitoring and

evaluation processes. Given that limited information is available on the broader impact of green economy interventions beforehand, the use of an integrated simulation model can effectively inform decision-making by forecasting the possible impact of various policy interventions, under varying assumptions, on well-being and human development. In this respect, a cross-sectoral analysis that fully incorporates social, economic and environmental indicators, and the relations existing among them (characterized by feedbacks, delays and non-linearity) would be needed in order to provide a coherent evaluation of impacts (including synergies and side effects) across a variety of sectors and indicators.

This booklet takes environmental issues as an illustrative entry point and focuses on policy interventions that primarily address them, while ensuring positive effects on human well-being and social equity apart from environmental improvement. Related indicators therefore focus on well-being and equity. If the entry point focuses on economic or social issues, then the composition of policy impacts may vary and could focus on environmental improvement and social equity or environmental improvement and economic well-being.

⁶ The Rio+20 outcome document, *The future we want* (UN 2012, p. 43) states that: "We further recognize the importance and utility of a set of sustainable development goals (SDGs), which are based on Agenda 21 and Johannesburg Plan of Implementation (...) They should be coherent with and integrated in the United Nations Development Agenda beyond 2015, thus contributing to the achievement of sustainable development and serving as a driver for implementation and mainstreaming of sustainable development in the United Nations system as a whole. The development of these goals should not divert focus or effort from the achievement of the Millennium Development Goals".

Table 4: Examples of well-being and equity

Well-being and equity	Indicators
Employment	<ul style="list-style-type: none"> • Construction (person, %) • Operation and management (person, %) • Income generated (USD/year) • Gini coefficient⁷
EGSS performance ⁸	<ul style="list-style-type: none"> • Value added (USD/year) • Employment (jobs) • CO₂ and material productivity (e.g., USD/ton)
Total wealth	<ul style="list-style-type: none"> • Value of natural resource stocks (USD) • Net annual value addition/removal (USD/year) • Literacy rate (%)
Access to resources	<ul style="list-style-type: none"> • Access to modern energy (%) • Access to water (%) • Access to sanitation (%) • Access to health care (%)
Health	<ul style="list-style-type: none"> • Level of harmful chemicals in drinking water (g/litre) • Number of people hospitalized due to air pollution (person) • Road traffic fatalities per 100 000 inhabitants (transport related)

4.1 Well-being indicators

Economic indicators describing a significant part of human well-being are crucial in the green economy approach. It is expected that the shifting of investments towards green activities would lead to capital accumulation and employment creation (or substitution, often generating net gains), stimulating economic growth through more sustainable production and consumption.⁹ It is therefore important to identify economic indicators to assess the effectiveness and benefits of the green economy approach and its potential repercussions on society and the environment.

An economy is normally measured using a variety of indicators, such as those included in the System of

National Accounts (SNA),¹⁰ complemented by the Social Accounting Matrix.¹¹ These frameworks serve to evaluate monetary flows among the key sectors of the economy and are frequently used to support the definition of fiscal policies and budgetary allocation. On the other hand, the SNA should be further disaggregated to analyse the performance of the environmental goods and services sector (EGSS).¹² This is needed because EGSS businesses have a limited impact on the environment, and therefore actively support the transition to a resource efficient, low-carbon economy that preserves and values natural capital. The growth of this sector would therefore improve the well-being of the population, and primarily that of the poor who rely heavily on ecosystems for their subsistence. Furthermore, any new employment

⁷ The Gini coefficient (for income) measures inequality in the distribution of income for a given society. The index takes values between 0 and 1. The greater this value is the greater is the income concentration and the inequality level. A high level of unemployment is generally associated with high inequalities in the society.

⁸ EGSS performance reduces environmental pressure, which would support improvement in human well-being.

⁹ UNEP, 2011.

¹⁰ European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations, World Bank, 2009.

¹¹ Pyatt and Round, 1985.

¹² United Nations Statistics Division, 2003.

created in the EGSS through a green economy strategy should be good and decent work, thereby improving the quality of life of workers. A starting point for this analysis

is provided by the SEEA, which already incorporates the EGSS.

Box 3. The environmental goods and services sector

Eurostat has developed a classification of EGSS within the context of the system of national accounts. This classification system, for which a handbook¹³ has already been formulated, offers an approach to defining new green sectors, including associated investments and employment. It has been considered and even tested by member states.

The sector consists of a heterogeneous set of producers of goods and services aimed at the protection of the environment and the management of natural resources. Environmental goods and services are those products that are produced for the main purpose of:

- Preventing, limiting, minimizing or correcting environmental damage to water, air and soil, as well as problems related to waste, noise, ecosystems, pollution, degradation and natural resource depletion.
- Carrying out other activities such as measurement and monitoring, control, research and development, education, training, and information and communication related to environmental protection and resource management.

Environmental goods and services reduce pressure on the environment. They can also create new jobs and are economically advantageous for businesses.

Going beyond the EGSS, employment in general is one of many well-being indicators of a green economy, especially if it is stimulated by green investments and policy interventions. More specifically, green jobs are of particular interest in this context. According to the International Labour Organization's (ILO) International Institute for Labour Studies (IILS): "Green jobs are those jobs maintained or created in the transition process towards a green economy that are either provided by low-carbon intensive industries (enterprises) or by industries (enterprises) whose primary output function is to greening economy [sic]"¹⁴.

Since the transition to a green economy will have important implications for both the education of new

entrants to the job market and the building of the expertise, skills and capacity of existing employees through training and other programmes, it is important to correctly measure and monitor the impact of green investments on employment. Research on green jobs has shown that there are four ways in which employment is likely to be affected as economies become oriented toward sustainability¹⁵:

1. In some cases, additional jobs will be created – as in the manufacturing of pollution-control devices being added to existing production equipment.
2. Some employment will be substituted – as in shifting from fossil fuels to renewables, or landfills and waste incineration to recycling.

¹³ Eurostat, 2009.

¹⁴ IILS, 2011.

¹⁵ UNEP et al, 2008.

3. Certain jobs may be eliminated without direct replacement – as when packaging materials are discouraged or banned and their production discontinued.
4. Many existing jobs (especially plumbers, electricians, metal workers and construction workers) will simply be transformed and redefined as day-to-day skill sets, work methods and profiles are greened.

Well-being indicators therefore should be developed to capture the four elements above, including the nature of the employment created, lost and transformed.

However, jobs in low-carbon or green industries are not necessarily safe and healthy, nor do they come with adequate remuneration and social coverage. The dismantling and recycling of electronic parts by workers under conditions that do not meet recognized occupational health and safety standards would not qualify as green. The Green Jobs Report, jointly published by UNEP, ILO, the International Trade Union Confederation (ITUC) and the International Organization of Employers (IOE), highlights that in addition to environmental considerations, green jobs also need to reflect “decent work”.¹⁶

Decent work is understood to:

- Be productive and secure;
- Ensure respect of labour rights;
- Provide an adequate income;
- Offer social protection; and
- Include social dialogue, union freedom, collective bargaining and participation.

4.2 Social equity indicators

Social equity indicators refer to overall measures of human and social development, including dimensions such as poverty alleviation, equity, social inclusiveness and inclusive wealth.¹⁷ They include a wide range of proposed sub-indicators, mostly to complement GDP with social, environmental and more detailed economic criteria. It should be empirically measurable and demonstrable that a green economy transition contributes to reducing poverty and enhancing social equality. Linking the pillars of sustainability suggests the use of measures for inclusive wealth.

The process of greening the economy can have several direct and indirect positive impacts on human progress and social equity. These impacts - some of which are already measured and monitored by the MDGs - include:

Direct social impact of interventions

- Improved access to energy and water (clean and potable), and improved sanitation. These can be achieved through efficiency measures that reduce the consumption of natural resources, creating the conditions for more sustainable consumption, both in terms of availability and quality (e.g., cleaner).
- Improved nutrition. Several studies indicate that agricultural yields would grow under ecological agriculture practices,¹⁸ increasing production and food available for consumption, or potentially reducing land use and lowering pre-harvest losses.
- Increased employment, resulting in reduced poverty. Employment in emerging sectors is often higher than in consolidated ones, and natural capital conservation requires a dedicated and skilled

¹⁶ UNEP et al., 2008.

¹⁷ Inclusive wealth, as developed in Arrow et al. 2003, is where a nation can be seen as achieving sustainable development if social welfare (intergenerational well-being) is at least maintained. Social welfare is the aggregation of present value of all human well-being, current and future (including soil, water, biodiversity, buildings, education, etc.). The best available proxy for measuring social welfare is the measurement of the ‘value’ of all capital stocks (human, manufactured and natural). The sum of an economy’s capital stocks, weighted by their shadow prices for each capital component, is a measure of the country’s inclusive wealth. Therefore, a country is achieving sustainable development if its measure of inclusive wealth is non-declining. Hargroves, K. and M. Smith (2005).

¹⁸ Pretty, J. 2006.

workforce. This is the case with energy supply (if power capacity for renewables is produced domestically) and with ecological agriculture practices, where labor intensity is higher (+30%)¹⁹ than conventional methods and generates a proportionally higher yield (between 75% and 84%).²⁰

Indirect social impact of interventions

- Reduced health problems and mortality due to decreased use of fossil fuels for cooking in environments with low ventilation, and the shift to public transport modes, as well as walking and cycling.
- Higher quality education and business-related skills, some of which would also contribute to improved Human Development Index (HDI) rankings and in many cases potentially better Gender-related Development Index (GDI) rankings as well.
- On top of HDI and GDI, several other aggregate indicators (e.g., MDGs) would improve under a green economy scenario. For instance, the conservation (or reduced use) of natural resource stocks would ensure that adjusted net savings would be higher.²¹

- The overall improved performance on social, economic and environmental indicators would lift the MDG indicators and other aggregate measures, such as the Genuine Progress Indicator.

It is worth noting that some of these indicators may be affected not only by direct and indirect impacts, but also by induced impacts of green economy interventions. These include higher - or more resilient and sustainable - economic growth, driven by lowered expenditure for the use of energy and water, generating more resources for the government (through taxation, resulting in higher budgetary expenditure) and households (increasing income and spending and/or investment and/or savings). However, it is important to take account of the “rebound effect”. Evidence and studies suggest that higher GDP, income and access to water and energy would result in higher natural resource consumption intensity, thus potentially off-setting gains in resource productivity.

Due to the many cross-sectoral impacts of green economy interventions, both direct and indirect, the use of a set of indicators is preferred to a composite index, especially concerning the evaluation of effects on well-being and equity. Box 4 summarizes the main challenges related to the use of a composite indicator, emphasizing the difficulty of objectively defining a rating system for the aggregate index and accounting for the interlinkages among key indicators.

¹⁹ Zieseme, J. 2007; Khan, Z. R. et al., 2008.

²⁰ Pretty, J. 2006.

²¹ Adjusted net savings are derived from the standard national accounting measure of gross saving by making four adjustments: (i) consumption of fixed capital is deducted to obtain net national saving; (ii) current public expenditure on education is added to account for investment in human capital; (iii) estimates of the depletion of a variety of natural resources are deducted to reflect the decline in asset values associated with extraction and depletion; (iv) deductions are made for damages from carbon dioxide and particulate emissions (World Bank, 2002).

Box 4. Challenges of composite indicators

Due to the complexity of the socio-economic and environmental systems under analysis, populated by a variety of cross-sectoral relations and feedbacks, the assessment of progress towards sustainability with a single metric is considerably challenging. Attempting to do so implies the risk to send misleading policy messages, particularly if the composite indicators and indices are poorly constructed or misinterpreted. Since aggregated indices and rating systems are prone to subjectivity despite the relative objectivity of the methods employed in assessing sustainability, the existence of a value system is a prerequisite of any approach to measuring progress towards sustainability. However, the difficulty in either finding an absolute measure of value or obtaining consensus on which value system to use creates a controversy that so far has eluded resolution. Furthermore, the models to be used should also capture interlinkages among indicators and phenomena considered. As a result, methodological pluralism coupled with stakeholder participation seems a safer and more objective way forward.²²

If a particular policy option is adopted, the associated outcome indicators will be used to monitor policy implementation and for evaluation at certain intervals or after the policy has been implemented. The differences between the projected outcomes and actual performance would inform future policy processes.

²² Hak, T., 2011.

V. Examples of policy instruments and related indicators

To support and guide the transition to a green economy, public policies play a decisive role. This may take the form of incentives, regulation, or information and education. This section aims to highlight some of these policy options and related indicators.

5.1 Incentives

Governments can guide the behaviour of market participants through price signals by using economic incentive instruments such as pollution charge systems (taxes and fees), tradable permits, deposit refund systems, reduction of market barriers and phasing out of harmful subsidies. For example, by implementing feed-in tariffs for independent small producers of renewable energy, or reducing costs in mature sectors through incentives such as in the case of waste recycling and material reuse in manufacturing, a government can encourage the transition to a green economy. Indicators can be used to evaluate and monitor the existence, as well as the outcomes of policy incentives. These indicators include, for instance, share of taxes in end-use prices in the energy sector, production cost and market prices of certain goods and services (kept artificially low and potentially increasing), and their consumption (potentially decreasing if prices increase), as well as government account figures (for the foreseen reduction in public expenditure).

5.2 Public procurement

Governments can also focus on how their existing spending is being used and foster sustainable public procurement.²³ Related indicators include public expenditure on sustainable procurement. This may impact revenues and profits in several sectors, especially locally, as well as employment creation and reduced expenditures (such as on transport of goods

and materials by contracting local producers, but also costs for the operation and management of buildings through efficiency improvements).

Among others, sustainable public procurement impacts energy efficiency measures (e.g., double glazing and building insulation standards) and renewable energy supply (e.g., solar water heating and photovoltaic panels on rooftops). Sustainable procurement is also extending to the use of products and materials (ranging from wood-based materials to metals employed in construction) produced domestically and/or sustainably (e.g., with a low-carbon profile).

5.3 Regulation

Regulatory mechanisms are an important tool in environmental policy. They can be effective in sustainable management of forest, land, cleaner water and air. For instance, a city may decide to achieve a certain level of environmental protection by adopting air pollution, wastewater treatment or noise-level standard. It may also involve compliance of new factories or new residential buildings to certain energy-efficiency standards. When regulatory tools are in place, they need to be monitored and well adjusted in order to achieve the policy objective at the least possible expense to the overall functioning of the economy. Governments can apply such regulatory measures, collect related statistics and compile indicators, although in general, information on regulation is of a qualitative nature and thus not always easy to evaluate.

5.4 Education, training and skills development

Transforming an economy into one that is resource-efficient and that produces optimal socio-economic results requires targeted policies and investments at

²³ Procurement of goods and services by governments and state-owned enterprises usually represents a large proportion of total public spending. Analysis in 2001 estimated that OECD countries spent between 13 and 20 per cent of their GDP on procurement of such goods and services. Although less data is available regarding procurement in developing countries, literature suggests similar and, in some cases, higher percentages (IISD, 2008).

levels ranging from society as a whole to individual citizens. For individuals, these would include targeting their ability to be employed productively and meaningfully in the economy and to adopt environmentally friendly behaviour in daily life. The use of quantitative indicators is important to understand the social dimensions of a green economy and the potential impacts that educational interventions can have on poverty and well-being. Social impact, vulnerability and development opportunity metrics would be needed to identify eventual contributors to, and winners and losers of a green economy transition.²⁴

²⁴ In a green economy scenario, the identification of winners and losers also depends on the choice of policies and related funding sources (e.g., public versus private), which may lead to synergies or may create side effects in certain contexts. For instance, a policy that relies excessively on households' funding may result in a decline in consumption and private investment. This in turn may have detrimental effects on GDP and government revenues, further requiring households' support to avoid a public deficit increase.

VI. Data needs and capacity building

The development of a framework for indicators to inform all the key steps of green economy policymaking poses an important challenge: the needs and capacities of different countries, particularly developing countries, in collecting and evaluating the required data and developing appropriate indicators.

Technical assistance and capacity-building will be required in order to address the special needs of these countries and to support the development of the necessary information systems. Developing and implementing basic monitoring and data collection systems, be it statistical or based on remote sensing or other techniques, is essential. Improved access to information and communication technologies (ICTs) by these countries in the past decade has provided a unique platform and window of opportunity to initiate concrete actions in this respect.²⁵

For example, as highlighted by the IRP, most countries use different approaches and data classification systems when defining and evaluating the impact of economic activities on the environment. In all areas (e.g., production, consumption, material flows), there is a significant opportunity to improve data and information by regularly providing analysis and better data in an internationally consistent format. This would make it much easier to monitor progress, create cross-country and cross-sector analyses, and identify in more detail the economic drivers that are responsible for impacts and the factors that determine the success of policies.

Comprehensive and harmonized data across countries and sectors are often unavailable. On the other hand, there are various international harmonized databases

providing pieces of the overall picture, such as the International Energy Agency (IEA)'s energy database,²⁶ the Food and Agriculture Organization of the United Nations (FAO) databases on land use, water use and agricultural production,²⁷ and the United Nations Framework Convention on Climate Change (UNFCCC) greenhouse gas emission inventories.²⁸ Along with these, there are various ongoing large research projects on data modelling and comparison, but these often lack a formal status.

Overall there seems to be a clear window of opportunity to develop or improve harmonized integrated data sets in support of a green economy approach. In addition to supporting countries in building their capacity for basic data collection, international agencies could contribute to the further development of frameworks, such as the SEEA and the Framework for Development of Environment Statistics, by defining a clear structure to inform green economy policymaking processes and measuring progress towards sustainability. This would require programmatic support for national institutions in developing economies to improve their capacity to collect, organize, interpret and communicate relevant data.

Public institutions can also learn from experience gained by responsible businesses in two main areas: (i) defining and applying core and additional indicators in their reporting systems, and; (ii) coupling the use of non-financial and financial information in emerging integrated reporting models. In particular, the Rio+20 Summit emphasizes the importance of developing models for best practice and the need to facilitate action for the integration of sustainability reporting.²⁹

²⁵ The report *Keeping promises, measuring results*, produced in 2011 by the World Health Organization Commission on Information and Accountability for Women's and Children's Health, in conjunction with the International Telecommunications Union, highlighted the potential of ICTs to provide more accurate and timely data for monitoring and reviewing commitments, results and resources invested in improving women's and children's health at the global level (see www.everywomaneverychild.org). Similar approaches can be adopted to keep track and monitor green economy indicators.

²⁶ Statistics of the IEA can be found at www.iea.org/stats/index.asp

²⁷ Statistics of the FAO can be found at: www.fao.org/corp/statistics/en

²⁸ Statistics of the UNFCCC can be found at: unfccc.int/ghg_data/items/3800.php

²⁹ UN, 2012.

VII. Way forward

In light of the outcome of Rio+20 Summit calling on governments to define sustainable development goals,³⁰ and considering the challenges currently being faced by most countries, decisive action is needed to move towards a greener and more sustainable future. Three key steps are necessary to effectively design solutions to the current and upcoming challenges:

1. Identify major sustainability issues, key causes and effects
2. Adopt an integrated method for policymaking
 - a. Development of a customized analysis framework
 - b. Clear definition of key indicators
 - c. Creation and collection of relevant data
3. Build capacity on data collection, as well as a quantitative scenario analysis (modelling).

Acknowledging that several indicators are available to measure a green economy and several proposals are emerging to assess progress towards sustainable development (e.g., from the UN Commission on Sustainable Development and the Bellagio Sustainability Assessment and Measurement Principles), this booklet focuses on the need for, and the use of, indicators to better inform policymaking. Its aim is to contribute to the adoption of an integrated method for policymaking.

In this context, an immediate step to be taken is a clear identification of the issues to be analyzed and the definition of the key indicators that could be used to assess the impact of policy implementation. Although certain overarching problems, such as climate change, affect all countries, most of these issues are generally of a national nature. Thus an international agreement should be based on a framework that promotes a suite of indicators as part of a green economy

approach, and possibly a subset of core or headline indicators that could be used by all. This would facilitate international comparison and still allow for a high degree of customization at the country level, ensuring that all indicators are relevant for all countries and their respective circumstances.

Of paramount importance is data collection and analysis. This is critical to the effectiveness of green economy policymaking and requires coordinated efforts to support developing countries in creating local capacity for data collection, analysis and communication. Skills in scenario building and systems analysis are also important to effectively carry out integrated policy formulation and evaluation exercises.

At the request of governments, UNEP is providing green economy advisory services in more than 20 countries in Africa, Asia and the Pacific, Eastern Europe, Latin America and the Caribbean. The advisory services consist of policy advice, technical assistance and capacity building to countries in support of their national and regional efforts to transform and revitalize their economy. This work has also underscored that an appropriate green economy measurement framework is needed to address the specific needs of policymakers in monitoring progress at the country level.

This booklet on green economy indicators identifies some tools that can help policymakers set their agendas and monitor progress in greening their economies. In this regard, it adds to a toolbox of instruments that UNEP provides in advising countries. UNEP is ready to help countries define specific indicators, as well as contribute to the development of a national statistics framework, which will help them track progress towards a transition to a green economy.

³⁰ UN, 2012.

References

- Arrow, K., P. Dasgupta, and K. Maler. (2003). *Evaluating Projects and Assessing Sustainable Development in Imperfect Economies*, Working Paper of the Beijer International Institute of Ecological Economics, Stockholm.
- European Commission, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank. (2009). *System of National Accounts 2008*.
- Eurostat. (2009). *The Environmental Goods and Services Sector. A Data Collection Handbook*. Luxemburg: European Communities.
- Hak, T. (2011). *Status report on composite indices of environmental sustainability*, Discussion Paper prepared for UNEP and supervised by EWB/DEWA.
- Hargroves, K. and M. Smith. (2005). *The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century*. London: The Natural Edge Project, Earthscan.
- International Institute for Labour Studies. (2011). *Defining "green": Issues and considerations*. EC-IILS Joint Discussion Paper Series No. 10. Geneva: ILS.
- International Institute for Sustainable Development. (2008). *Building Accountability and Transparency in Public Procurement*. Winnipeg: IISD.
- International Labour Organization, International Trade Union Confederation and United Nations Environment Programme. (2008). *Green Jobs: Towards Decent Work in a Sustainable, Low-carbon World*. Geneva: ILO.
- Khan, Z. R., C. A. O. Midega, D. M. Amudavi, E. M. Njuguna, J. W. Wanyama, and J. A. Pickett. (2008). "Economic Performance of the 'Push-Pull' Technology for Stemborer and Striga Control in Smallholder Farming Systems in Western Kenya," *Crop Protection* 27: 1084-1097.
- OECD. (2011). *Towards Green Growth: Monitoring Progress*. Paris: OECD.
- Pretty, J. (2006). "Agroecological Approaches to Agricultural Development". Background paper for the *World Development Report 2008*.
- Putnam, R.D. (2004). *Education, diversity, social cohesion and social capital*. Note for discussion submitted at the "Raising the quality of learning for all" meeting of OECD education ministers, Dublin, 18-19.
- Pyatt G., and J. I. Round. (1985). *Social Accounting Matrices: A Basis for Planning*. Washington, DC: The World Bank.
- United Nations. (2012). *The future we want*. New York: United Nations.
- United Nations Environment Management Group. (2011). *Working towards a Balanced and Inclusive Green Economy: A United Nations System-wide Perspective*. Geneva: United Nations.
See www.environmenthouse.ch/?q=fr/events/inter-agency-report-green-economy-presentation
- UNEP. (2008). *SCP Indicators for Developing Countries. A Guidance Framework*. Paris: UNEP.

UNEP. (2010). *Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials*. A Report of the Working Group on the Environmental Impacts of Products and Materials to the International Panel for Sustainable Resource Management. Hertwich, E., E. van der Voet, S. Suh, A. Tukker, M. Huijbregts, P. Kazmierczyk, M. Lenzen, J. McNeely, Y. Moriguchi. Paris: UNEP.

UNEP. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, Nairobi: UNEP.

UNEP. (2012). *The Impacts of Sustainable Procurement: Eight Illustrative Case Studies*. Accessed on 31 July 2012 at: www.unep.fr/scp/procurement/docsres/ProjectInfo/StudyonImpactsofSPP.pdf

United Nations Statistics Division. (2003). *Handbook of Integrated Environmental and Economic Accounting (SEEA)*. New York: United Nations.

United Nations Statistics Division. (2012). *The System of Environmental-Economic Accounts (SEEA). Measurement Framework in Support of Sustainable Development and Green Economy Policy*. Accessed at 23 October 2012 at: unstats.un.org/unsd/envaccounting/Brochure.pdf.

World Bank. (2002). *Manual for Calculating Adjusted Net Savings*, Environment Department. Bolt, K, M. Matete, and M. Clemens. Washington DC: World Bank.

World Health Organization and International Telecommunications Union. (2011). *Keeping promises, measuring results*. Geneva: WHO.

Zieseme, J. (2007). *Energy Use in Organic Food Systems*. FAO International Conference on Organic Agriculture and Food Security. 3-5 May 2007. Rome.

www.unep.org

United Nations Environment Programme
P.O. Box 30552 Nairobi, 00100 Kenya
Tel: (254 20) 7621234
Fax: (254 20) 7623927
E-mail: unep@unep.org
web: www.unep.org



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