UNEP

GREEN economy

A GUIDANCE MANUAL FOR GREEN ECONOMY POLICY ASSESSMENT

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LIST OF BOXES, TABLE AND FIGURES

LIST OF ACRONYMS

DEPI	Department of Environment and Primary Industries (DEPI)
GE	Green economy
GEPA	Green economy policy assessment
GHG	Greenhouse gas
MDG	Millennium Development Goal
MEA	Multilateral Environmental Agreements
O/M	Operations and maintenance
PES	Payment for environmental services
SCP	Sustainable consumption and production
SDG	Sustainable Development Goal
T21	Threshold 21 model
UNEP	United Nations Environment Programme

TABLE OF CONTENTS

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FOREWORD

Countries seeking to transition to greener and more inclusive economies are often faced with significant challenges. Extreme poverty, growing inequity, degradation of ecosystems, and vulnerability to climate change are but a few of the barriers policy-makers must surmount to achieve more sustainable and inclusive development.

This manual offers guidance on implementing a green economy approach to sustainable development, and comes at a unique moment in time when many countries and organizations are looking at the potential of bringing sustainability concerns into the heart of economic policy.

The manual contributes to the ongoing discussion on green economy in three ways. It clarifies the original starting point of UNEP's "green economy approach" to sustainable development—an approach that emphasizes the reform and mobilization of investment for delivering more sustainable development. It takes the evolving Sustainable Development Goals as the starting point for any target-driven green economy policy process, and it brings together two major technical components for green economy related policy analysis: indicators and modelling tools.

A Guidance Manual for Green Economy Policy Assessment first responds to the call by Heads of State at Rio+20 for the United Nations system to provide interested countries with methodologies to enable assessment of green economy policies.

This keystone piece, released in conjunction with two supporting publications on indicators and modelling, shows in a step-wise manner how to prioritise sustainable development goals and targets, how to estimate the investment required for achieving them, and what policies need to be put in place to mobilize the investment and enhance its effectiveness, ensuring an equitable transition for all.

The manual is expected to meet the need for advice on how to translate the general concept of green economy into practice, particularly in countries under the Partnership for Action on Green Economy (PAGE), which brings together UNEP, the International Labour Organization, the United Nations Development Programme, the United Nations Industrial Development Organization and the United Nations Institute for Training and Research to provide joint advisory services to governments.

As part of an ongoing effort to support policymakers in the process of policy and investment reform, we hope that this publication, together with the co-released volumes on modelling and indicators, will help to provide solutions to some of the most pressing challenges faced by policymakers today.

As UNEP continues to support and engage in discourses around the green economy and strengthen its work with partner countries under PAGE, we look forward to improving upon the methodologies and tools available to governments and practitioners as they advance the global transition to greener and more inclusive economies.

United Nations Under-Secretary-General and
UNEP Executive Director

1 INTRODUCTION

Since the term "green economy" appeared in the report *Blueprint for a Green Economy* (Pearce, Markandya, & Barbier, 1989), interest in a green transition has evolved and intensified, particularly with the emergence of global challenges in the areas of climate, biodiversity depletion, energy prices and water scarcity. UNEP has confirmed the headway with the publication of its landmark Green Economy Report[1] in 2011, which set forth the definition of a green economy – one that improves human well-being and social equity while significantly reducing environmental risks and ecological scarcities – and showed that the process of greening economies can be a new engine of sustainable growth.

In this context, the 2012 Rio+20 Conference re-asserted the importance of green economy as a tool for achieving social, economic and environmental sustainable development. It specifically acknowledged that this approach can be tailored according to local and regional development needs, while working towards meeting broader international obligations and targets. Rio+20 called on all relevant stakeholders to form partnerships, strengthen institutional and financial capacity, and disseminate technology that will create an enabling environment for the transition to a more resilient development pathway in various sectors of national and international economies.

This manual provides a customized guidance on how to conduct a target-driven Green Economy Policy Assessment (GEPA) in order for policymakers to develop and adopt green economy policies to achieve their sustainable development targets. It is aimed at all those who are involved in managing, designing or implementing projects in the name of green economy (or green growth, green development, low-carbon development and the like). With this manual, UNEP hopes to address some of the growing demand for a methodology from counterparts and focal points in local ministries and national policy research institutes as well as high-level decision makers or other relevant stakeholders engaged in incorporating green economy principles into their national development agenda.

A typical GEPA includes five activities: 1) establishing priority sustainable development targets based on the overall development plans of countries; 2) estimating the amount of investments required to achieve the targets; 3) identifying the policies or policy reforms that are essential for enabling the required investments; 4) assessing the impacts of the required investments as well as the enabling policies using a range of economic, social and environmental indicators and comparing the results with the business-as-usual scenario; and 5) presenting the assessment results to inform the making of specific decisions.

What are "green economy policies"? From UNEP's perspective, green economy as a tool (as opposed to a particular state of an economy) focuses on mobilising a more efficient allocation of resources through society's investments – enabled by public policies – to achieve sustainable development. Based on this perspective, any policy that is able to mobilise and shift investments to attain specific sustainable development targets can be considered a green economy policy.

Why focus on investments? Because investments shape the future of our economies. Investment decisions choose one type of infrastructure over others, another type of production or technology over others, which narrows down the options for future choices. Some will lock in certain technologies and lock out others, while contributing to technological upgrade. This seems to be the case for many developing countries that are under the technological frontier (in most sectors). Then there are investment decisions that can be physically irreversible such as the clearing of an old-growth forest. With regard to a green economy, transition involves shifting investments to infrastructure, clean technologies, natural capital and human development.

A wide array of policy reforms, regulatory changes and targeted public expenditure are needed to trigger and support investments that work towards "improved human well-being and social equity while significantly reducing environmental risks and ecological scarcity" – the results from green economy as defined by UNEP.[2] In addition, behavioural change and institutional development are also important as there is a crucial interaction between change in households' and firms' day-to-day behaviour and a shift in investments.

This manual thus addresses the following questions:

- How are sustainable development (or similar) targets for guiding green economy policymaking identified and prioritised (Section 2)?
- How is the amount of the investment required for achieving the priority targets estimated (Section 3)?
- How are barriers to the required investments analysed and how are the needed policy reforms identified (Section 4)?
- How are the overall impacts of the required investments as well as the enabling policies assessed (Section 5)?
- How can quantitative modelling be used to conduct the policy assessments (Chapter 6)?
- How should we present the assessment results to enable decision-making? (Section 7).

Moreover, it provides general guidance that should be used in an adaptive manner. Countries interested in using green economy as a tool to achieve sustainable development have varying contexts. Some may start from scratch, while others may have already prioritised their targets and have been searching for ways to achieve them. Some may have developed policies but have not been able to integrate them into development plans and budgets, partly because the impacts of the proposed policies are not fully assessed. Others may already have made huge investments in green sectors, but have encountered new challenges such as the marketing of the related products or skills and human capacity gaps. Depending on where countries are positioned in their green economy pathways, the manual needs to be used flexibly, bearing in mind the overarching objective that it is meant to enable decisions on green economy policy interventions (plans, strategies, or roadmaps).

In this regard, a summary of generic sectoral goals and policy options is given in the Annex to illustrate the policymaking possibilities. It is expected that experiences from using the manual will also provide inputs to further improve to this living document.

As this manual is unlikely to address all the issues faced by countries in moving towards their respective green economy pathways, other related UNEP publications may also be utilized. One of them is a working paper on the use of indicators to support green economy policy making, which provides guidelines on how to establish priority goals, targets and baselines, measure the extent of policy interventions, and assess the impacts of these interventions ex ante and ex post.[3] The other is a guide describing major modelling tools that can be used for the various assessments described in this manual.[4] Finally, the "Manual on Integrated Policymaking for Sustainable Development", provides guidance on the process of public policy formulation.[5]

2 TARGETS, POLICIES AND STAKEHOLDERS

2.1 INTRODUCTION

This chapter provides guidance on how to build an analytical basis for conducting a GEPA. Its basis includes: 1) the identification of priority sustainable development issues and the sectors including related goals, targets, indicators, baselines and trends; 2) relevant existing policies and large-scale infrastructure projects; and 3) major stakeholders. The effort to build such an analytical basis may well lead to a stand-alone product – a stocktaking study. This chapter, however, takes the key elements from a stocktaking study and integrate them into a full assessment exercise. The checklist in Box 1 summarises the steps for building the analytical basis.

2.2 SETTING TARGETS

The Rio+20 Outcome Document, "The Future We Want", endorsed the green economy as a tool for achieving sustainable development. In applying this tool, it is, therefore, necessary to revisit and list out existing sustainable development goals, targets and indicators. It is important to keep in mind that such goals, targets and indicators are not always framed in the context of sustainable development and that some may well have been presented in the name of green economy, green growth, human development or environmental protection.

Many countries have developed a variety of such goals, targets and indicators over the last two decades. Usually, these have been devised through bottom-up participatory processes following the first Rio Summit, which adopted sustainable development as a global, overarching destination. Some countries are also developing new sets of goals, targets and indicators in the context of the post Rio+20 international negotiations on Sustainable Development Goals (SDGs). Further yet, in some countries these goals and targets may overlap with the Millennium Development Goals (MDGs) or may stem from MEAs such as the Strategic Plan for Biodiversity 2011-2020, adopted in 2010 by the Conference of the Parties to the Convention on Biological Diversity, which includes twenty global policy targets.

As an example of the types of goals, targets and indicators to be considered for a GEPA, Box 2 gives the example of Mongolia where a green development strategy has been formulated, pending adoption by the legislators.

2.2.1 The need for prioritisation

Existing goals, targets and indicators are often too many. How then does one prioritise? Politically, stakeholder participation is essential for achieving a consensus on what gets prioritised and for continued political support of the ensuing decision. Another way to prioritise is to examine at the scientific evidence on environmental degradation and see how it impacts on the overall well-being of the country's population. Analytically, priorities should be given to issues that have a strong nexus among the social, economic and environmental dimensions of sustainable development, not least because a green economy aims to generate multiple benefits along all these dimensions.

If few relevant targets exist, UNEP's publication "Using Indicators for Green Economy Policymaking" provides guidance on how to use indicators for identifying priority sustainable development issues as well as for measuring policy interventions and assessing policy impacts. It employs an approach that highlights crosssectoral relations across indicators to shed light on the importance of the underlying issues. Examples include indicators of storm-related damages related to the impacts of climate change or of water usage intensity related to the depletion of groundwater. Box 3 shows the steps for using indicators to identify priority issues.[10]

BOX 1 Checklist for building an analytical basis for GEPA

1. Review existing sustainable development (or similar) goals, targets, indicators, baselines and trends; find out how they have been generated; and (re)validate these with stakeholders;
2. If little of the above exists, initiate a stakeholder process to prioritise major sustainable development challenges and specify related goals, targets, indicators, baselines and trends;
3. Review and briefly discuss relevant existing policies (and provide references to related previous analyses), such as green economy (or green growth, green development) strategies, national development plans and large-scale infrastructure investments, including those that appear to contradict the priority targets;
4. Review related international conventions signed by the country (i.e. Multilateral Environmental Agreements – MEAs – and labour related conventions) and highlight the main targets therein;
5. Identify related stakeholders and their respective activities; and
6. Propose and reach stakeholder agreement on priority issues, sectors, goals, targets, indicators, baselines and trends for subsequent assessments.

UNEP has completed several studies with the goal of supporting countries in identifying priority issues. For example, in Barbados,[11] following stakeholder consultations, extensive data collection and trend analysis, UNEP identified a number of worrying trends and potential threats to the sustainability of the sectors that were considered to be key enablers for a green economy transition (agriculture, fisheries, housing, transport and tourism). These threats included (1) a contraction of agricultural exports, especially due to the lack of infrastructure; (2) significant losses in the fishery sector (harvest and post-harvest); (3) the high share of electricity sales assigned to residential users (32 per cent in 2009) due to a lack of energy-efficient technology; (4) high levels of emissions and pollution deriving from the use of private cars as the main mode of transportation; (5) harmful impacts of unsustainable tourism, including pollution, depletion of natural resources, soil erosion, displacement of residents, inflation, excessive foreign ownership accompanied by foreign exchange leakages, loss of culture, cultural commodification and extensive changes in societal norms.

2.2.2 Measuring the un-measurable

As policy goals and targets are most likely to be achieved when they are measurable, policymakers should consider using measurable targets as much as possible when pursuing green economy policies. Nevertheless, certain desirable targets are not directly measurable. For example, Target 7.D of the MDGs on environmental sustainability is phrased as follows: "By 2020, to have achieved a significant improvement in the lives of at least 100 million slum dwellers".[12] This "significant improvement" cannot easily be quantified or monitored. In such cases, there two possible actions that could be undertaken.

One could involve prioritising goals on the basis of the needs and aspirations of the society. The process can be based on stakeholder consultations. If these goals are indeed priorities but are not directly measurable, it would then be necessary to discern whether proxy indicators could be used to measure them or whether these targets can be articulated differently in such a way that will allow measuring using established indicators.[13]

In terms of processes, if appropriate and measurable goals, targets and indicators do not exist in a given country, there is a need to engage stakeholders policy and decision makers and in their development, taking into account the steps mentioned earlier. This exercise needs to follow a clear political vision combined with bottom-up approach so that the major concerns from

BOX 2 Mongolia's Draft Green Development Strategy

The Mongolian Green Development Strategy is composed of eight goals, each having a series of objectives.

CLIMATE CHANGE ADAPTED DEVELOPMENT

1. Harmonize socio-economic development to climate change and strengthen the national climate adaptable capacity. This includes strengthening defences against atmospheric-originated disasters with the aim of diminishing damages incurred from such events by 30 per cent against the 2010 rate.
2. Introduce a new system of maintaining the stability of ecosystems, limiting environmental pollution and degradation and increasing investment in protection and rational use of natural resources and ensure safe and favourable living conditions for people. Key targets include preserving at least 70 per cent of the habitat of rare animals and plant species and at least 60 per cent of forest areas and headstream territories of major rivers in the network of the State special protected areas to achieve at least 25 per cent of the total land by 2020.

GREEN ECONOMY AND FINANCING SYSTEM

3. Increase the public and private green investment by spending two per cent of GDP annually for green development in enhancing carbon productivity in the economy and introduce the mechanisms of green loans, funding and incentives.
4. Increase the effectiveness of resource utilization, support production with minimal waste and pollution, decrease raw material and energy consumption per unit products, increase the sources of renewable energy and develop knowledge based multi-pillar green economy. The key targets are increasing the share of renewable energy to 20 per cent by 2020 and reducing twofold the amount of GHG emissions per unit of GDP by 2020 against the 2006 level.

EQUAL SOCIETY OF CITIZENS WITH EMPLOYMENT AND INCOME

5. Support green job creation, improve quality life and decrease poverty through equal distribution of national wealth. A key goal is to increase life expectancy to 72 years by 2020.

CULTURE AND HERITAGE

6. Maintain and protect traditional knowledge, lifestyle and cultural heritage while promoting education, culture, sciences, technology and innovation as catalysts for green development. Key targets include spending up to two per cent of GDP by 2020 to support domestic green technologies and innovations and expanding the network of special protected areas and national natural and cultural heritage sites to reach at least 35 per cent of all the territories.
7. Managing the settlements within their local and regional, environmental and natural capacities; building new settlements and satellite cities to decentralize over populated areas in the capital city; and turn province (aimags) centers into 'green' towns by green infrastructures. The key goals include reducing energy demand in buildings by 30 per cent from the level of 2010 by the year 2020, expanding green areas in urban centers up to 25 per cent and increasing the recycling rate of municipal solid waste up to 40 per cent by 2020.

GOVERNANCE FOR SUSTAINABLE DEVELOPMENT

8. Enhance the leadership skills of government institutions at all levels, improve the intersectoral coordination and cultivate transparency, accountability and control in the governance in order to enable implementation of the sustainable development concept.

BOX 3 Steps to identify priority sustainable development issues

1. Identify potentially worrying trends concerning any aspect of sustainable development;
2. Assess the main issue underlying the trends;
3. Analyse the causes of the issue;
4. Analyse how the issue impacts society, the economy and the environment.

The combination of different indicators for analysing simultaneous environmental, social and economic trends is essential to identify present and upcoming issues and clearly determine their causes and effects within and across sectors.

various segments of society are aggregated, prioritised and addressed through extensive consultations. To enhance the legitimacy of the process and its outcomes, it is important that one or several government ministries with cross-cutting functions sponsor such exercises. For example in Barbados, the government established a cross-disciplinary project team comprising officials from various ministries and which regularly engaged stakeholders from business, academia and civil society to garner feedback for its green economy scoping study. This helped to improve the effectiveness and legitimacy of the process.

2.2.3 Establishing trends and baselines

Once priority goals, targets and indicators are established, the next step is to establish baselines for, and trends of, the corresponding indicators. Baselines will be used for measuring gaps and actions needed to close the gaps whereas trends will be used for establishing causalities and comparing business-as-usual with the projected results from green economy policy interventions. It will be useful to include a matrix or diagramme showing priority goals, targets and indicators as well as corresponding baselines and trends, as shown in the box below drawing from an MDG example. If possible, related indicators from international conventions or from other countries sharing similar characteristics and priorities should be considered for the purposes of international benchmarking (see Table 1).

When establishing priorities, sectoral dimensions quickly reveal themselves. For example, if climate-related issues are considered as a priority, then the energy, buildings and transport sectors (among others) will immediately come to the foreground. Issues of poverty, on the other hand, have a lot to do with not only the energy sector, but also agriculture and water, among others. The point is that priority sectors are not selected on their own; they are usually embedded in priority issues.

2.3 EXISTING POLICIES

Identifying relevant existing policies is a major part of the analytical basis for a GEPA. There are several criteria for how to review these policies.

First, it is important to consider those policies that are explicitly designed to achieve existing priority targets. They typically include national development plans and poverty reduction strategies, if not also strategies or plans that are specific to a green economy transition. In fact, many countries already have policies aimed at achieving their various sustainable development targets. These policies can indicate the countries' current priorities, which in turn can inform the (re) prioritization process. At the same time, existing policies are the basis upon which green economy interventions (including both investments and enabling policies) should be built. Green economy interventions often represent adjustments to, or enhancements of existing policies.

Second, it is necessary to capture the policies and large-scale infrastructure investments that undermine the achievements of priority targets for sustainable

Table 1. Example of benchmarking priority issues: global assessment of progress towards MDGs

Goals	Targets	Indicators	Baselines	Trends
GOAL 7 ENSURE ENVIRONMENTAL SUSTAINABILITY	Target 7A: Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources	Total emissions of carbon dioxide (CO_2)	World emissions in 1990: 21.7 billion metric tons	Global emissions of carbon dioxide (CO_2) have increased by more than 46 per cent since 1990.
	Target 7C: Halve by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation	Proportion of population using an improved drinking water source	World proportion in 1990: 76 per cent	More than 2.1 billion people have gained access to improved drinking water sources since 1990

development. An often quoted example is subsidies for the production and consumption of fossil fuels, which globally amounted to US$500 billion in 2011.[14] This type of fiscal policy encourages excessive carbon emissions and, if reducing carbon emission is among the country's sustainable development targets, it places investors of renewable energy technologies in a disadvantageous position. A green economy intervention would seek to reform such subsidies.

Third, there are policies that are beyond the control of national governments and that also pose sustainable development challenges and opportunities. A particular example is the international trade regime, which can affect the trade in environmental goods and services. Similarly, international investment agreements can have similar impacts.

An assessment of existing policies offers an opportunity to set new goals and targets. Sometimes, existing policies are short of societal aspirations and therefore need to be made more ambitious. In other cases, policies are too ambitious and targets need to be reviewed downward. One example is the EU revision of their targets on crop-based biofuels from the 10 per cent by 2020 set in 2008 to a cap of six per cent voted by EU parliament in 2013,[15] to address concerns over environmental sustainability of impacts on food security in other countries. Therefore, a review of existing policies can be a starting point.

2.4 Key stakeholders

Another major component of the analytical basis involves key stakeholder identification for the purpose of engaging them in the entire GEPA process. Several major stakeholder categories may be considered, including:

- Parliamentarians who may have an interest in existing policies and who will ultimately decide whether or not to adopt new policies or change existing ones;
- Officials of economic, trade, finance, labour, planning and environmental ministries who need to integrate the results of the green economy policy assessment into budgeted national development plans;
- Officials of sectoral ministries and senior managers from business, trade and financial sectors whose sectoral/business prospects are likely to be implicated;
- Representatives of NGOs and civil society groups who have been closely involved in addressing the related issues;
- Non-government economic associations including Chambers of Commerce, trade associations, industry groups and financial groups;
- Think tanks, universities and other research-based local institutions;
- Journalists and operators of mass media who can help reach out to citizens at large; and
- International development partners who have been supporting or are expected to support related

BOX 4 Maximising involvement, legitimacy and effectiveness of a green economy scoping study — Experiences from Barbados

In the development of its regional green economy strategy, Barbados has proved to be a champion in supplementing and ensuring the legitimacy of the process via a series of timely inter-ministerial meetings, stakeholder consultations and expert advice sessions. Barbados has shown a strong commitment to developing a participatory stakeholder approach where technical experts were able to benefit from the knowledge of stakeholders as well as to engender commitment to the project ideals. Key aspects of this approach included:

1. The country's compilation of a highly cross-disciplinary project team, who met on a monthly basis (and included technical experts, sector specialists, an economist, a resource management specialist, an urban planner, a fiscal analyst, an agriculture economist, an energy specialist as well as tourism and fisheries experts).
2. Sector-specific meetings, with representation from focus sectors' ministries and industry players provided further guidance to the project team, while also providing an opportunity to discuss the broader green economy vision and to draw on previous consultative processes in the different sectors.
3. A Green Economy Technical Steering Committee (GETSC) was established by the Government of Barbados to have technical oversight of the project and received regular updates on the progress and obstacles faced by the project team in completing the green economy scoping study. This meant that GETSC members also stayed up-to-date on the emerging options for policy changes in favor of greening the local economy.
4. The outcomes and evolution of multi-stakeholder dialogue between local business, academia, civil society, gender and youth groups also continually fed into how the Barbados green economy scoping study was carried out and validated; into the ultimate iteration of the country's green economy objectives; and into how UNEP saw its supportive role in the country.
5. UNEP and other international partners only provided project advice and suggested methodologies, while the analytical work and project steering were carried out "on the ground" by local ministries, parts of the GETSC and research institutes - thereby ensuring maximum national ownership of the final outcome strategy.

UNEP. 2012. *Green Economy Scoping Study for Barbados*.

initiatives in the country of concern; coordination among these latter partners is particularly important.

The key stakeholders can be identified in multiple ways: 1) by getting recommendations from the leading government agency and key international partners; 2) by organizing and publicly announcing consultations for the purpose of the GEPA; and 3) by reviewing the list of participants in related past meetings.

Throughout the policy assessment process, a broad range of stakeholders should be consulted, particularly those from marginalised groups. For further guidance on stakeholder participation, please consult UNEP's "The Stakeholder Engagement Manual".[15] Box 4 gives an example of the stakeholder consultation in Barbados.

3 INVESTMENT ANALYSIS

3.1 THE ROLE OF INVESTMENT IN GREEN ECONOMY POLICY ASSESSMENT

In this manual, the concept of investment is used broadly to mean any public or private spending aimed at creating and maintaining an asset – built, natural, human and institutional. Investment includes capital costs as well as Operation and Management (O/M) costs. There may also be costs in providing training of workers and setting up new institutions. In addition, there are indirect investment requirements, such as the need to improve infrastructure, so that sector-specific investments can be properly implemented and utilized.

The investment analysis is at the core of any green economy related policy assessment, as green economy – as a tool – emphasises shifting and increasing investments - supported by key enabling policies – towards priority policy areas. A green economy seeks to generate multiple benefits including growth of income and jobs, improved access to clean water and energy, reduced carbon emissions and waste and the conservation of biodiversity and ecosystem, among others. And among many potential interventions, it is investment that has the potential to most directly generate income and jobs. Additionally, many sustainable development challenges are caused by existing subsidies such as those going into the fossil fuel sector. Without shifting these existing investments, new green investments will be undermined or even completely offset. Shifting existing investments also has the potential to yield funding for green investments.

Not all policy targets, however, require new and additional investment for their achievement. For example, a target such as reducing food waste can be achieved through moral suasion and long-term change in consumption patterns using informational tools (while in contrast reducing crop loss may require investing in improved storage and transport facilities). These other tools are important and many groups are actively applying them. As far as the green economy approach is concerned, it is important that connections be made as much as possible between these other tools and investments.

A primary focus of green economy is to link environmental benefits to economic gains at the macro-economic level such as the growth of GDP and total wealth, the creation of new jobs and a reduction in poverty and inequality. The scope of green economy is wide, and entails among other measures: the identification of private and public investment required for greening the economy; the adjustment of fiscal policies, including phasing out harmful incentives or introducing ecological tax reform; enhancement of market access for low carbon technologies; support of the development of green industrial development strategies; harnessing labor markets generating green jobs; and promotion of social inclusion policies and fostering trade opportunities arising from new markets and technological innovation are also keys to transition to a green economy.

On the other hand, sustainable consumption and production (SCP) is more targeted toward production patterns and primarily identifies and supports interventions by governments, business and consumers that shift consumption and production to sustainable patterns contributing to economic, social and environmental gains. SCP's scope is narrower compared to green economy as it mainly looks at "greening production", which is a part of green economy, as well as the consumption and trade patterns since economically, supply generally follows demand. SCP is more specific and it is geared at not only influencing policy but extends to implementation at the sectoral level and at the business level where SCP directly influences production patterns. SCP is an approach that can be used to implement the 'green

BOX 5 Checklist for an investment analysis

→What are the agreed policy targets?
→What are some of the alternative means – specifically, technologies – required to achieve the same targets?
→Do these means and technologies require investments (in clean physical capital, natural capital, human capital or institutional capital)? If not, could they be considered as enabling policies)?
→What is the cost of each alternative means or technology (including O/M) required to achieve the targets/ indicators, taking into account the relavant sectors, physical locations and durations of the underlying investment?
→Estimate investment needs by using information from existing studies and investment plans or by consulting relevant line ministries and major enterprises.

production' in manufacturing, agriculture and services sectors of production under the transition to a green economy. The development of SCP policies and practices tends to take a sectoral approach, which can then be complemented by a more macro-economic and transversal approach on green economy policies to generate the necessary investment and to help the countries in the transition to a green economy.

3.2 ESTIMATING INVESTMENT REQUIREMENTS

Specific investment analysis depends on the types of policy targets in question, alternative means or technologies to reach the targets and their respective costs. In dealing with targets related to climate change and investment needs analysis, for example, a well-known approach is the McKinsey Greenhouse Gas Abatement Cost Curve, which shows the cost of using different technologies to achieve a given emission target at the global level. First published in 2007 and based on national GHG abatement studies in some of the world's largest countries including the United States, China, India, Brazil, Russia, Germany and Britain, it is an "in-depth evaluation of the potential and the costs, of more than 200 greenhouse gas abatement opportunities across 10 sectors and 21 world regions and in a 2030 time perspective."[17] The curve shows the range of emission reduction actions possible with either available technology or those with a strong possibility of coming to fruition in the near future, with the different options arrayed from the lowest to highest-cost and the width of each bar representing that option's abatement potential relative to business-as-usual development. The 2009 version of the curve is replicated in Figure 1. A general checklist for an investment analysis is provided in Box 5 for reference.

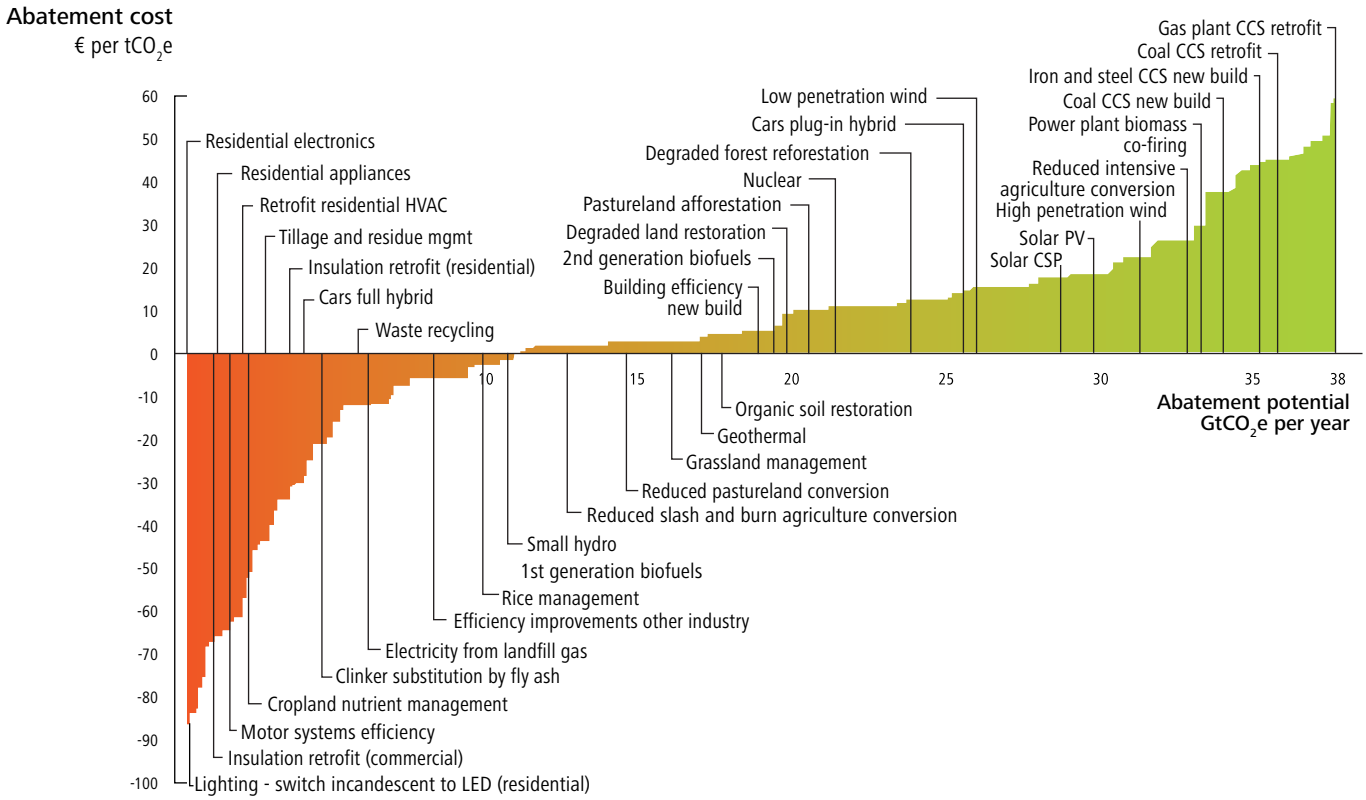
3.2.1 Competitive bidding

One unique way of getting the investment estimates is to subject the target-driven investments to competitive bidding.[18] An example is the BushTender program run by the State government of Victoria, Australia, which seeks to deliver improvements in biodiversity conservation on private land at least cost. The program adopts an auction approach, as described by the Department of Environment and Primary Industries (DEPI)[19]: "Landholders competitively tender for agreements to better manage their native vegetation. Successful bids are those that offer the best value for money. Successful landholders receive payments for environmental services (PES) for their management actions under agreements signed with DEPI. These actions are based on management commitments over and above those required by current obligations and legislation." BushTender has proved to be successful and has now been widened to include other environmental benefits in a program known as EcoTender.

3.2.2 Measuring investments for MDGs

As priority targets may well focus on social and poverty dimensions, Box 6 shows how the costs of achieving some of the MDGs are calculated with two alternative but complementary approaches.[20] For the World Bank,

Figure 1. McKinsey Global GHG Abatement Cost Curve



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below € 60 per tCO_2e if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.

the first method is to focus exclusively on the first goal – reducing income poverty by half between 1990 and 2015 – as this is linked to the other targets and, the more measures taken to promote growth, the stronger the link. The second approach is to estimate the costs of other goals except income poverty – i.e. attaining the health, education and environmental goals – with the idea that achieving these will reduce poverty in large measure. Although these estimates are at the global level with implications for development assistance, the approaches can be applicable to the national level.

3.2.3 Measuring investments for climate actions

In the area of climate change covering both mitigation and adaptation, UNDP has developed guidelines for conducting sectoral assessments of investments and financial flows.[21] The methodology can be used flexibly according to a country's needs, resources and modelling capacity.

Box 7 provides the main "checklists" for the assessments, some of which extend beyond the investment analysis and covers broader policy evaluation. As a first step, the parameters of the assessment, such as its scope and the analytical approach to take, have to be determined. Subsequently, both the baseline and mitigation scenarios are worked out before calculating the costs. With the estimated costs in mind, the various policy options can then be weighed.

3.2.4 Measuring investments in the T21 model

To estimate investments using system dynamics modelling such as the T21 model – the main modelling tool used by UNEP for GEPA, the typical approach is to: 1) identify the key areas/sectors to be invested based on the prioritisation of sustainable development issues and targets and the specific policy targets in each key sector; 2) estimate the investments to achieve targets in each of the sectors; 3) develop the corresponding

BOX 6 The costs of attaining the Millennium Development Goals

Devarajan, Miller and Swanson (2002) proposed a methodology for estimating the aggregate costs of attaining the Millennium Development Goals. Yet, it is a speculative exercise which produces only crude estimates. They calculate the additional financial assistance required to achieve the goals, but warn that such assistance is only one factor among many, such as effective resource use and political commitment. That being said, two methods of estimation are possible.

The first one consists in calculating the additional economic growth required to achieve the income poverty goal (halve poverty by 2015) and then estimating the additional foreign aid required to reach that level of growth. This method yields an estimate ranging from an additional US$54 to US$62 billion in foreign aid per year to reach the income poverty goal. The reasoning is then that economic growth has a positive effect on the progress towards other goals, especially those related to health and education. This happens through two channels: income growth increases demand for health and education services, which then increases public revenues and thus serve to raise the supply of these services. Therefore, the estimate obtained with this method can also be taken as an approximation of the aid required to achieve the social and environment goals.

The second and complementary method takes the opposite route and estimates the costs of meeting each one of the social and environmental goals separately. As mentioned, this method is subject to sizeable uncertainties because the link between public spending and outcomes in health and education is usually very weak and also because there is the risk of double counting the costs, since the different goals are interdependent. The authors use existing estimates, preferably country-level ones when available, to improve their reliability. They find that the additional costs for achieving the education goals ranges from US$10 to US$30 billion per year, the health goals from US$20 to US$25 billion and the environment goals from US$5 to US$21 billion. The total ranges between US$35 to US$76 billion per year in additional aid, which is consistent with the estimate obtained with the first method, though these results should be handled with the appropriate care given the huge uncertainty they face.

Source: Shantayanan Devarajan, Margaret J. Miller and Eric V. Swanson (2002). "Goals for Development: History, Prospects and Costs", *World Bank Policy Research Working Paper.*

components of the policies and investments in the model including the cross-sector relationships; and 4) conduct scenario analysis. Cross-sector impacts in the model help identify policy synergies and offsets and avoid the risk of double counting. A variety of national stakeholders are involved to ensure the proper representation of national contexts and improve the reliability of the analysis.

Specifically, first, the analysts will study the specific country conditions to identify the major sectors where policy interventions (investments and enabling conditions) contribute to addressing the country's priority issues. In the case of Rwanda, for example, the key issues are hunger (per capita cereal production less than 100 kg) and access to electricity (currently about 10 per cent of the population). The sectors implicated most are agriculture and electricity generation from renewable energy. In these sectors, the analysts identify the specific policy targets and policy options to achieve these targets. For investment interventions, parameters such as investment costs, duration and impacts are then collected from local sources or international studies. The values of these parameters may change over the period of the investment. The type of investment costs, i.e. fixed cost (such as capital cost) and variable cost (such as O/M), needs to be differentiated. In addition, investment requirements for the sector policy targets are calculated. To increase electricity generation in Rwanda, for example,

Figure 2. Estimated capital investment for selected electricity capacity targets

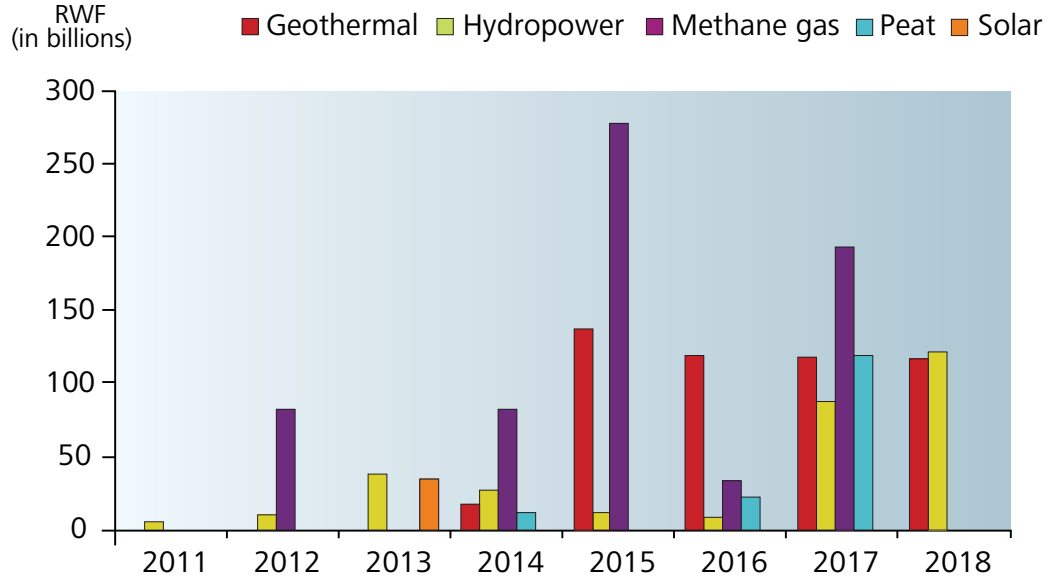
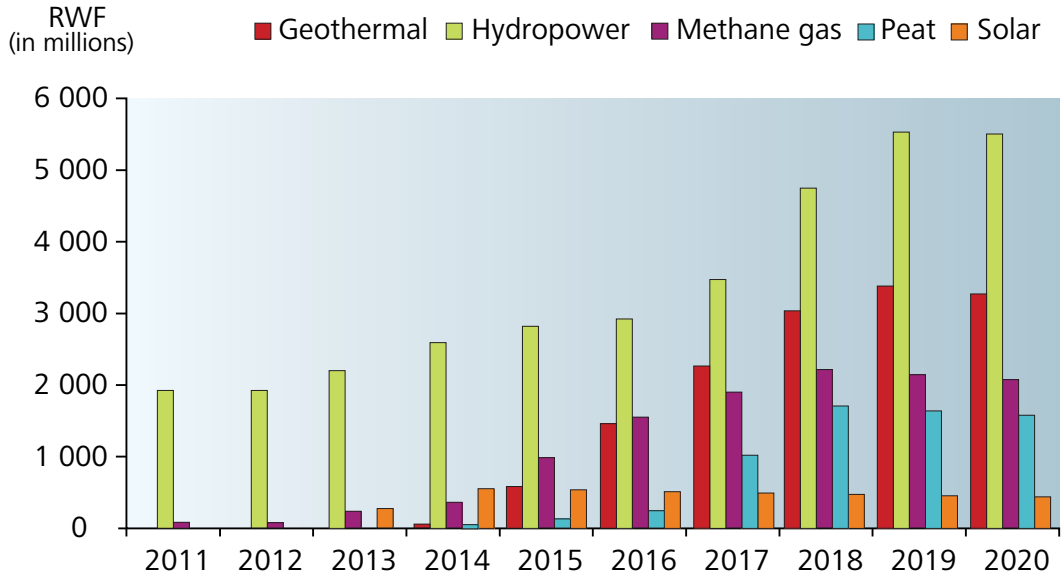


Figure 3. Estimated operations and maintenance expenditures for selected electricity capacity targets



investments in renewable energy (wind, solar and hydro) will be allocated as the country currently imports expensive oil to generate electric power.

Taking wind electricity generation as an example, the required annual construction as well as infrastructure depreciation is calculated given the target and current wind electricity capacity of the country. This enables estimation of employment in wind power plant construction and O/M. The investment required to achieve the wind power generation can, therefore, be estimated as the sum of capital cost (including construction cost and training cost for new employees) during the years of construction and O/M cost per year of wind power plants. Similarly, the investment required for hydro and solar electric generation can be estimated. Thus total investment required in electricity generation sector is estimated by summing up the investments for all three renewable resources.

Investment to expand these green economy activities relating to grid-connected renewable energy supply vary depending on the planned and assumed development.

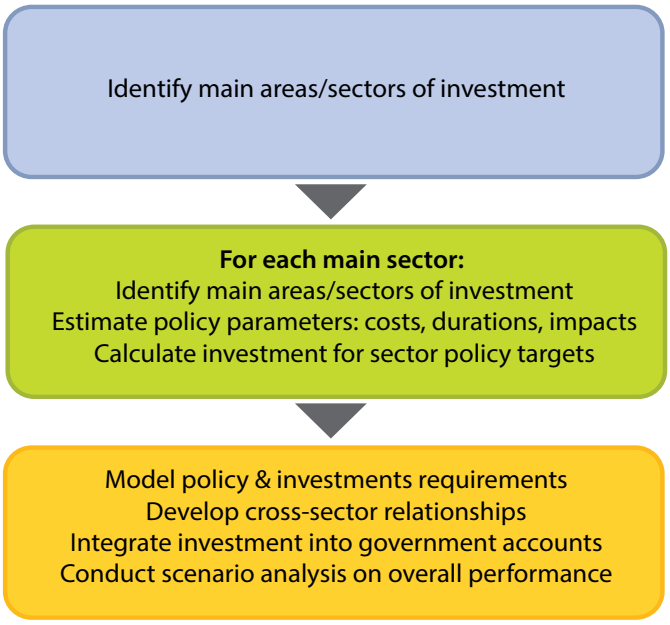
The total capital investment required to develop geothermal, hydropower, methane gas and peat reaches RWF 1,657 billion, while the operations and maintenance expenditures are RWF 69,133 million. The disaggregated capital investments and operations and maintenance expenditure requirements for each of the technologies are shown in Figures 2 and 3 respectively.

Furthermore, the T21 model also covers the policy interventions, investment requirements and policy impacts both within a sector and across the sectors. As the policies or investments are usually interdependent, the impacts of policies in one sector on the required investments and performance of other sectors are accounted for in the model given to its integrated feature. It is worth noting that the required investments are integrated into the government accounts of the country, which further affects the long-term national development. For example, when investment goes into wind power, electricity supply in Rwanda will increase, which improves the local quality of life and productivity, benefiting agricultural and other production sectors. On the other hand, investment in other areas may be reduced (if government budget is shifted) or government deficit may be increased (if the investment comes from additional government borrowing). Therefore, the T21 model is used to assess the overall performance of green economy policy interventions in a country.

Finally, by simulating the model, scenario analysis is conducted to compare the overall social, economic and environmental performance of the green economy policy interventions including in comparison with a business as usual scenario.

The approach described above is illustrated in the figure below, which includes not only investment analysis but the assessment of the overall performance of green economy policy interventions.

Figure 4. Approach for estimating investments using system dynamics modelling such as the T21 model



BOX 7 Steps in the sectoral assessment of investment & financial flows to address climate change

Establish key parameters of the assessment

— Define detailed scope of sector
— Specify assessment period and base year
— Identify preliminary mitigation (or adaptation) measures
— Select analytical approach

Compile historical investment flows (IF), financial flows (FF) and operation and maintenance (O&M) cost data, subsidy cost data (if included explicitly) and other input data for scenarios

— Compile historical annual IF and FF data, disaggregated by investment entity and source
— Compile historical annual O&M cost data, disaggregated by investment entity and source
— Compile historical annual subsidy cost data, if subsidies are included explicitly in the assessment

Define baseline scenario

— Describe socioeconomic trends, technological change, sectoral and national plans and expected investments given current sectoral and national plans

Estimate annual IF, FF and O&M costs, and subsidy costs if included explicitly, for baseline scenario

— Estimate annual IF and FF for each investment type, disaggregated by investment entity and funding source
— Estimate annual O&M costs for each IF, disaggregated by investment entity and funding source
— Estimate annual subsidy costs for each relevant investment type and for IF, FF and O&M costs, if subsidies are included explicitly in the assessment

Define mitigation (or adaptation) scenario

— Describe socioeconomic trends, technological change, mitigation (or adaptation) measures and investments given implementation of mitigation (or adaptation) measures

Estimate annual IF, FF and O&M costs, and subsidy costs if included explicitly, for mitigation (or adaptation scenario

— Estimate annual IF and FF for each investment type, disaggregated by investment entity and funding source
— Estimate annual O&M costs for each IF, disaggregated by investment entity and funding source
— Estimate annual subsidy costs for each relevant investment type and for IF, FF and O&M costs, if subsidies are included excplicitly in the assessment

Calculate the changes in IF, FF, and O&M costs, and in subsidy costs if included explicitly, needed to implement mitigation (or adaptation)

— Calculate changes in cumulative IF, FF and O&M costs, by funding source, for individual investment types and for all investment types
— Calculate changes in annual IF, FF and O&M costs for individual investment types, for individual sources of funds, and for all investment types and funding sources
— If subsidies are included explicitly, consider calculating changes in cumulative and/or in annual subsidies for IF, FF and O&M for each investment type and all investment types

Evaluate policy implications

— Re-evaluate initial prioritization of mitigation (or adaptation) measures undertaken in step #5
— Determine policy measures to encourage changes in I&FF

Source: UNDP Environment & Energy Group, *Methodology Guidebook For the Assessment of Investment and Financial Flows to Address Climate Change,* Version 1.0, 1 July 2009, Figure 2-1, p. 17.

4 IDENTIFICATION OF ENABLING POLICIES

4.1 INVESTMENT AND ENABLING POLICIES

Green economy as a tool distinguishes between investments and policies that are essential to enable the investments. Enabling policies are needed because investments towards the achievement of sustainable development targets are unlikely to take place on their own. This is why suggested policies should be aligned with existing political priorities and the national development agenda. They should be conveyed in a way that shows benefits across sectors and actors, and grounded on relevant and transparent data sources.

Most sustainable development targets are likely to internalize externalities and have the characteristics of public goods. Preventing loss of biodiversity is but one of such examples. Even where a target may be commercially viable over the medium and long term, such as raising energy or resource efficiency, there are short-term to medium-term costs to private investors. Public policies are needed to enable private investments to shift towards the desired sectors and locations. Policies are also needed to enhance the effectiveness of these investments. This chapter provides policy guidance on how to identify and assess major barriers to the shift and mobilization of investments towards a green economy. Once the amount of investment is assessed, a question immediately coming to the mind of most policymakers is often that of financing – where to get the funds to support the needed investment. Yet guidance on the full range of financing options is beyond the scope of this manual. It is also unnecessary as markets know best which financing option is most suitable for particular investments. However, we must take into account the suboptimal nature of market valuations of investments opportunities in the presence of externalities What this section does is to address major policy barriers whose removal may unleash or incentivize the financial flow to support green investment. They include the review of:

a. existing public expenditure, including large infrastructure public projects;
b. existing fiscal policy, in particular subsidies for fossil fuel, water and fisheries and taxes on labor vs. on resource use and pollution/emission;
c. barriers to trade in environmental goods and services; and
d. existing (or lack of) regulations and standards such as vehicle emission standards and green public procurement requirements.[22]

The section uses these policy areas non-exhaustively to illustrate the reforms that are needed to enable green investments. A checklist for identifying enabling policies in general is provided in Box 8. The rest of this chapter will illustrate the assessments of some of these policy issues and the necessary reforms.

BOX 8 Checklist for identifying enabling policies

- How do existing policies affect mobilizing the amount of investment required for the desired sectors and locations (including large scale infrastructure projects)?
- To what extent do existing policies affect the effectiveness of the desired investments?
- What changes to these existing policies are needed to achieve the desired level and effectiveness of investments across sectors and locations?
- What new policies are necessary?
- Who are the potential winners and losers?
- What any "flanking" measures might be needed to ensure a fair and just treatment of those who are likely to be negatively affected by the policy change?
- Which mechanisms of social dialogue can ease the process of reform?

The assessment methodologies overlap across these different policies. They are also applicable to the assessment of the impacts of the required investments.

4.2 PUBLIC EXPENDITURE

Although the bulk of the investment for a green economy transition will ultimately have to come from the private sector, public investment and spending can play an instrumental role in the following areas, among others: 1) leveraging private sector financing via fiscal policies, which will be described in the next section; 2) financing public goods that would not be provided by private sector agents; and 3) stimulating markets by using sustainable public procurement practices.

4.2.1 Financing the provision of green public goods

Apart from its other identities, a government makes investments just like any other economic agent. Public investments typically focus on the provision of public goods such as energy and transport infrastructure that benefit society as a whole and that would not be provided to its full extent by a private investor. To enhance a green economy transition, these public investments should aim at enabling green markets and ensuring more efficient use of the environment and natural resources. Investments that fall under this category are, for example, the promotion of innovation in new technologies and investments in infrastructure needed to support a green economy transition such as public transport systems or smart grids.

To finance these investments, governments have a variety of sources at their disposal such as shifting existing resources into green public investments, leveraging new tax income for the provision of green public goods and issuing innovative fixed-income investment products such as green bonds.[23] In many countries, governments also make investments jointly with the private sector, such as in the case of mining and telecommunication sectors given their significance in supporting the national economy.

For developing countries, official development assistance also plays a pivotal role in financing investments in green sectors. Global aid in 2010-2011 by OECD-DAC members, which focused on the environment, amounted to US$25.4 billion.[24]

4.2.2 Stimulating green markets

Through sustainable procurement practices, governments can also stimulate markets and create high-volume and long-term demand for environmental goods and services with existing resources. Considering that the percentage of GDP spent on public procurement is estimated to range between 30 to 45 per cent in certain developing countries and economies in transition,[25] government procurement can set important market signals and provide incentives for the production and provision of environmental goods and services by its high volume of demand.

In considering public investment as a source of funding for green economy, we need to answer the following questions:

- In which sectors and areas does public investment occur?
- Does the current public investment pattern, including specific publicly supported large-scale infrastructure projects, contribute to or undermine the achievement of the selected priority targets? In which way? In which sectors and areas is more green investment needed to reach the defined green economy policy targets?
- Does the government use sustainable public procurement as a tool to stimulate green markets and sectors?
- What current investment options are resulting or may result in possible infrastructure "lock-ins" running against the achievement of the priority targets?
- What changes to the current public investment are needed to leverage private investment to move towards the desired sectors and locations?
- Who are the winners and losers of the required changes and how to ensure a fair and just treatment of the losers?

4.2.3 Fiscal policy

Governments use fiscal policy – the ways in which they collect and spend money – to regulate macroeconomic performance by influencing behaviour changes and achieve certain social objectives by controlling distribution of incomes as well. The analysis should start by determining the fiscal space. When an economy is in recession, for example, the government may increase public spending or reduce taxes to

stimulate economic activities. When the economy is overheated and inflation is on the rise, they may do the reverse. Fiscal policy may also be used to tax the wealthy and transfer payments to the poor.

Governments can also use monetary and exchange rate policies to effect economic growth and stability, which affect decisions on investments and have an important repercussion on the international balance of payments.

Fiscal measures can influence the flow and effectiveness of private investment towards desired sectors and locations. Subsidies for the use of natural resources, for example, tend to discourage investment in resource conservation. Removing such subsidies and redirecting them towards resource conservation can support the desired investment and leverage private investments. Similarly, taxes on labor discourage investment in labor intensive activities. Shifting taxes from labor to the use of natural resources is, therefore, expected to promote more job creation while encouraging investment in resource efficiency. For example, ecological tax reform in Germany over the period 1999-2003 raised taxes on energy and resulted in a 2.4 per cent reduction in carbon dioxide emissions and the creation of 250,000 jobs by 2003.[26]

The assessment of fiscal policy needs to answer the following questions, similar to the questions to be answered under the assessment of public investments and the political economy of policy reform:

- What is the overall fiscal situation – surplus or deficit?
- Is the fiscal situation sustainable? How is the current fiscal situation evaluated from a medium-long term perspective?
- What is the overall monetary situation – level of interest rate, price level and currency over-valuation or under-valuation?
- What are the major subsidy programmes or tax burdens/breaks and what is the scale of subsidy and tax related to green economy? What is the effectiveness in achieving their intended goals and how are they likely to affect the effectiveness of the investment required to achieve priority goals and targets?
- What changes are needed to the existing major subsidy programmes and taxes to provide a level playing field for the desired investment and to redirect the financial resources for supporting the desired investment?
- Who are the winners and losers of the required changes and how to ensure a fair and just treatment of the losers?

4.3 TRADE POLICY

Trade policy can be defined as the "laws related to the exchange of goods or services involved in international trade including taxes, subsidies and import/export regulations."27 Trade policy affects market access for exports and imports of goods and services, generating higher earnings in some sectors and lower earnings in others. Thus, it has a direct impact on the basket of goods and services that each country produces. With around a third of global GDP being accounted for by international trade in 2012, trade policy drives a significant portion of domestic income and production. As a result, trade policy also strongly impacts public and private investment, which tends to flow into the most productive sectors of the economy. International investment in particular tends to target sectors with a high volume of international trade.

A trade policy assessment in the green economy context addresses the following questions:

- What are the tradable goods and services implied by the priority sustainable development goals and targets (for example, solar panels and wind turbines may be implied if renewable energy is a priority)?
- Which of these implied goods and services have the potential to attract major investments, grow the home industries and best achieve the priority goals and targets?
- How do existing trade policies between trading partners affect the market access and value chain participation for the implied goods and services?
- What changes to which countries' trade policies (or new policies) and to international trade rules are required to promote and reduce barriers to international trade for the implied goods and services?
- How would the required changes to existing trade policies or new policies incentivise investments in the provision of the implied goods and services?
- Who are the winners and losers of the required changes and new policies and how to ensure a fair and just treatment of the losers?

4.4 REGULATORY MEASURES

Investments may be influenced not only by economic incentives – public expenditures, fiscal policy and trade policy; they can also respond to regulatory measures. For example, financial regulation plays a fundamental role in mobilising private investment at scale. To meet the large financing gap required for the green economy, investment should be understood broader than "green" or "development" finance; mobilising private finance for the green economy should be understood not only as "financing projects" (e.g., investment in renewable energies, affordable housing, proper water treatment, etc.), but also changing the way in which finance operates so that its own processes are sustainable and support sustainability. Financial institutions are enablers of the economy and, through their lending, investment and underwriting policies, can influence the behaviour of businesses from all sectors of the economy. To make a system-wide shift in the financial system, it requires the integration of financial regulation to the green economy. Box 9 discusses Public-Private Partnerships in the financial sector.

Assessment of the current regulatory situation in relation to green economy and the reforms needed should answer the following questions (with the financial sector as an example, but these questions are generally applicable to other regulatory issues):

— Considering the priority goals and targets, what existing rules and regulations tend to undermine their achievements (e.g., an environmental impact assessment of existing financial regulation may provide insights)? What are the necessary changes to these rules and regulations?
— Are there any barriers hindering financial business practices from aligning with environmental and social goals? If so, how could they be removed?
— Are there any new financial policy and regulation that need to be introduced (not necessarily more, but better coordinated regulation in line with green economy)?
— Have different green economy initiatives and policies put forward by the different ministries and departments aligned between each other and coordinated?
— How would these changes or new measures affect investments in relation to the priority goals and targets in particular?
— Who are the winners and losers of the required changes and new measures and how to ensure a fair and just treatment of the losers?

4.5 SKILLS AND HUMAN CAPACITY MEASURES

The greening of economies will often entail restructuring in production processes i.e. changing from energy and resource-intensive production processes towards more efficient models. It will also lead to the emergence or faster development of new economic activities. Both types of effects impact on the labour force and require that skills be updated so that workers can effectively respond to the demand of green transformations. Studies have shown that a lack of the skills needed to meet the requirements of changing and newly emerging occupations impedes green investment and hinders green economic development (ILO, 2011).

Employable skills are usually grouped by occupations. In the transition to greener economies, occupations will be affected in different ways, which can be grouped broadly into three categories: i) some occupations will not change at all; for example if a government decides to invest additional resources to expand protected areas, more national park rangers will be needed; ii) in other cases, established occupations will require new ways of working and thus skill upgrades will be needed to apply new technologies of management practices; iii) a third type of effect concerns new occupations created, which often call for higher-level qualifications, either because of their dependence on new technologies, or because they call for specific soft skills such as networking, organizational or consultancy skills, i.e. eco-designers, solar technicians (ILO, 2011).

A skill and human capacity assessment could address the following questions:

— Which structural changes are likely to occur as a result of greening economies and what re the labour implications?
— How will the greening of economies affect existing skills?
— Which economic sectors are emerging and what are associated skills needs and challenges?
— What are the investment needs to upgrade

existing skills, retrain workers and create skills for new occupations?

4.6 SOCIAL PROTECTION MEASURES

Green investments at scale will inevitably lead to structural transformations and economic restructuring. Often, there will be winners and losers. Those likely to incur losses are in economic sectors bearing heavy restructuring costs such as extracting industries or high carbon-emitting manufacturing. The shifts in the economy and in labour markets can vary according to economic sectors or geographical locations. Social protection measures will be needed to ease the transition for those most negatively affected. For example, income-support measures such as unemployment benefit and transfers will be central to economic sectors incurring major restructuring. Unlike in other structural transformations, changes associated with a greener economy can to a large extent be anticipated through and early identification of the opportunities and potential risks and losses (ILO, 2012).

On the other hand, investments in innovative social protection approaches can help create new opportunities for income generation, jobs and social inclusion. Several national initiatives exist including large-scale investments under the National Rural Employment Guarantee Act in India, the Expanded Public Works Programmes in South Africa or the Bolsa Verde programme in Brazil, a green income-support scheme paying poor households for environmental services they provide by protecting forests and marine life (ILO, 2012).

An assessment green economy policy and investments needs to ensure social inclusion could consider the following questions:

— How will the structuring changes affect different sectors and regions?
— Who are likely to be the winners and losers?
— Which social safeguards should accompany green investments and policy reforms?
— How much could it cost to provide social protection measures to vulnerable groups?

BOX 9 Public-Private-Partnerships in the financial sector

Collaborative approaches between relevant players, from policy-makers and regulators (environmental/ development and financial), to businesses (financial and non-financial), the scientific community and academia, are a prerequisite to mainstreaming sustainability in finance and economy at large. Sustainable finance frameworks are emerging internationally, demonstrating joint leadership between policy-makers, regulators and the financial sector to integrate sustainability considerations in financial thinking, with the overall goal to put economic / private sector growth on a more sustainable path. Examples that can be mentioned are: the Green Protocols in Colombia and Brazil, Nigeria's Sustainable Banking Principles, Kenya's Sustainable Finance Initiative, China's Green Credit Policy, Indonesia's Green Banking Policy, Japan's Principles for Financial Action towards a Sustainable Society, etc.

5 IMPACT ASSESSMENT

5.1 INTRODUCTION

To enable decisions on investments and enabling policies for achieving priority targets, there is a need to quantify and compare the impacts of potential interventions against a broad set of indicators.

Let us take energy efficiency as a hypothetical example. Supposing that improving energy efficiency per unit of GDP by 20 per cent by 2020 is a priority target for a country; the investment assessment shows a total of US$100 billion investment per year till 2020 in green buildings and public transport is required; this investment needs to be triggered by US$25 billion public investment per year: and reforming fossil fuel subsidy is to be introduced, what would be the impacts of potential interventions for achieving these targets on the government's fiscal status (government revenues and expenditures, fiscal balance) and on the private sector (GDP growth, employment as well as savings from reduced energy consumption and import) and inclusiveness (i.e. mobility for poor communities)+ apart from reduced carbon emissions? Box 10 provides a checklist for the impact assessment.

Most of the information required for the impact assessment is addressed in previous sections. This section focuses the guidance on establishing a set of indicators for measuring impacts beyond those related to the targets. It draws on the UNEP publication on "Using Indicators in Support of Green Economy Policy Making". Guidance on using modelling tools is covered in the next section.

5.2 ESTIMATE POLICY IMPACTS ACROSS SECTORS

It is important to ensure that a holistic approach towards assessment is taken. Given the degree of interdependence between social, economic and environmental spheres, a green economy policy implemented in one sector is likely to impact others. Hence, an integrated, cross-sectoral impact analysis of green economy policies should be carried out in order to provide a coherent evaluation of synergies, side effects and ancillary benefits.

For instance, greening the agriculture sector is expected to improve soil quality and increase yields and production and consequently farmers' incomes, but additional positive effects and synergies could include improvements in nutrition (social sphere), reductions in food imports (economic sphere) and reductions in the rate of deforestation (environmental sphere).

5.3 EVALUATE IMPACTS ON THE OVERALL WELL-BEING OF THE POPULATION

Several indicators can be used to estimate the impact of green economy policies on well-being – which is

BOX 10 Checklist for the assessment of policy impacts

- Listing out priority policy targets and baselines;
- List out 2-3 major means or technologies for achieving each target and related investment requirement;
- List out major enabling policies;
- Establish a set of indicators for measuring both the level of policy interventions and the impacts of the interventions for achieving the targets
- Use modelling tools to project the impacts of major interventions;
- Compare the impacts between alternative interventions and with BAU.

a key aspect of UNEP's definition of green economy – such as employment and income generation, total wealth including the value of natural resource stocks, access to resources, as well as health benchmarks.

For example, a number of well-being indicators can be considered when evaluating policies on green agricultural practices, both in terms of direct benefits, such as gains in employment or fewer cases of malnutrition, as well as indirect benefits, such as improving education levels arising from higher rural incomes or lower flood risks due to better land and water management.

At the macro-level, the impact of green economy policy interventions can also be estimated through compound indicators of well-being such as the Human Development Index, the Millennium Development Goals Indicators or the Inclusive Wealth Index.[28] While these can help to determine the aggregated impact of policies, they can be prone to subjectivity and are not able to highlight the underlying mechanisms of these aggregate indices. Value systems may influence the theoretical framework for the selection and combination of individual indicators as well as the relative weights given to these indicators.

5.4 ASSESS THE BENEFITS AND COSTS FOR INFORMED DECISION-MAKING

The initial step in undertaking an analysis of the benefits and costs of a policy lies in establishing a baseline and estimating the cost of inaction. Some examples include the costs of biodiversity loss (in terms of lost ecotourism dollars) or the costs of health treatment for respiratory diseases (in terms of as the number of people hospitalized and the cost of treatment). Subsequently, indicators that can quantify the costs of intervention should be identified. The cost of a policy may be one-off or recurring and could involve a multitude of stakeholders. For instance, improving forest conservation might entail raising salaries and benefits for park rangers as well as increasing management and operational costs for the establishment of forest protected areas.

At the same time, indicators of the benefits of a policy to all stakeholders can be identified. This includes damages avoided, the direct and indirect economic

impact as well as qualitative improvements of well-being. For example, economic benefits of forest conservation could increase revenue from forest products or ecotourism. However, it should be noted that such benefits are not necessarily restricted to monetary ones, as policies could have an impact on well-being: forest conservation could result in better air quality and fewer cases of respiratory diseases.

With the costs and benefits in mind, the selection of policy options can be weighed against criteria such as whether the policy would harness synergies between different sectors while at the same time avoid onerously burdening disadvantaged groups. A list of common assessment methodologies is in Box 11 and some examples of UNEP's experiences with applying its approach in assisting partner countries with carrying out policy assessments are in Box 12.

BOX 11 List of common assessment methodologies

— Cost-benefit analysis (CBA): consisting of a systematic process for calculating and comparing benefits and costs of a given decision, it is based on assigning a monetary value to all the activities performed (either as input or output). A cost-benefit analysis is normally project-based and it is narrowly focused on capital and O&M costs (or the investment required to implement a project) and its direct economic impacts. CBA makes it possible to compare aggregate economic costs and benefits at different points in time, normally using the concept of net present value and applying a discount rate.

— Cost-effectiveness analysis (CEA): a form of economic analysis that compares the relative costs and outcomes (effects) of two or more courses of action. It is broader than the CBA and includes the analysis of non-monetary impacts, evaluated qualitatively or ranked on a numerical scale.

— Multi-Criteria Analysis (MCA): a decision-making process that allows the assessment of different options against a variety of criteria. In contrast to CBA and CEA, a Multi-Criteria Analysis can be conducted in cases where multiple objectives and criteria exist. Further MCA includes both quantitative and qualitative indicators, and is more adequate for a cross-sectoral and multi-dimensional analysis.

BOX 12 UNEP's experiences in policy assessment

UNEP provides support to countries for the assessment of green economy policy options, making use of specific tools, such as indicators, scenario analysis and models, to elaborate quantitative projections of expected policy impacts across sectors and actors.

The Kenya Green Economy Assessment study (UNEP, 2014), undertaken by the Kenya Institute of Public Policy Research and Analysis (KIPPRA) on behalf of the Kenyan government, and with support from UNEP and other key partners, provides a quantitative assessment of economy-wide impacts of green investments in green technology and renewable energy development under different scenarios. Findings suggest that positive returns could be realized 7-10 years following the reallocation of public investments. More precisely, projections show that Kenya would achieve faster economic growth in the long run under a green economy scenario, with an average annual real GDP growth rate of 5 per cent between 2010 and 2030, as compared to 3.7 per cent under a business-as-usual (BAU) scenario. Moreover, the creation of new employment opportunities would lead to a per capita national income of about KSH 64,000 in 2030 under a green economy, compared to 53,000 under the BAU scenario. Finally, the environmental benefit of green investments would result in a 15 per cent reduction of CO_2 emissions by 2030, compared to BAU.

UNEP provided support also to the government of Mexico, for the assessment of green economy policies in various sectors, including, among others, water, forests and fisheries (UNEP, forthcoming). In particular, projections indicate that investments in water efficiency would reduce water losses and water intensity, thereby allowing to sustain economic and demographic growth with lower water requirements. More precisely, total water demand in the arid northern and central regions is projected to be 28.5 per cent lower under a green economy scenario compared to BAU in 2035. Moreover, reforestation policies for the preservation of primary forest cover would lead to a 28.6 per cent average annual reduction of annual emissions from deforestation by 2035, at the same time producing a 16.8 per cent increase in average annual income of forestry workers, due to additional reforestation jobs. Finally, the study shows how the combination of fishing capacity reduction and expansion of marine protected areas might create the conditions for fish stocks to regenerate sustainably.

The government of South Africa, in collaboration with UNEP, conducted a quantitative green economy policy assessment study (UNEP, 2013b). Results show that investment in a green economy can contribute to 46 per cent more restored land and greater water availability by 2030, without reducing land required for the agriculture sector. In addition, it could create jobs for an additional 169,000 people compared to a business-as-usual scenario. Moreover, targeted investments in organic agriculture could increase crop yields by as much as 23.9 per cent by 2030, while avoiding further CO_2 emissions. The study also shows that green investment in the transport sector is currently insufficient to meet the national energy efficiency goal of nine per cent by 2015.

Sources: United Nations Environment Programme (UNEP), United Nations Development Programme (UNDP) and Kenya Institute for Public Policy Research and Analysis (KIPPRA) (2014), *Kenya Green Economy Assessment;* United Nations Environment Programme (UNEP, forthcoming), *Green Economy Scoping Study – Mexico; and* United Nations Environment Programme (UNEP, 2013), *Green Economy Modelling Report of South Africa: Focus on natural resource management, agriculture, transport and energy sectors.*

6 MODELLING

6.1 THE ROLE OF MODELLING IN GREEN ECONOMY POLICY ASSESSMENT

In economics, a model is a "representation of an economic system, relationship or state".[29] In the context of a green economy, a model represents not only the economic system but also social and environmental systems and their interactions. A model usually takes the form of a computer programme or excel sheet that transforms input data into output results. A computer-based model consists of a set of relationships and data that are processed by dedicated software to produce the results that are coherent with such input. Modelling is the process of building and running a model including the determination of relationships between factors and the assessment of the strength of these relationships.[30]

Modelling is useful for a green economy policy assessment in four ways, by helping to:

— establish the relationship between a given policy target such as the percentage of population having access to clean water and policy measures required to achieve the target such as investing in forest conservation, water recycling and waste water treatment and water pricing measures;
— project the impacts of policy measures so as to enable the making of specific decisions. For example, water pricing measures, while having the potential to reduce water waste and increase water use efficiency, might also negatively affect poor people's ability to afford water. Such impacts need to be considered before a decision can be made;
— analyze the effects of existing policies that may undermine the achievement of the policy target in question; and
— identify synergies and cross sector impacts among policy choices. For example, subsidy for water use is not conducive to the target of improving water access. Such analyses need to be integrated into the consideration of policy measures, which in many cases represent reforms to existing policies.

This section provides guidance on how to design and organize a green economy modelling exercise. It is intended to:

— assist managers of green economy analytical projects in designing and monitoring the modelling work with technical support from modelers; and
— provide basic knowledge and broad guidelines on the major steps required in developing terms of references for modelers.

Further details on green economy modelling may be found in a forthcoming UNEP publication on a comparison of major modelling approaches to a green economy policy assessment.[31]

6.2 MAJOR STEPS

Modelling green economy policy assessment starts with defining the scope of the model, including time, space, scale and logical boundaries. As each country has its own unique context, the most appropriate and effective green economy issues should be identified. These could come from the production/supply side, or the consumption/demand side, or they can be related to poverty reduction. Altogether, they constitute the major components of an integrated model. For the purpose of a green economy policy assessment, the major elements for a proposed modelling exercise could include:

1. policies (including investments, large scale infrastructure projects) or changes thereof are required to achieve a given policy target (or several targets);
2. cross-sector impacts of the required policies or policy reforms on what key economic, social

BOX 13 Methodologies for modelling

Methodologies for modelling are broken into two categories. One is data frameworks, which include: indicators, Input-Output (I-O), Social Accounting Matrix (SAM), and Geographic Information System (GIS), which are "static" and can be used in two ways: 1) in isolation, to investigate and understand the history and current state of system; and 2) embedded in simulation models, to generate simulations of future trends for all the indicators included in the framework selected.

The other is modelling approaches, which refer to the underlying mathematical theories and frameworks that can be used to create and simulate (or solve) quantitative simulation models. These methodologies could, therefore, be considered "dynamic" as they allow the generation of projections into the future. They include: econometrics, optimisation and System Dynamics (SD).

DATA FRAMEWORKS

Indicators: An indicator is an instrument that provides an indication, generally used to describe or give an order of magnitude to a given condition. Indicators provide information on the historical and current state of a given system, and are particularly useful to highlight trends that can shed light on causal relations among the elements composing the system and in analyzing whether progress is made in reaching a given policy target. For a detailed discussion on using indicators for green economy policymaking (UNEP, 2014a).

I/O: The I-O framework depicts inter-industry relationships within an economy or across economies, estimating how output from one sector (such as cement) may become an input to another sector (such as construction). Inputs and outputs can be measured in economic (e.g., the monetary value of trade) and physical terms (e.g., material flows and emissions, or employment).

SAM: This is an accounting framework that captures the transactions and transfers between the main actors in the economy. As a result, for any given year, the SAM provides information on the monetary flows that have taken place between, for instance, the government and households, ensuring that all inflows equal the sum of the outflows. The focus on households makes the SAM "social", and makes it an adequate backbone for Computable General Equilibrium (CGE) and other macroeconomic models to carry out analysis that spans across the whole economy.

GIS: This is a system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data. In the simplest terms, GIS is the merging of cartography, statistical analysis and computer science technology, and is used to analyze land use changes.

MODELLING APPROACHES

Econometrics: This approach measures the relation between two or more variables, running statistical analysis of historical data and finding correlation between specific selected variables. It includes three stages – specification based on economic theory, estimation and forecasting. The structure of the system is specified by a set of equations, describing both physical relations and behavior and their strength is defined by estimating the correlation among variables using historical data. Forecasts are obtained by simulating changes in exogenous input parameters that are then used to calculate a number of variables forming the structure of the model (e.g., population and economic growth).

Optimization: This approach generates "a statement of the best way to accomplish some goal" (Sterman, 1988). Optimization leads to models that are normative or prescriptive and provide information on what to do to make the best of a given situation. On the other hand, they do not generate extensive insights on what might happen in such situation or what the impact of actions may be. Policymakers often use optimization models to define what the perfect state of the system should be in order to reach the desired goals -information that allows them to formulate policies intended to reach such perfect state of the system and, ultimately, their goals.

SD: This approach is used to create models that are descriptive and focuses on the identification of causal relations influencing the creation and evolution of the issues being investigated. Models based on SD such as T21 are in fact most commonly used as "what if" tools that provide information on what would happen in case a policy is implemented at a specific point in time and within a specific context.

and environmental dimensions of sustainable development; and

3. ways in which these impacts compare with different policy and investment options, as well as with a BAU scenario.

The next step would be chosing a particular model, preceded by selecting the methodology. Strictly speaking, methodology refers to the way of analysing the relationships among different variables, formalizing them into equations and estimating the strength of these relationships. The selection of the methodology depends on how ready and flexible the methodology is to include green economy analytical components. Major methodologies of relevance to a GEPA are listed in Box 13.

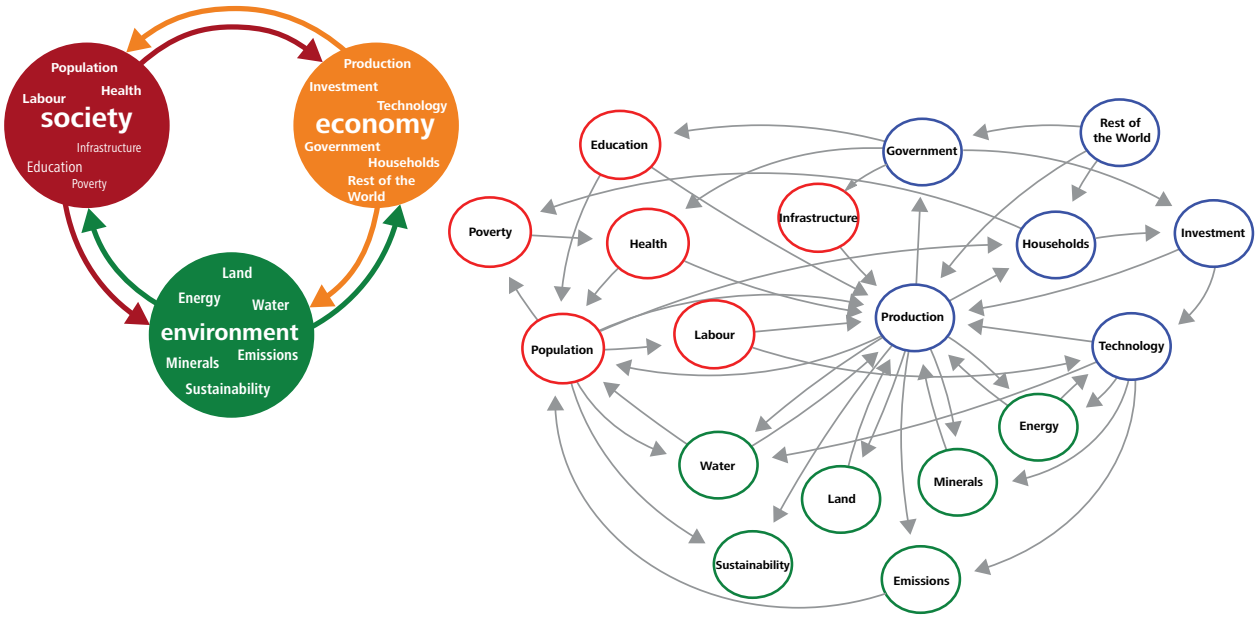
Models are specific applications of methodologies. Once the methodology is selected, a specific model could then be chosen. This could include the major methodologies such as I-O and SAM, which are both e a methodology and a model.

Each model may well use more than one methodology and it is also possible to combine several models into a large one. For example, the T21 model is based on the SD methodology, but it also uses SAM to enforce consistency among sectors and the optimisation and econometrics methodologies to estimate parameter values.

T21 is the model used in UNEP's Green Economy Report and is increasingly used in countries where UNEP and its partners offer green economy advisory services. Figure 5 illustrates the major components and relations among across the social, economic and economic aspects of sustainable development as well as the relations at the production level. Major models of relevance to green economy scenario assessments are listed Box 14. Key considerations in selecting the model for a GEPA are presented in Box 15.

Data gathering and analysis follows the selection of a specific model. This step covers the major objects of modelling – policy targets, policy interventions and impacts of policy interventions – as well as the basic contextual data, including both endogenous variables such as GDP and population as well as exogenous variables such as total land that condition the results of modelling. It should be noted that the availability of data affects the choice of the methodology and model. Some data such as GDP and total land can be obtained from international sources such as the World Bank and FAO. Others, such as policy intervention

Figure 5. Subsystem diagramme of the Threshold 21 model



BOX 14 Models for green economy policy assessment

I-O and SAM: These are empirical modelling tools that rely on the construction of a matrix or table listing all subsectors in an economy and detailing how outputs from one sector are used as inputs in others. They answer the question, for example: "how many jobs could be created by investing US$1 million in a given sector, and what would be direct and indirect number of jobs created?" Environmental applications of I-O models include accounting of ecological footprints, embodied emissions and embodied primary resources, material flows, life-cycle impacts of products, waste flows, and impacts of policies within and across sectors.

Energy/other system engineering models: MARKAL/TIMES is an energy system model to optimise energy optimize to minimize production costs. WASP also an energy system model for long-term electricity generation planning including environment analysis. LEAP is another energy system model for integrated energy planning (including demand and supply) and greenhouse gas mitigation assessment, applicable at local, national and regional levels.

InVEST (The Integrated Valuation of Environmental Services and Trade Offs) is a family of models that quantifies and maps the values of environmental services. It is designed to help local, regional and national decision-makers incorporate ecosystem services into a range of policy and planning contexts for terrestrial, freshwater and marine ecosystems, including spatial planning, strategic environmental assessments and environmental impact assessments.

CGE (Computable General Equilibrium Model): These models, which can be either static or dynamic, represent the main economic flows within and across the key actors of the national economy. Most governments use them to generate short to medium term economic projections. CGEs take I-O tables and SAMs a step forward, allowing the generation of future projections while ensuring internal consistency. The most notable CGE model is global – the GTAP (Global Trade Analysis Project) – which lends its database to several country applications. Also, the World Bank's MAMS (Maquette for MDG Simulations) is available for over 50 developing countries.

T21 (Threshold 21): This is an example of the System Dynamics model designed to support comprehensive, integrated long-term development planning. T21 integrates economic, social and environmental factors in its analysis, thereby providing insight into the potential impact of development policies across a wide range of sectors, and revealing how different strategies interact to achieve desired goals and objectives. The economy sphere contains major production sectors (agriculture, industry and services). An SAM is used to elaborate the economic flows and to balance supply and demand in each of the sectors. The social sphere contains a demographic model and, among others, calculates employment, as well as education (both demand and supply) and health. The environment sphere tracks CO_2 and GHG emissions from fossil fuels, as well as consumption of natural resources (both renewable and non-renewable), such as land use, energy and water.

costs and local impacts, are usually collected locally. If there are uncertainties in some data, such as temperature change projections, the range of values and level of uncertainty (or variations) are accordingly collected.

It is essential to ensure that the model is transparent and user friendly enough that, after some technical training in weeks, users can run the model, validate the parameters and equations of the model, undertake sensitivity tests on the parameters and possibly expand the model to meet the demands of constantly evolving policy requirements. A well-designed model interface would simplify these processes and allow non-technical and non-trained users to run the model.

Finally, it is critical to ensure that the ownership of the model is shared by those who sponsor the GEPA and the national government, which would allow both parties to apply the model freely within the country and to update the source code, if needed.

BOX 15 Major considerations in model selection

The structures and contents of the model could be important to determine if it is ready to include green economy analytical components.
To integrate these components, the model should have at least several key sectors as well as the key relationships among the sectors:

1. Population with age cohorts to support employment, education, subsidies and more;
2. Income distribution consistent with the Gini coefficient;
3. Production functions with labour, capital and investment;
4. Government accounts of revenues and expenditures;
5. Stocks of resources, including land, water and energy;
6. Social services of education, health care and poverty reduction;
7. Energy and renewable energy;
8. Agriculture; and
9. SAM to enforce internal consistency among sectors.

In addition to these consideration, model selection also needs to consider: 1) the level of model's contribution to the key components of the GEPA – investment assessment, enabling policies, policy impacts on the economic, social and environmental dimensions of sustainable development; 2) complementarity with other methodologies/ models and their capability to involve a variety of stakeholders in model development and use; and 3) the ease of their creation and use, as in many developing countries, data, time, financial and technical resources may be scarce and the trade-offs between using different models need to be addressed.

7 PRESENTING GREEN ECONOMY ROADMAPS

Green economy is a tool for achieving sustainable development. Green economy assessments are thus conducted, at the country level, to find policy interventions that can achieve specific sustainable development goals and targets. Towards the end of the assessment, analysts need to communicate effectively the analytical results to policymakers and make a case – in a way accessible to average citizens – for green economy policy interventions. One of the ways to achieve this is by highlighting the priority goals, targets and indicators of sustainable development in the country's context and by describing the participatory process that has led to a societal agreement on the priorities.

In addition, specific, time-bound targets and related indicators could used to show the corresponding baselines and trends in order to allow for an appreciation of the gaps between the desired destinations and the status quo. It would also be useful to show the investment required, across sectors (and geographic locations where appropriate) and over time by illustrating how different sources of funding – public, private, domestic, external, equity, debt, etc. – may be mobilized to finance the required investments.

Furthermore, analysts could point out which policies – public investments, subsidies, taxation, trade, regulatory measures – can enable the shift of investment in the required amount towards the relevant sectors and locations over the required period of time, or can enhance the effectiveness (rather than undermining or competing with) the required investments. It is essential to focus the policy discussions on the potential effects on the required investment.

Beyond their effects on the required investments, enabling policies also have broader impacts on other issues, such as GDP growth, jobs, fiscal burden, income distribution and inclusive wealth, even though not all of these aspects are included in the national sustainable development goals and targets. Similarly, the required investment, apart from its impact on the achievement of the related targets, also has broader societal impacts. Analysts need to present the system-wide impacts of both the investment required and the enabling policies in a single framework across a range of key indicators (UNEP, 2014a; GGKP, 2014) – e.g., effects of the required investment plus reforming a perverse subsidy or a taxation policy or trade policy.

There is also need to draw conclusions based on, for example, the comparison of two or three policy packages – each with a different amount of the required investment (which could depend on technological choices), varying sectoral and spatial allocation, time horizon, amount of public investments, sources of funding, and combination of enabling policies. In this regard, it would be useful to show – in a matrix – how these packages score on all major fronts, but first and foremost, on the achievement of priority goals and targets. This exercise could continue and cover a range of indicators beyond the priority targets, including economic, social and environmental dimensions of sustainable development, across sectors. The demands that each package make on implementation capacity should also be indicated.

After having completed the green economy policy assessment, the next step would be to present the results of the assessment to policymakers for consideration. However, before any formal decision is made on whether to go ahead with a particular policy package or not, it would be constructive to conduct debates on the implications for major stakeholders, in particular those who tend to hold

up any decision. Additional efforts are often needed to provide further explanation of the results from the assessment, refine the priority targets and policy proposals, and revise the assessment. At the same time, sustained capacity building effort is needed to enable major stakeholders to effectively participate in the green economy policy process, including in the implementation of policies that are eventually adopted.

Annex. Summary of generic sectoral goals, and possible policy options

Sector	Goals	Enabling conditions			
		Investment	Fiscal policies	Capacity building	Institutions
Agriculture	• Food security • Reduce poverty • Create rural jobs • Reduce pressure on the environment	• Resource efficient technologies • Ecological farming practices • Post harvest storage • Research and development	• Market price premium • Elimination of perverse subsides (e.g., pesticides and fossil fuels) • Organic agriculture incentives	• Training programs on green farming practices • Information and communications technologies • Public awareness and educational initiatives	• Financial institutions • Private investors • NGOs • Global agribusiness corporations • Public sector
Water and Sanitation	• Achieve MDGs for water in 2015 • Halve the number of people without access to water and sanitation in 2030 • Efficient use of water	• Water efficient infrastructure and technology • Non traditional sources of water (e.g. desalination) • Small local water supply systems	• Removal of harmful subsidies and policies (e.g. input subsidies) • Fiscal measures (e.g. tax revenues, tariffs, etc.) to finance water infrastructure	• Education and information programs	• Government • Private investors • Local communities • Nongovernmental organizations
Renewable energy	• Universal access to modern energy services • Renewable energy penetration • Emission reduction	• Renewable energy assets • R&D and production • Clean development mechanism	• Phasing out of subsides for fossil fuel • Carbon tax • Feed-in tariffs • Public Financing mechanisms	• Demonstration projects • Knowledge spillovers from R&D in renewable energy technologies	• Governments • Private institutions • Bilateral and multilateral agencies • Formal and informal financial institutions
Forests	• Manage forestry sector as an asset • Eliminate deforestation	• Protected areas • Forest certification • Planted forests • Agroforestry	• Payments for environmental services (PES) • Incentives for certified activities	• Improved information on forest stocks, flows and cost-benefit distribution • Research on ecosystem services	• Governments • Financial institutions • NGOs • Private Investors and communities • Public investors
Buildings	• Reduce carbon footprint • Improve access to water and basic sanitation through green buildings	• New technologies (e.g. for heating and cooling) • Sustainable building materials • Design and engineering expertise	• Energy or carbon taxes • Property tax exemptions • Grants and rebates • Subsidized loans	• Building codes and standards, green building design, energy auditing, labeling and certification, etc.	• Governments • Institutional investors • Energy service companies • Private sector
Fisheries	• Rebuild overfished and depleted fish population to reach sustainable yield	• Adjust fishing capacity • Manage transitions in labor markets • Scientific research	• Environmental Fiscal Reform • Redirection of harmful subsidies to green activities	• Awareness programs on fish consumption • Re-training programs for fishermen • Best practices	• Fishermen communities • Management institutions • Public and private financial sectors • Public Private Partnership(PPP)
Manufacturing	• Life-cycle approaches that enable dematerialization and expanded service systems • Constantly improve resource efficiency	• Closed-cycle manufacturing • Energy and water efficient technology • Support transition to green jobs	• Abolishment of perverse subsidies • Taxation on waste emissions and/or materials extraction • Incentives to invest in green technologies	• Consumer awareness and education programs • Environmental impact assessments • Retraining of workers and technicians	• Governments • Public institutions • Public-private partnerships (PPP)
Waste	• Minimization of material use and waste generation • Recycling and reuse of waste • Recovery of energy from waste	• Collection services • MSW management infrastructure • Reclaiming contaminated sites	• Volumetric landfill taxes • Pay-as-you-throw (PAYT) • Recycling credit • Deposit-refund	• National certification programs • Creative reuse of wastes • Training for waste workers in the informal sector	• Municipalities • Public sector • Community based organizations • NGOs • Small enterprises
Transport	• Expand public transport • Constantly improve resource efficiency	• Public transport infrastructure • Green vehicles and fuels • Remote work	• Taxes on fossil fuels • Congestion charges • Subsidies for low carbon vehicles and transport modes	• Public information • Mobility management, labeling of new cars and driver education • Best practices	• Public sector • International donors • Private investors • Public- private partnership (PPP)
Tourism	• Energy and water efficiency • Conserve biodiversity and cultural heritage • Generate local income	• Infrastructure • Environmental conservation • Technology improvements	• Tax reduction and subsidies • Payment for environmental services (PES)	• Labor force skills • Public awareness campaigns on sustainable tourism	• Governments • Tourism industry • International development institutions
Cities	• Reduce carbon emissions and pollution • Minimize environmental risks	• Public transport infrastructure • New smart monitoring and metering devices	• Tax incentives and removal of harmful incentives • Land and licence plate auctioning	• Green education into school curricula • Demonstration projects	• Private sectors • Universities and NGOs • Civil society • Municipal sectors • Governments

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[12] http://www.undp.org/content/undp/en/home/mdgoverview/mdg_goals/mdg7/

[13] For example, in the above example related to slums, a note has been added to the indicator: "The actual proportion of people living in slums is measured by a proxy, represented by the urban population living in households with at least one of the four characteristics: (a) lack of access to improved water supply; (b) lack of access to improved sanitation; (c) overcrowding (3 or more persons per room); and (d) dwellings made of non-durable material". With a more specific definition of proxy indicators, progress on this target can be directly measured by the number of slum dwellers gaining access to improved water source, sanitation facilities, sufficient living space or durable housing.

[14] http://ecowatch.com/2013/11/07/worlds-richest-countries-spent-500-billion-fossil-fuel-subsidies/

[15] http://www.biofuelstp.eu/legislation.html

[16] http://www.accountability.org/images/content/2/0/207.pdf

[17] McKinsey & Company. (2009). *Pathways to a Low-Carbon Economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve*, p. 3.

[18] Mike Young suggested that one way of getting the investment estimates is to subject the target-driven investments to competitive bidding.

[19] Accessible at: http://www.depi.vic.gov.au/environment-and-wildlife/environmental-partnerships/innovative-market-approaches/bushtender

[20] World Bank Policy Research Working Paper, "Development Goals: History, prospects and Costs", by Shantayanan Devarajan, Margaret J. Miller and Eric V. Swanson.

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[22] Several country examples of such measures can be found in UNEP's 2012 "Study on the impacts of sustainable public procurement on sustainable development: Eight illustrative case studies".

[23] Green bonds have been successfully issued by the World Bank since 2008. This innovative financing product spurred interest of governments to use green bonds as a way to attract private capital for green investments. For further information on green bonds refer to Treichelt, Heike. (2010): "Green bonds: a model to mobilise private capital to fund climate change mitigation and adaptation projects", in *The Euromoney Environmental Finance Handbook 2010,* pp. 1-7.

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