



GREEN economy

Assessment Report

Kenya





Copyright © United Nations Environment Programme, 2014

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UNEP would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

Citation

UNEP. (2014). Green Economy Assessment Report – Kenya

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

Front cover photo: UN Photo

Back cover photos: Above, Curt Carnemark/World Bank; middle, Peter Prokosch; below: Joy of Seth.

UNEP promotes environmentally sound practices globally and in its own activities. This publication is printed on 100% recycled paper, using vegetable inks and other eco-friendly practices. Our distribution policy aims to reduce UNEP's carbon footprint.

TABLE OF CONTENTS

iv	List of figures
iv	List of tables
iv	List of boxes
v	Acknowledgements
1	Foreword
2	Key messages
6	1 Introduction
8	1.1 The concept of a green economy
9	1.2 Context of the study – objectives, process and partners
10	2 Macroeconomic profile and overarching challenges to the economy
10	2.1 Macroeconomic profile
11	2.2 Environmental footprint
12	2.3 Social profile
16	2.4 Policy and legal landscape
17	3 Key sectors identified
17	3.1 Agriculture sector
17	3.1.1 Current policies
17	3.1.2 Greening the agriculture sector
19	3.2 Energy sector
19	3.2.1 Current policies
21	3.2.2 Greening the energy sector
21	3.3 Manufacturing sector
23	3.3.1 Current policies
23	3.3.2 Greening the manufacturing sector
25	3.4 Transport sector
25	3.4.1 Current policies
25	3.4.2 Greening the transport sector
26	4 Greening model scenarios
28	4.1 Sector modelling and formulation in T21
28	4.1.1 Agriculture
28	4.1.2 Energy sector
29	4.1.3 Transport infrastructure (roads)
30	4.2 Definition of scenario and assumption used to simulate green economy interventions
30	4.2.1 Overview of results
34	5 Discussion of policy-enabling conditions
34	5.1 Regulations and standards
34	5.2 Fiscal policy instruments
35	5.3 Institutional and policy processes to support reforms
36	5.4 Financing
38	6 Conclusion and key recommendations
39	Annexes
42	Notes
44	References

LIST OF ACRONYMS

AAP	Africa Adaptation Programme
AFD	Agence Française de Développement
ASALs	Arid and Semi-Arid Lands
ASDS	Agricultural Sector Development Strategy
BAU	Business-as-usual
CAADP	Comprehensive African Agricultural Development Programme
CDM	Clean Development Mechanism
CIDA	Canadian International Development Agency
CIL	Chandaria Industries Ltd.
DANIDA	Danish International Development Agency
DfID	UK Department for International Development
EAC	East African Community
EAs	Environmental Audits
EIAs	Environmental Impact Assessments
EITI	Extractive Industry Transparency Initiative
FiT	Feed-in Tariff
GDP	Gross Domestic Product
GKI	Greening Kenya Initiative
GDI	Gross Domestic Income
GHG	Greenhouse gas
HACCP	Hazard Analysis Critical Control Point
HDI	Human Development Index
INTP	Integrated National Transport Policy
IVM	Integrated Vector Management
KBS	Kenya Bureau of Standards
KNBS	Kenya National Bureau of Statistics
KNCP	Kenya National Cleaner Production Centre
KES	Kenyan Shilling
KTDA	Kenya Tea Development Agency
LCPDP	Least Cost Power Development Plan
LPG	Liquefied Propane Gas
MDGs	Millennium Development Goals
MEAS	Multilateral Environmental Agreement Strategy
MEAs	Multilateral Environmental Agreements
MEWNR	Ministry of Environment, Water and Natural Resources
MRTS	Mass Rapid Transit System
MTP	Medium-Term Plan
MVEC	Motor Vehicle Emissions Control
NAMAs	Nationally Appropriate Mitigation Actions
NCCAP	National Climate Change Action Plan
NCCRS	National Climate Change Response Strategy
NEMA	National Environment Management Agency
NEPAD	New Partnership for Africa's Development
PPPs	Public-Private Partnerships
R&D	Research and Development
RECP	Resource Efficient and Cleaner Production
REDD	Reducing Emissions from Deforestation and Forest Degradation
SAM	Social Accounting Matrix
SD	System Dynamics
SMEs	Small and Medium-Sized Enterprises
SPS	Sanitary and Phytosanitary Measures
T21	Threshold 21
TFP	Total Factor Productivity
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

UNFCCC	United Nations Framework Convention on Climate Change
USAID	US Agency for International Development
VAT	Value-Added Tax
WTO	World Trade Organization
WWF	World Wildlife Fund

LIST OF FIGURES

- Figure 1. Kenya and sub-Saharan Africa average 2004-2012
- Figure 2. Sources of growth
- Figure 3. Energy consumption in Kenya
- Figure 4. Sources of electricity generation in Kenya
- Figure 5. Cross-sectoral linkages in the T21 model
- Figure 6. Causal loop diagram – green economy effects of investment on agricultural production
- Figure 7. Tree diagramme – power generation by source
- Figure 8. Stock and flow diagramme – power generation by source
- Figure 9. Trends in real GDP growth rate in BAU, BAU2% and GE2% scenarios
- Figure 10. Trends in national poverty rate in BAU, BAU2% and GE2% scenarios
- Figure 11. Trends in average agricultural yield in BAU, BAU2% and GE2% scenarios
- Figure 12. Trends in fossil fuel CO₂ emissions in BAU, BAU2% and GE2% scenarios

LIST OF TABLES

- Table 1. Selected indicators of natural capital and environment in Kenya
- Table 2. Poverty and inequality in Kenya, 1993-2006
- Table 3. Incidence of poverty and inequality in Kenya per province (%), 2006, 2005
- Table 4. Policy and legal landscape provisions for a green economy
- Table 5. Modules, sectors and spheres of the T21-Kenya Model

LIST OF BOXES

- Box 1. Just their cup of tea: sustainable farm management brews confidence
- Box 2. Policy sweetens rural livelihood; sugarcane energizes economy
- Box 3. Tissue company plying cleaner production practices
- Box 4. Public transport: speeding up green economy transition

LIST OF ANNEXES

- Annex 1. Green economy investments – simulated and analysed
- Annex 2. Impacts of climate change – simulated and analysed
- Annex 3. Main results of the quantitative scenario analysis, selected years

Currency: At the time of the research in 2012, the exchange rate was US\$ 1 = KES 80.7

ACKNOWLEDGEMENTS

This study was commissioned by the United Nations Environment Programme (UNEP), at the request of the Ministry of Environment, Water and Natural Resources, on behalf of the Government of the Republic of Kenya. It was conducted by the Kenya Institute for Public Policy Research and Analysis (KIPPRA), with the support of the Washington-based Millennium Institute and the valuable research input from International Institute for Sustainable Development (IISD). The study is the result of national stakeholder consultations held in February 2012 and September 2012, as well as regional stakeholder consultations held in April 2012 for communities in the coastal region, with funding from the World Wildlife Fund (WWF).

UNEP is grateful for the financial support provided by the European Commission and the Government of The Netherlands.

Representatives of the following institutions led the project:

Ministry of Environment, Water and Natural Resources

Alice Kaudia, Charles Mutai

United Nations Environment Programme

Kofi Vondolia, Moustapha Kamal Gueye, Patrick Mwesigye

United Nations Development Programme

Tim Scott

Kenya Institute for Public Policy Research and Analysis

Dickson Khainga, Rhoda Wachira, Wilfred Nyangena, Naomi Mathenge, Geoffrey Sikei

Millennium Institute

Andrea M. Bassi, Zhuohua Tan

Members of the Inter-Ministerial Committee on Green Economy:

Ministry of Environment, Water and Natural Resources

Moses Omedi, Stephen King'uyu, Fatuma Mohamed, Isabella Masinde, Simintei Kooke

The National Treasury

Peter Odhengo, Erastus Wahome, Obadiah Mungai

Ministry of Devolution and Planning

Joshua Opiyo, Florence Were

Ministry of Energy and Petroleum

Esther Wangombe

Ministry of Land, Housing and Urban Development

Mary Ndungu

Ministry of East African Affairs, Commerce and Tourism

David Gitonga

Ministry of Agriculture, Livestock and Fisheries

Michael Obora

Kenya Cleaner Production Centre

Jane Nyakang'o

Kenya Association of Manufacturers/Kenya Private Sector Alliance

Martha Cheruto, Suresh Patel

World Wide Fund for Nature

Jackson Kiplagat

Green Africa Foundation

John Kioli

UNEP would like to thank Jason Dion (IISD), Veronika Gyuricza (International Energy Agency) and Kazuo Matsushita (Institute for Global Environmental Studies) for their valuable research input and comments.

At UNEP, the project was managed by Joy Kim, under the overall guidance of Steven Stone, Chief of the Economics and Trade Branch, and Desta Mebratu, Deputy Director, Regional Office for Africa. Mamadou Diakhite and Asad Naqvi contributed to the report. Administrative support was provided by Désirée Leon, Fatma Pandey and Rahila Somra. The report was edited by Qurratul-Ain Haider, Diwata Hunziker, Leigh Ann Hurt and Dambudzo Muzenda. The layout design was done by Thomas Gianinazzi.



Solar energy is finding its way into Kenya's energy mix/African Solar Design

FOREWORD

Kenya has one of the most dynamic economies in Africa, yet it is facing a number of pressing economic, environmental and social challenges. From climate change and natural resource depletion to high poverty rates and rising unemployment, the country is addressing these concerns through its commitment to a low-carbon and resource-efficient development pathway.

In recent years, Kenya has adopted several green economy-related approaches and policies, which include implementing renewable energy feed-in tariffs in 2008, embedding sustainable natural resource utilization into its 2010 Constitution and mainstreaming green economy in its Second Medium Term Plan (2013-2017).

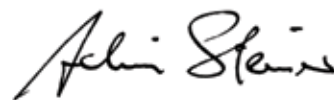
Kenya is already moving towards a green economy. However, there is still untapped potential to pursue a development pathway that will create green jobs, accelerate poverty reduction, support sustainable growth and restore environmental health and quality. With targeted policy interventions and financing, the country can continue to generate new opportunities from this transition.

In this context, the Ministry of Environment, Water and Natural Resources, in partnership with UNEP, commissioned a study to assess the economic benefits and challenges of investing in priority economic sectors in support of Kenya's transition to a green economy. Conducted in collaboration with the Kenya Institute of Public Policy Research and Analysis (KIPPRA) and the Millennium Institute, the study examines investments under "business-as-usual" (BAU) compared to green economy scenarios in four key sectors that are critical for the country's green growth, namely: agriculture, energy, manufacturing and transport.

The results of this assessment will contribute not only to the realisation of Kenya's Vision 2030, but also to the ongoing debate on how the transition to a green economy can serve as an enabler of sustainable development, poverty alleviation and green job creation.



Judi W. Wakhungu
Cabinet Secretary
Ministry of Environment, Water & Natural Resources
Republic of Kenya



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

KEY MESSAGES

KENYA IS EMBARKING ON A NEW ERA OF DEVELOPMENT.

In response to a number of pressing economic, environmental and social concerns – such as the increasing rural to urban migration, need for job creation for youth, and degradation of valuable ecosystems – Kenya has established key policies and programmes for a green economy:

- The country has developed a national climate change response strategy and action plan, and seeks to embrace a low-carbon development pathway that is inclusive and equitable, and contributes to its global competitiveness.
- Through the Greening Kenya Initiative (GKI), the government has developed a database on green economy activities, which highlights efforts on the manufacturing of eco-friendly materials, tree planting, organic farming, fish farming, renewable energy, eco-labelling, solid waste management and environmental management, among others.
- The country's long-term development blueprint, Kenya Vision 2030, launched in 2008, aims to transform the country into “a newly industrializing, middle-income country, providing a high quality of life to all its citizens in a clean and secure environment” by 2030.
- The Constitution of Kenya 2010, in Article 42, recognizes a healthy environment as a right and calls for “sustainable exploitation, utilization, management and conservation of the environment and natural resources.”
- More recently, the government's Medium-Term Plan (2013-2017) endorsed the development of a comprehensive national green economy strategy.

THE NEXT WAVE OF INVESTMENT AND INNOVATION IN KENYA WILL BE DRIVEN BY THE NEED FOR NEW ENERGY SOURCES, WEALTH GENERATION AND JOB CREATION.

For instance, green investments are expected in renewable energy, resource-efficient and clean

production, pollution control, waste management, environmental planning and governance, and the restoration of forests and other vital ecosystems.

- Roughly 42 per cent of the country's GDP is derived from natural resource sectors, such as agriculture, mining, forestry, fishing and tourism, while 42 per cent of the total employment comes from small scale agriculture and pastoralism. Under a green economy scenario, an investment in “resource conservation” and “agriculture capital” can lead to an increase in agriculture production, and thus increase GDP, investment and employment opportunities.
- Under a green economy scenario, real per capita income in Kenya is expected to nearly double by 2030, outpacing income growth under business-as-usual (BAU) scenario.

THE TRANSITION TO A GREEN ECONOMY CAN DELIVER IMPORTANT BENEFITS, SUCH AS RELATIVELY HIGH LONG-TERM ECONOMIC GROWTH, A CLEANER ENVIRONMENT AND HIGH PRODUCTIVITY.

The quantitative analyses undertaken to assess the economy-wide impact of green investments, under different scenarios, shows that significant positive returns can be realized after only seven to 10 years.

- In the short-term (from 2010 to 2020), in spite of costs associated with green economy investments, growth in GDP would not be substantially different compared to business-as-usual. However, the prices of goods and services, costs of operations and technology choices could create different welfare costs and benefits for different segments of the population in the short-term which require careful attention and “social protection floors” as needed to ensure a smooth and just transition.
- In the long-term (from 2010 to 2030), the analysis finds that a green economy scenario results in faster economic growth and increased wealth creation opportunities. For example, under a green economy scenario, national real

GDP is projected to exceed the BAU investment scenario by 12 per cent by 2030. Furthermore, green economy investments can yield several positive impacts in the medium to long-term across all sectors in the economy.

GREEN ECONOMY-RELATED INVESTMENTS IN THE AGRICULTURE, ENERGY, MANUFACTURING AND TRANSPORT SECTORS COULD HELP LOWER ENERGY CONSUMPTION AND CARBON EMISSIONS. While CO₂ emissions are projected to increase from 12 million tonnes per year in 2012 to 24.35 million tonnes per year in 2030 in the agriculture and energy sector alone, under a green economy scenario, emissions would be approximately nine per cent lower than BAU investment scenario (26.7 million tonnes).

The Mau Forest complex in Kenya provides goods and services worth US\$1.5 billion a year through water for hydroelectricity, agriculture, tourism and urban and industrial use, as well as erosion control and carbon sequestration. Alternative accounting has helped spur the government of Kenya to invest in rehabilitating the area and its vital ecological services.

Examining various green economy investment scenarios, the report proposes sector-specific policy interventions that have been validated through multiple consultations with stakeholders.

AGRICULTURE

Agriculture accounts for about one quarter of Kenya's GDP, and an estimated 64 per cent of households are engaged in farming activities, while 84 per cent of rural households keep livestock. Given the vital role of natural capital in the Kenyan economy, smart investment in agriculture can boost productivity and protect scarce natural resources. Average agricultural yield under the green economy investment scenario would exceed that of the BAU investment scenario by about 15 per cent by 2030.

While the report finds that the same amount of investments allocated to the agriculture sector under BAU would result in increased yields in the

short-term, it would also result in increased use of chemical fertilizers and lower soil quality, which would reflect negatively on yields in the medium and long term.

Thus, the report outlines the benefits of scaling-up efforts in agro-forestry; sustainable water management, such as rainwater harvesting for irrigation; education, training and capacity building, mainly in soil and water management; and research and development. By supporting green agricultural practices, such as organic farming, fish farming and post-harvest loss reduction, Kenya can enhance job creation, nutrition and food security.

ENERGY

Green energy investments could lead to about a 2 per cent reduction in energy consumption and an expanded supply of electricity from renewable sources compared to a BAU investment scenario. Under the green economy investment scenario, renewable energy is projected to double geothermal power capacity by 2030, compared to the BAU investment scenario. Other renewables would also grow during this period, contributing to 20 per cent of the total power supply.

The report also outlines several options that the government could pursue in this sector, including adopting targeted clean energy solutions for households and institutions, such as energy-efficient lighting and appliances, and providing additional investment in renewable sources, such as geothermal, solar, wind and biofuel energy. In addition, the report finds that the distribution of renewable energy and small-scale off grid systems has the potential to contribute substantially to environmental conservation and increased access to electricity.

MANUFACTURING

Even though the contribution of the manufacturing sector to GDP has levelled off at about 10 per cent over many years, Kenya still has one of the largest manufacturing sectors in Sub-Saharan Africa. While the sector is challenged by high energy costs and

poor infrastructure, as well as weak and fragmented policy coordination, it has been identified as one of the key pillars of the Kenya Vision 2030 and various initiatives are underway to strengthen its productivity and competitiveness.

The report finds that public policy support is needed to scale-up current efforts towards greening the sector, including eco-labelling, recycling and re-use, and the production of eco-friendly materials. Also, public policy could go further to support resource-efficient and clean production processes; and, mandatory energy-efficiency audits for large manufacturers could be considered as part of the country's overall energy-management strategy.

TRANSPORT

Kenya's transport sector is growing rapidly, and as a result, so are its emissions, which are reportedly expected to triple between 2010 and 2030. In the last decade alone, the number of vehicles on the road doubled for instance. This is further exacerbated by limited public transport, which is mostly dominated by privately-owned mini buses and a lack of emission standards.

The report recognizes that the government has taken significant steps to regulate the sector and reduce harmful pollutants. However, it suggests the government could consider taking further action by creating incentives that would lower the age profile of Kenya's passenger and freight vehicle fleet; promoting mass transit, especially rail and public transport; and, integrating land use and transport planning to enhance efficiency.

KEY COMPONENTS OF A GREEN ECONOMY TRANSITION

AN OVERALL ENABLING POLICY ENVIRONMENT THAT UNDERPINS A GREEN ECONOMY IS FUNDAMENTAL FOR THE SUCCESS OF SECTOR-SPECIFIC GREEN INITIATIVES AND INVESTMENTS.

The underlying institutional and policy processes, regulations and standards, financial resources and fiscal instruments that support Kenya's transition to a green economy are essential components of the overall strategy.

- **FISCAL POLICY INSTRUMENTS.** Aligning fiscal policy instruments, including taxation, subsidies, procurement and public expenditure allocations, is vital for the transition to a green economy. In this regard, Kenya can review the existing revenue, expenditure and taxation policy landscape and identify areas where pricing instruments can be introduced, subsidies can be eliminated or incentives could be provided to support resource efficiency and increase employment. Key design issues, including impact on the poor, administrative costs and impact on competitiveness, need careful consideration.
- **FINANCING.** Continued participation in international climate financing mechanisms, and engaging with the Green Climate Fund, National Appropriate Mitigation Actions (NAMAs) and Reducing Emissions from Deforestation and Forest Degradation (REDD), among others, can help ease fiscal pressures and attract private sector participation in green investment. Other areas of actions include demonstrating transparency and solid fiscal management to attract international and domestic funding; encouraging the transition to a green economy through Kenya banks, asset managers and bankers associations, for example to create a National Climate Fund; introducing and enforcing environmental taxes; and facilitating the participation of the private sector through Public-Private Partnerships (PPPs).
- **INSTITUTIONAL AND POLICY PROCESSES TO SUPPORT REFORMS.** Most green economy initiatives are multi-sectoral and involve multi-stakeholder participation. In this regard, a coordinated and strategic approach is essential to align policies and support. These approaches include sustainable public procurement that promotes green products and services; engaging local communities and county governments in the formulation and implementation of green policy interventions; encouraging transparency, participation and accountability in the exploitation of Kenya's natural resources; improving collection and dissemination of green economy related data such as biodiversity inventories, GHG emission inventories and environmental satellite accounts; and engaging internationally on the appropriate international policy environment needed for a green economy.

- **REGULATIONS AND STANDARDS.** There are important opportunities for Kenya to enhance compliance and enforcement of existing regulations and standards, such as those related to biodiversity, energy, noise, quality of water, waste disposal and management, and physical planning to support the transition to a green economy. Various standards are increasingly being applied in international trade, such as Sanitary and Phyto-sanitary measures (SPS) and Hazard Analysis and Critical Control Point (HACCP) regulations, which relate to food safety and animal and plant health; and technical standards, which relate to product standards and labelling. These are equally important for competitiveness and access to emerging new international markets.

RECOMMENDATIONS FOR ACTION

A roadmap for moving Kenya to a globally competitive green economy by 2030, consistent with the goals of Kenya Vision 2030 and the provisions of the Constitution of Kenya 2010, could consider the following priority actions and guiding principles:

- Recognize that the green economy transition will support the goals of Kenya Vision 2030, by pursuing the country's development as a priority;
- Design green economy policies to create youth employment, especially given Kenya's demographic profile;
- Engage stakeholders, including industry, civil society and the public at national and county levels, to facilitate participation and buy-in;
- Consider sector-specific policy scenarios and options for a transition to a green economy to help inform policy on potential costs, risks and opportunities, trade-offs and the range of sector strategies;
- Align fiscal policy instruments to enhance renewable energy and encourage job creation in Kenya;
- Leverage international assistance frameworks aimed at enhancing aid effectiveness, to support a green economy. This could include climate finance mechanisms as well as international financial and technological support schemes;
- Adopt environmental and technical standards to ensure Kenya is not disadvantaged by the changing institutional framework governing international trade; and
- Strengthen data collection, data quality and the reach of the national statistical system to support policy formulation, monitoring and evaluation of the transition to a green economy.

Finally, the report demonstrates how Kenya's continued leadership to advance its green economy, combined with targeted policy interventions and financing in key sectors can rapidly boost opportunities to accelerate this transition, while maintaining its broader development goals. More specifically, the report underscores that Kenya's green economy approach has the potential to build a transformative development pathway that will create green jobs, accelerate poverty reduction, support sustainable growth, and restore environmental health and quality as a foundation for future prosperity and well-being.



Souvenir market in Kenya/World Bank Photo Collection

1 INTRODUCTION

Article 42 of Kenya's 2010 Constitution recognizes a clean and healthy environment as a right and calls for "sustainable exploitation, utilization, management and conservation of the environment and natural resources".

Kenya's key policies and programmes for a green economy include investments in renewable energy, promotion of resource-efficient and clean production, pollution control and waste management, environmental planning and governance, and restoration of forest ecosystems. The country has developed a national climate change response strategy and action plan and seeks to embrace a low-carbon development pathway that is inclusive and equitable, and that contributes to Kenya's global competitiveness. Through the Greening Kenya Initiative (GKI), the government has developed a database on green economy activities, which include the manufacture of eco-friendly materials, tree planting, organic farming, fish farming, renewable energy, eco-labelling, solid waste management and environmental management.

USING THE KENYA T21 MODEL, QUANTITATIVE ANALYSES INDICATE THAT A TRANSITION TO A GREEN ECONOMY HAS IMPORTANT POTENTIAL BENEFITS, SUCH AS RELATIVELY HIGH LONG-TERM ECONOMIC GROWTH, A CLEANER ENVIRONMENT AND HIGH PRODUCTIVITY. The study reveals that significant positive returns will be realized after seven to 10 years. In the short run, some green economy investments may be associated with adjustment costs so that the gain in Gross Domestic Product (GDP) is not substantial compared to (BAU). Green economy policies associated with short-run changes in the prices of final goods and services, costs of operations and technology choices may create different welfare costs and benefits for different segments of the population. However, in the long run, green economy results in faster economic growth. Kenya's national real GDP is projected to exceed the baseline by 12 per cent by 2030. The economy-wide results indicate that green economy investments yield several positive impacts in the medium to long-term period across all sectors.

AVERAGE AGRICULTURAL YIELD UNDER THE GREEN ECONOMY SCENARIO WOULD EXCEED THE SAME UNDER THE BAU INVESTMENT SCENARIO BY ABOUT 15 PER CENT BY 2030. The same amount of investments allocated to the agriculture sector in the BAU case would result in increased yields in the short run but a more extensive use of chemical fertilizers. The latter result is projected to lower soil quality, which reflects negatively on yield in the medium- and long-term.

GREEN ENERGY INVESTMENTS WOULD LEAD TO A 2 PER CENT REDUCTION IN ENERGY CONSUMPTION AND EXPANDED SUPPLY OF ELECTRICITY FROM RENEWABLE SOURCES RELATIVE TO BAU. Energy savings are projected to reach 1.8 GWh and the share of geothermal in total power supply to reach 20 per cent by 2030.

A GREEN ECONOMIC GROWTH PATH FOR KENYA WOULD CONTRIBUTE TO A RELATIVELY CLEANER AND HEALTHIER ENVIRONMENT, AS ENVISAGED IN KENYA VISION 2030. Green economy-related investments in agriculture and energy would contribute to low energy consumption and carbon emissions. As a result, although CO₂ emissions are projected to increase from 12 million tonnes per year in 2012 to 24.35 million tonnes per year in 2030 under green economy investments, emissions would be approximately 9 per cent lower than the BAU case (26.7 million tonnes), when the same level of investments are effected.

Policy simulations based on green investments under different scenarios, complemented by multi-stakeholder consultations, propose the following sector-specific policy interventions:

AGRICULTURE SECTOR: Sustainable water management such as rainwater harvesting for irrigation; education, training and capacity building mainly in soil and water management; different crop strains and species; agroforestry and livestock management; and research and development. The authorities should also support green agricultural practices, such as organic farming, fish farming, and post-harvest loss

reduction to support job creation, nutrition and food security.

ENERGY SECTOR: Targeted clean energy solutions for households and institutions, such as energy-efficient lighting and appliances; investment in renewable sources, such as geothermal, solar, wind and biofuel energy. Renewable energy and small-scale off grid systems have the potential to contribute substantially to environmental conservation and to increased access to electricity.

MANUFACTURING SECTOR: Public policy should support scaling up of current efforts towards greening the sector, including eco-labelling, recycling and re-use, and production of eco-friendly materials, as well as resource-efficient and clean production processes. Mandatory energy-efficiency audits for large manufacturers should be considered as part of the overall energy management strategy.

TRANSPORT SECTOR: The government should pursue incentives to facilitate the transition of Kenya's passenger and freight vehicle fleet to one with a lower age profile; promote mass transit, especially rail and public transport; and integrate land use and transport planning to enhance efficiency.

An overall enabling policy environment that underpins a green economy is fundamental for the success of sector-specific green interventions and investments. In order to support Kenya's transition to a green economy, the following essential components have been identified:

INSTITUTIONAL AND POLICY PROCESSES TO SUPPORT REFORMS. Most green economy initiatives are multi-sectoral and involve multi-stakeholder participation. In this regard, a coordinated and strategic approach is essential to align policies and support. These approaches include public procurement that promotes green products and services; engaging local communities and county governments in the formulation and implementation of green policy interventions; encouraging transparency, participation and accountability in the exploitation of Kenya's natural resources;

improving collection and dissemination of green economy related data such as biodiversity inventories, GHG emission inventories and environmental satellite accounts; and engaging internationally on the appropriate international policy environment needed for a green economy.

REGULATIONS AND STANDARDS. Kenya needs to enhance compliance and enforcement of existing regulations and standards, such as those related to biodiversity, energy, noise, water quality, waste disposal and management, and physical planning to support the transition to a green economy. Various standards are increasingly being applied in international trade, such as Sanitary and Phytosanitary measures (SPS) and Hazard Analysis and Critical Control Point (HACCP) regulations, which relate to food safety and animal and plant health, and technical standards, which relate to product standards and labelling. These are equally important for competitiveness and access to international markets.

FISCAL POLICY INSTRUMENTS. Aligning fiscal policy instruments – including taxation, green subsidies, procurement and public expenditure allocations – can support the transition to a green economy. In this regard, Kenya should review the current environmental tax landscape and identify areas where taxes or charges can be introduced, eliminated or raised to support environmental protection, conservation and resource efficiency. Key design issues, including impact on the poor, administrative costs and impact on competitiveness, need to be appropriately addressed.

FINANCING. Continued participation in international climate financing mechanisms, such as the Green Climate Fund, National Appropriate Mitigation Actions (NAMAs) and Reducing Emissions from Deforestation and Forest Degradation (REDD), can help ease fiscal pressures and attract private sector participation in green investment. Other actions include demonstrating transparency and solid fiscal management to attract international funding, encouraging the transition to a green economy through domestic sources of financing (e.g., creating a National Climate Fund), introducing

and enforcing environmental taxes, and facilitating the participation of the private sector through Public-Private Partnerships (PPPs).

Consistent with the goals of Kenya Vision 2030 and the provisions of the Constitution of Kenya 2010, a roadmap for moving Kenya to a globally competitive green economy by 2030 should consider the following priority actions and guiding principles:

- Recognize that the green economy transition should support the goals of Kenya Vision 2030, i.e. pursuing the country's development as a priority;
- Take cognizance of the impact of green economy policies on youth employment during decision-making, given Kenya's demographic profile;
- Engage stakeholders, including industry, civil society and the public at national and county levels, to facilitate participation and buy-in;
- Consider sector-specific policy scenarios and options for transitioning to a green economy to help inform policy on potential costs, risks and opportunities, trade-offs and the range of sector strategies;
- Align fiscal policy instruments to support a green economy in Kenya;
- Leverage international assistance frameworks aimed at enhancing aid effectiveness to support a green economy. This should include climate finance mechanisms as well as international financial and technological support schemes;
- Bear in mind that environmental and technical standards will become increasingly important in international trade and that Kenya should move to ensure it is not disadvantaged by the changing institutional framework governing international trade; and
- Strengthen data collection, data quality and the reach of the national statistical system to support policy formulation, monitoring and evaluation of the transition to a green economy.

1.1 THE CONCEPT OF A GREEN ECONOMY

In recent years, interest in the 'green economy' has grown rapidly, due largely to economic, social and environmental challenges, including climate change, natural resource depletion, inequality, unemployment and loss of biodiversity and ecosystem services. The UNEP *Green Economy Report* defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.¹ It entails essentially a low-carbon, resource-efficient and socially-inclusive economy. The concept presents a new paradigm in development thinking, emphasizing growth that is friendly to the earth's ecosystems and that can also contribute to poverty alleviation. It is an approach to achieve sustainable development and requires a transformation of production and consumption ways into one that enhances and preserves environmental quality, while using energy, water and natural resources more efficiently.

There is no generic model for a green economy. The specific case of Kenya requires an emphasis on achieving the goals of Kenya Vision 2030, Kenya's long-term development blueprint. Kenya Vision 2030 aims to transform Kenya into "a newly industrialising, middle-income country providing a high quality of life to all its citizens in a clean and secure environment."² Sustainable growth in Kenya requires modernization, meaning huge investments in infrastructure and increased demand for electricity. In addition, Kenya is experiencing increased rural-to-urban migration and needs to create employment opportunities for a large, youthful population. Kenya is embarking on a new era of development with recent discoveries of oil, natural gas, coal and other minerals. Undertaking a green economy transition now can allow the country to take advantage of growing revenues and invest in a development pathway that puts people and livelihoods at the forefront.



Kenyan woman holding sorghum/Bioversity International

1.2 CONTEXT OF THE STUDY – OBJECTIVES, PROCESS AND PARTNERS

The aim of this study is to identify how Kenya can transition its key sectors – agriculture, energy, manufacturing and transport – towards a green economy pathway. It provides a profile of the country in terms of its economy, environment, socioeconomic context and policy landscape. An overview of the key sectors for greening the economy as well as the modelling done to assess the impacts of a transition to green economy is discussed. The report also provides the key findings and outlines the policy-enabling conditions and a roadmap for moving forward.

The basis of this report is the work undertaken by the Kenya Institute for Public Policy Research and Analysis (KIPPRA) and the Ministry of Environment, Water and Natural Resources (MEWNR) in partnership with UNEP to develop a Green Economy Assessment Report. The report was produced in collaboration with relevant UNEP and international experts through a participatory and consultative process that involved various key stakeholders, to ensure a maximum degree of ownership.

The International Institute for Sustainable Development (IISD) provided research assistance, drawing on UNEP publications, including the *Green Economy Report*. Through a multi-stakeholder consultation workshop, four sectors were identified, namely, agriculture, energy, manufacturing and transport.

The study relied on quantitative and qualitative economic analysis in order to generate policy advice and recommendations. In addition to a desk literature review and stakeholder consultations, this study has benefited from the application of an integrated planning model called Threshold 21 (T21) based on investment simulations to assess the impact of a transition to a green economy. T21 is a dynamic simulation tool designed to support comprehensive and integrated long-term development planning. The model 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 objectives. The model was originally developed as part of the Africa Adaptation Programme (AAP) that was supported by the United Nations Development Programme (UNDP).

2 MACROECONOMIC PROFILE AND OVERARCHING CHALLENGES TO THE ECONOMY

2.1 MACROECONOMIC PROFILE

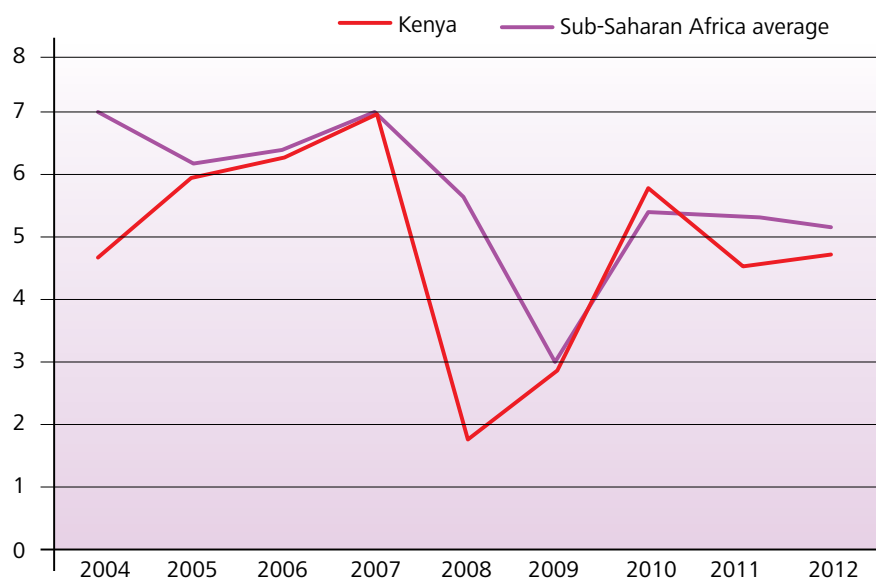
Kenya's economy is the largest within the East African Community (EAC), which comprises Burundi, Kenya, Rwanda, Tanzania and Uganda. Nonetheless, Kenya is considered a low-income country with an estimated GDP per capita of US\$862 in 2012 (World Bank, 2013). Between 2003 and 2007, the economy registered sustained economic growth and by 2007, GDP growth reached 7 per cent. This growth was not sustained due to multiple shocks emanating from a political crisis in 2007/08, drought, high global energy and food prices and the global financial crisis. Economic growth fell to 1.5 per cent in 2008, before increasing to 2.7 per cent in 2009. In 2010, the economy grew by 5.8 per cent and slowed to 4.4 per cent in 2011 and 4.6 per cent in 2012.³ Nonetheless, in the recent past, Kenya's growth has remained below the sub-Saharan Africa average (see Figure 1).

Agriculture is one of the leading sectors, accounting for about one quarter of Kenya's GDP. An estimated 60 per cent of all households are engaged in farming activities and 84 per cent of rural households

keep livestock. Roughly 64 per cent of all Kenyan households live in rural areas.⁴ Around 42 per cent of GDP is derived from natural resource sectors (namely agriculture, mining, forestry, fishing, tourism, water supply and energy), which account for more than 70 per cent of employment. The services sector, which includes transport and communication, wholesale and retail trade, financial and other services, accounts for about half of GDP. The share of the manufacturing sector in GDP has stagnated at about 10 per cent indicating that the rate of industrialization has been slow.⁵

Recent trends in key macroeconomic variables reveal that, although external demand for Kenyan goods and services has increased, growth has largely been driven by increases in domestic demand, especially private consumption and investment. Private consumption accounts for about three quarters of GDP. Savings and investment rates were estimated at about 13.2 per cent and 21 per cent respectively in 2011. The economy's performance in terms of external trade in goods and services also came under considerable pressure. Kenya's external current account deficit increased from about 2.3

FIGURE 1. GDP GROWTH: KENYA AND SUB-SAHARAN AFRICA, 2004-2012



Source: International Monetary Fund (IMF), World Economic Outlook Database, October 2013.

per cent of GDP in 2006 to 11.9 per cent in 2012. The worsening external current account position has largely been due to a rapid growth in key imports, especially oil, capital goods and machinery, compared to growth in exports.

While it is relatively strong by regional standards, Kenya's performance in terms of mobilization of fiscal resources has come under increased pressure in the recent past. Revenue collection as a percentage of GDP increased from about 20.2 per cent in 2007/08 to about 22.07 per cent in 2010/11. On the other hand, total expenditure as a percentage of GDP increased from about 27.3 per cent to about 29.5 per cent over the same period. The fiscal deficit (excluding grants) increased from 5.3 per cent in 2007/08 to 7.2 per cent in 2009/10 and is estimated at about 5 per cent in 2010/11. The government's fiscal target is to reduce the fiscal deficit to below 4 per cent of GDP in the medium term.

Kenya's total debt to GDP ratio has also increased in the recent past, from about 41.2 per cent of GDP in 2008 to 48 per cent in 2010. There has been increased reliance on domestic borrowing. The share of domestic debt in total debt increased from 40 per cent in 2006 to 50.3 per cent in 2010. In the recent past, the main sources of fiscal pressure arise from:

- the need to sustain economic recovery in the face of external shocks including drought, high

oil prices and the global financial and economic crisis;

- weak revenue performance due to subdued economic performance;
- increased investment in infrastructure consistent with the medium-term plan targets; and
- the obligation to implement the 2010 Constitution, which provides for a devolved government system of 47 county governments.

2.2 ENVIRONMENTAL FOOTPRINT

A country's ecological footprint is the area of productive land and aquatic ecosystems required to produce resources and assimilate wastes at a specific material standard of living, wherever that land may be located.⁶ For Kenya, this was 1.11 ha/person in 2007, compared to a global average of 2.7 ha/person and a global average biocapacity of 1.8.⁷ Although Kenya's ecological footprint per person is considered low and is below the global average biocapacity, the country continues to move rapidly into a state of "ecological overshoot", or simply, the rate at which natural resources are depleted faster than the rate at which they are replaced. This is reflected in the 37.5 per cent increase in Kenya's ecological footprint from 0.8 in 2003 to 1.11 in 2007.

Table 1 shows selected indicators of natural capital and the environment in Kenya.⁸

TABLE 1. SELECTED INDICATORS OF NATURAL CAPITAL AND THE ENVIRONMENT IN KENYA

RESOURCE	CURRENT SCENARIO
Wetlands	5 Ramsar sites*
Fresh water endowment	548 m ³ per capita per year against UN recommended threshold of 1 000 m ³ per capita per year
Biodiversity**	• Over 6 500 plant species, more than 260 of which are found nowhere else in the world. • More than 1 000 bird species. • Over 350 species of mammals.
Forest cover	6 per cent against a Constitutional target of 10 per cent***
Electricity consumption (TWh)	6.52****
Carbon dioxide emissions (Mt of CO ₂)	11.64 (CO ₂ emissions from fuel combustion only) *****
Combustible renewables and waste (Mt of oil equivalent)	13 871.8*****
Combustible renewables and waste (% of total energy)	77.9*****
Energy production (Kt of oil equivalent)	15 130.4

* Source: NEMA, Kenya State of Environment and Outlook, 2010.

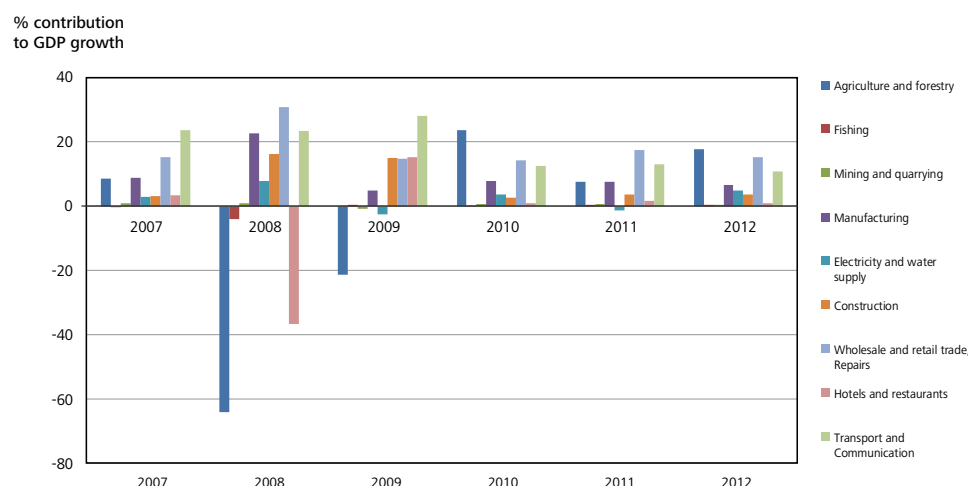
** Source: <http://www.virtualkenya.org/pdf/Booklet2.pdf>

*** Source: Food and Agricultural Organization, 2010.

**** Source: International Energy Agency, 2011.⁹

***** Source: <http://www.tradingeconomics.com/kenya/combustible-renewables-and-waste-percent-of-total-energy-wb-data.html>

FIGURE 2. SOURCES OF GROWTH



Source: Kenya National Bureau of Statistics, 2013.

Literature from various sources indicates that most of these resources are already strained as a result of increasing anthropogenic activities.¹⁰ Human activities and settlements have brought unprecedented change to Kenya's ecosystems. At the same time, extreme weather events, such as droughts and floods, are increasingly affecting food security and agricultural production and have contributed to high vulnerability and degradation of land and desertification. Concerns about environmental degradation and sustainable development have grown steadily over the last few decades, especially as economic growth becomes increasingly dependent on the exploitation of natural/biological resources. The main characteristics of such environmental degradation include overexploitation, industrial pollution, deforestation, soil erosion, desertification, loss of biodiversity, water scarcity and degraded water quality, poaching and domestic and industrial pollution. Human conflict and human-wildlife conflict are becoming increasingly common in resource-scarce areas, mainly in northern and north-eastern Kenya, where there have been instances of clan clashes over water resources and grazing lands.

The strain on ecosystems is especially apparent in the arid and semi-arid lands (ASALs), which make up more than 80 per cent of Kenya's total land mass and are home to over 10 million people, about a quarter of Kenya's total population. The ASALs have large natural endowment in terms of livestock,

wild game and minerals. More than 70 per cent of the national livestock population in Kenya is found in the ASALs, 90 per cent of the wild game that supports much of the tourism sector and much of Kenya's potential and exploited commercial mineral wealth are in the ASALs. Yet, the ASALs have the lowest development indicators and highest poverty incidence in the country, which is aggravated by environmental degradation, insecurity, climatic shocks and disease. However, there is a growing recognition that the ASALs have the potential to accelerate development and contribute to economic transformation.¹¹

2.3 SOCIAL PROFILE

The country's population was 39.5 million in 2011.¹² In 2011, the primary working-age population (15-64 years) was estimated to be 54 per cent of the total population, with a labour force participation rate of about 73 per cent. The country is still in the early stages of demographic transition, characterized by a large proportion of youth. About 53 per cent of the Kenyan population falls within the 0-19 year age bracket.¹³

Kenya faces various employment challenges. Overall unemployment is estimated at 8.6 per cent, with the unemployment rate for youth (15-35 years) being higher, at 10.4 per cent. The rate of unemployment varies across the country, with the highest in the

north-eastern regions at about 23 per cent and the lowest in Nyanza and the western regions, estimated at 4.8 per cent and 5.2 per cent, respectively.¹⁴ The level of under-employment (i.e. the proportion of employed people involuntarily working less than the normal hours of work) is also relatively high. The rate of under-employment of the labour force was 18 per cent in 2009. This rate was higher in rural areas than in urban areas. The informal sector remains the major employer, accounting for about 80 per cent of total recorded employment (Economic Survey, 2013). The predominance of informal employment raises policy questions about the quality of employment.

National absolute poverty in Kenya, based on the national poverty line – KES 1,239 (US\$15.4) and KES 2,648 (US\$32.8) per person per month for rural and urban areas respectively – declined slightly from 52.3 per cent in 1997 to 45.9 per cent in

2005/06. However, there are disparities between rural and urban poverty rates (Gakuru and Mathenge, 2012). Rural poverty declined from 52.9 per cent to 49.1 per cent, while urban poverty declined from 49.2 per cent to 33.7 per cent during the same period. The 2009 Oxford Poverty and Human Development Initiative report on multi-dimensional poverty in Kenya estimated that 27.4 per cent of the population in Kenya is vulnerable to poverty, while 19.8 per cent of the population lives in severe poverty. Overall estimates of poverty and youth unemployment levels (2005/06) show that there has been general improvement, declining from 56.0 per cent and 27.2 per cent in 1999/2000 to 45.9 per cent and 24.3 per cent in 2005/06, respectively. Table 2 shows the average poverty incidence and inequality (measured using the Gini coefficient, a measure of inequality) across regions.¹⁵ However, there are important rural, urban and regional disparities in poverty and inequality levels (Table 3).

TABLE 2. POVERTY AND INEQUALITY IN KENYA (%), 1993-2006

	1992	1994	1997	2000	2006	2011*
Poverty						
Urban	29.30	29.00	49.20	51.50	33.70	—
Rural	46.00	46.80	52.90	59.60	49.10	—
Total (urban and rural)		40.00	52.30	56.80	45.90	49.70
Inequality (%)	56.9	44.3	41.9	—	45.2	—

Source: Kenya National Bureau of Statistics and KIPPRA, 2012

* KIPPRA estimate based on the KIPPRA poverty model. The most recent household survey for poverty estimates is 2006.

TABLE 3. INCIDENCE OF POVERTY AND INEQUALITY IN KENYA PER PROVINCE (%), 2006

Province	URBAN		RURAL	
	Incidence of poverty	Inequality	Incidence of poverty	Inequality
Central	49	48	31	37
Coast	47	36	63	36
Eastern	51	44	59	34
North Eastern	61	36	64	29
Nyanza	63	39	65	34
Rift Valley	54	35	47	35
Western	68	45	60	34
Nairobi	44	38	—	—

Source: Kenya National Bureau of Statistics, 2006.

TABLE 4. POLICY AND LEGAL PROVISIONS FOR A GREEN ECONOMY

	STATE PROGRAMME/ STRATEGY/ACTION PLAN	PROVISIONS	MAIN IMPLEMENTATION AGENCY
Overall national development			
1	Constitution of Kenya 2010	- Article 42 recognizes a clean and healthy environment as a right. - Article 60 (c) calls for sustainable and productive management of land resources - Article 69 [(a)-(h)] declares that the State shall ensure sustainable exploitation, utilization, and protection of genetic and biological diversity; establish a system for environmental impact assessment; and achieve and maintain a tree cover of at least 10 per cent of the land area of Kenya.	Government of Kenya
2	Kenya Vision 2030	Over-reaching vision and overall policy framework for sustainable development	Ministry of Devolution and Planning
	First Medium-Term Plan, 2008-2012: Kenya Vision 2030	Programmes and projects for 2008-2012: restoration of ecosystems, including rehabilitation and protection of the five water towers (Mau, Mt. Kenya, Aberdares, Cheregany and Mt. Kenya); preparation of national land use plan, waste management systems, exploration and mining, invasive species, geological mapping, renewable energy and sustainable land use.	Ministry of Devolution and Planning
	Second Medium-Term Plan, 2013-2017	Some programmes and projects for 2013-2017 include: strengthening environmental governance; waste management and pollution control; rehabilitation of urban rivers; rehabilitation and protection of the water towers, forest and wildlife conservation and management; promotion and piloting of green energy; review of water resources management; land reclamation; implementation of the NCCRS and development of a national green economy strategy.	Ministry of Devolution and Planning
4	Population Policy for National Development (PPND)	PPND recognizes the impact of rapid population growth on Kenya's development goals and proposes a multi-sectoral approach to address this issue, with a focus on voluntary family planning.	Ministry of Devolution and Planning
5	Physical Planning Act	Reserve all land planned for open spaces, parks, urban forests and green belts.	Ministry of Lands, Housing and Urban Development
6	Local Government Act (Revised)	Utilization of sewage systems including removal and destruction of refuse and effluents	Ministry of Devolution and Planning
6	Arid and Semi-Arid Lands (ASALs) National Vision and Strategy: Natural Resource Management, 2005-2015	Sets out the overarching principles and broad actions required to transform the Kenyan ASALs into national wealth and employment creators.	Ministry of Devolution and Planning
Health			
7	Public Health Act	Provisions concerning sanitation and health	Ministry of Health
Agriculture			
8	Agricultural Sector Development Strategy (ASDS) 2010-2020	ASDS seeks to progressively reduce unemployment and poverty in Kenya through agriculture, and to spur agriculture back to growth trends.	Ministry of Agriculture, Livestock and Fisheries
9	Agriculture Act	Promotes and maintains stable agriculture and provides for conservation of soil and its fertility; aims to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry	Ministry of Agriculture, Livestock and Fisheries
10	Agriculture (Farm Forestry) Rules 2009	Promotion and maintenance of farm forest cover of at least 10 per cent of every agricultural land holding and preservation and sustenance of the environment in combating climate change and global warming	Ministry of Agriculture, Livestock and Fisheries
Energy			
11	Draft National Energy Policy - Third Draft	Aims to facilitate provision of clean, sustainable, affordable, reliable and secure energy services at least cost, while protecting the environment.	Ministry of Energy and Petroleum
12	Feed-in Tariffs for Renewable Energy Resource Generated Electricity- Guide for Investors	- Accelerates the development of green energy, including wind, solar and renewable biomass. - Instrument to promote generation of electricity from renewable energy sources	Ministry of Energy and Petroleum

	STATE PROGRAMME/ STRATEGY/ACTION PLAN	PROVISIONS	MAIN IMPLEMENTATION AGENCY
Energy			
13	Least Cost Power Development Plan (LCPDP)	Identifies affordable, low-cost energy sources for Kenyans.	Ministry of Energy and Petroleum
14	Scaling up Renewable Energy Programme (SREP) – Investment Plan for Kenya	GoK and various actors in the Kenyan society seek to use the benefits of SREP in low-income countries to achieve their goals in energy, in a way that improves environmental, economic, social and productive development.	Ministry of Energy and Petroleum
15	Sessional Paper No. 4 of 2004 on Energy	Sessional Paper No. 4 identified the need to integrate energy planning with the national economic, social and environmental policies, as energy is a critical input in the socioeconomic progress of any economy.	Ministry of Energy and Petroleum
16	Energy Act, 2006	Amends and consolidates laws relating to energy.	Ministry of Energy and Petroleum
Manufacturing			
17	Occupational, Safety and Health Act, 2007	Health, safety and welfare of persons employed in factories.	Ministry of Labour, Social Security and Services
Transport			
18	Integrated National Transport Policy	Aims to develop, operate and maintain an efficient, cost-effective, safe, secure and integrated transport system in order to achieve national and international development objectives in a socially, economically and environmentally sustainable manner.	Ministry of Transport and Infrastructure
	Motor Vehicle Emissions Control in Kenya	Provisions for the measurement of vehicular exhaust emissions in the country	Ministry of Environment, Water and Natural Resources
Environmental protection			
19	National Climate Change Response Strategy (NCCRS)	Outlines adaptation and mitigation measures to enhance climate resilience.	Ministry of Environment, Water and Natural Resources
20	National Climate Change Action Plan (NCCAP)	Sets out how the NCCRS will be implemented.	Ministry of Environment, Water and Natural Resources
21	Forests Act	Reservation, protection and sustainable exploitation of forests.	Ministry of Environment, Water and Natural Resources
22	Kenya Forestry Master Plan	Reservation, protection and sustainable exploitation of forests.	Ministry of Environment, Water and Natural Resources
23	Water Act	Water resource management and prohibition of water pollution, including throwing rubbish, refuse, effluent and discharge of trade waste into water.	Ministry of Environment Water and Natural Resources
24	Fisheries Act	Management, exploitation and conservation of fisheries	Ministry of Agriculture, Livestock and Fisheries
25	Environmental Management and Coordination Act	Legal and institutional framework for environmental management and related matters – currently under review.	Ministry of Environment Water and Natural Resources
26	Wildlife Policy	Seeks to balance the needs of the people of Kenya with opportunities for sustainable wildlife conservation and management countrywide.	Ministry of Environment, Water and Natural Resources
UN submissions			
27	Kenya's Climate Change Technology Needs and Needs Assessment Report Under the UNFCCC	The report on Kenya's Technology Needs Assessment is the first step towards factoring the development and diffusion of environmentally-sound technology in the country's investment strategies.	Ministry of Environment Water and Natural Resources
28	Millennium Development Goals (MDGs)	Kenya is committed to the MDGs and is implementing various programmes relevant to GE, especially related to energy and environment.	Ministry of Devolution and Planning
29	First National Communication to UNFCCC	The compilation of the First National Communication (2002) demonstrates that Kenya is willing to meet its obligations under the convention. Kenya ratified the UNFCCC in 1994 signifying its determination to join the international community in combating climate change.	Ministry of Environment, Water and Natural Resources

2.4 POLICY AND LEGAL LANDSCAPE

The newly adopted Kenyan Constitution (2010) gives rise to a devolved two-tier structure of government and, hence, new and distinct governance structures at the national and county levels. Article 42 of the Constitution recognizes the right to a clean and healthy environment, while Article 60 (c) provides for sustainable and productive management of land resources. It calls for “sustainable exploitation, utilization, management and conservation of the environment and natural resources” and works “... to achieve and maintain a tree cover of at least 10 per cent of the land area of Kenya” (Article 69 [(a)-(h)]).

In 2010, the government developed a comprehensive National Climate Change Response Strategy (NCCRS), which was followed by a National Climate Change Action Plan (NCCAP) that sets out how the NCCRS will be implemented. The NCCRS and NCCAP make recommendations for reducing the negative impacts of climate change.

By the end of 2012, other relevant policies were being formulated, including the National Environment Policy; Draft Carbon Investment Policy; Reducing Emissions from Deforestation and Forest

Degradation (REDD) Policy; and the National Energy Policy. Furthermore, policies and bills on oil and mineral resources are being developed, following the discovery of oil and mineral deposits in Kenya. Numerous green economy-related sector-specific planning documents exist (see Table 4). Kenyan authorities are currently in the process of formulating a Multilateral Environmental Agreement Strategy (MEAS).

In addition to these legal and policy provisions, numerous green economy-related programmes are being undertaken by government ministries. These include the Kenya National Cleaner Production Centre and the GKI. Multilateral and bilateral development agencies are also involved in supporting numerous projects that address the challenge of climate change and support the green economy policy agenda, notably UNEP, UNDP, the Danish International Development Agency (DANIDA), the Canadian International Development Agency (CIDA), the UK Department for International Development (DfID), the Agence Française de Développement (AFD), the US Agency for International Development (USAID) and the World Bank. By January 2013, Kenya had registered 11 projects under the Kyoto Protocol’s Clean Development Mechanisms (CDM).¹⁶



Mangroves in the Lamu Area/GRID Arendal/Peter Prokosch

3 KEY SECTORS IDENTIFIED

During country stakeholder consultations, the agriculture, energy, transport and manufacturing sectors were identified as having significant potential for greening the economy because of their contribution to GDP, employment creation, poverty reduction and global competitiveness. Each of the sectors is discussed below, keeping in mind the current development context, policy landscape and key green economy interventions.

3.1 AGRICULTURE SECTOR

The agriculture sector is the primary source of livelihood for the majority of the Kenyan population, in terms of food security, income, employment creation and foreign exchange earnings. The agriculture sector directly contributes to approximately one quarter of GDP annually. The sector accounts for 65 per cent of Kenya's total exports, and 18 per cent of formal employment in Kenya. Small-scale agriculture and pastoralism account for about 42 per cent of the total employment in Kenya.¹⁷

Farming in the country is largely small-scale, with 75 per cent of total agricultural output produced on rain-fed farms that average 0.3 to 3 hectares in size. The agriculture sector has come under pressure due to population increase and extreme weather changes. The sub-division of land, resulting from population pressure and the relative scarcity of productive agricultural land, has resulted in small, uneconomic farms that cannot be run sustainably. The problem is expected to increase, with available land per person in Kenya decreasing from the present level of approximately 1.5 ha to 0.3 ha, by 2050.¹⁸ Moreover, the sector is vulnerable to increasing droughts and floods due to climate change,²⁰ resulting in increased soil erosion, deforestation, loss of soil fertility and reduced productivity.

3.1.1 CURRENT POLICIES

The government allocates approximately 8 per cent of the national budget to the sector. The Agricultural Sector Development Strategy (ASDS) 2010-2020 is the main national policy document for the

agriculture sector. The strategy outlines the following interventions to fast-track growth in the sector:

- Review and harmonize the legal, regulatory and institutional frameworks;
- Restructure and privatize non-core functions of parastatals and sector ministries;
- Improve delivery of research, extension and advisory services;
- Improve access to quality inputs (fertilizers, hybrid seeds, equipment) and financial services; and
- Improve access to both domestic and external markets.

In addition, the government has developed the National Food and Nutrition Security Policy²⁰ to address challenges related to nutrition and food security, and is implementing the Comprehensive African Agricultural Development Programme (CAADP), supported by the New Partnership for Africa's Development (NEPAD).²¹

The country is also allocating resources towards increased irrigation, distribution of drought-resistant seeds for maize as well as indigenous crops, such as pigeon peas, cowpeas, green grams, chickpeas and beans. Some policy initiatives aim at encouraging the country's youth to venture into agribusiness by providing concessional loans and promoting greenhouse farming.

3.1.2 GREENING THE AGRICULTURE SECTOR

Green agriculture is characterized by shifting both commercial and subsistence farming towards ecologically-sound farming practices, such as efficient use of water, extensive use of organic and natural soil nutrients, optimal tillage, integrated pest control and agroforestry. In Kenya, where the majority of farming is small-scale, greening the small-farm sector through promotion and dissemination of sustainable practices could be the most effective way to make more food available to the poor and hungry, reduce poverty, increase carbon sequestration and access growing international markets for green products. Given food security concerns in the country, greening the sector would contribute to increasing productivity in the long run through the use of green practices.

A photograph of a lush green tea plantation with rows of tea bushes stretching into the distance under a clear sky.

Tea bushes/ James Finlays Tea Estate

Box 1. Just their cup of tea: sustainable farm management brews confidence

In March 2006, the Kenya Tea Development Agency (KTDA) and Unilever (through its Lipton brand) partnered on an extension programme to promote good agricultural practices as a tool for fostering sustainable tea production in Kenya. The initiative was supported by funding from Unilever, DfID (2006-2009) and the Dutch Sustainable Trade Initiative (IDH) (2009-2011), with experts drawn from Wageningen University and Research (UR), ETC East Africa and the Tea Research Foundation of Kenya. Pilot projects were initiated, using the Farmer Field School (FFS) approach, to provide smallholder tea farmers with the motivation, skills and technical assistance for improvement of production and implementation of more sustainable farm management practices.

The first pilots took place in 2006 and involved 120 farmers at four KTDA buying centres. Wageningen UR and ETC East Africa trained KTDA's technical extension officers and assistants to take on the role of facilitators. Farmers were able to prioritize content and decide on how it should be delivered. Within a year, they explored a range of issues such as plucking intervals, tipping-in height of bushes after pruning, agroecology, safe use of agrochemicals, bookkeeping, using trials on the ground, field visits, short talks, debate, storytelling and other activities. The results of the pilots were encouraging, with farmers experiencing improved yields per hectare, better product quality, adoption of better agricultural practices, biodiversity conservation, and reduced soil loss. Improved farmers' empowerment, knowledge improvement and group cohesion were also reported.

In 2007, Unilever decided to use certified sustainable tea. KTDA was tasked with the role of supplying the required volumes of certified tea. Unilever and the Rainforest Alliance also decided to offer capacity-building efforts on certification to farmers through the established FFS. The Rainforest Alliance became responsible for training the trainers on the implementation of certification practices and for managing the certification/auditing process with its Sustainable Agriculture Network (SAN) partners. The FFS curriculum was expanded to include other aspects of farming and to cover the social, environmental and economic requirements for certification, such as ecosystem conservation, wildlife protection, workers' rights and safety, water and soil conservation, agrochemical reduction, decent housing and legal wages for workers.

In 2009, KTDA initiated the roll-out phase of the project, aiming at stretching the scope of the FFS to include at least 6 FFS groups per factory in all the 59 factories, and to have 21 Rainforest Alliance Certified factories by 2011, which would correspond to approximately half of KTDA's tea production areas. By December 2009, some 12 000 smallholders had become Rainforest Alliance Certified, having succeeded in making the social, economic and environmental changes necessary to achieve compliance. The farmers could now supply to the Momul Tea Factory Company, owned by KTDA. It became not just the first group of smallholders in Kenya to meet the Rainforest Alliance Certified standards but also the largest single group to reach this status worldwide.

As of February 2011, five factories were certified in Kenya and another nine were being audited.

There are currently various green economy activities in agriculture, including organic farming, production of organic fertilizer, agroforestry, fish farming and certification (see Box 1).

3.2 ENERGY SECTOR

Energy is obtained from a variety of renewable and non-removable resources, namely hydropower, biomass, geothermal, petroleum, wind and solar. At the national level, wood fuel and other biomass account for 68 per cent of the total primary energy consumption (see Figure 3). About 80 per cent of Kenya's population depends on wood fuel for domestic energy needs (cooking and heating) and for informal rural industries.²² Thus, demand for energy is one of the main drivers of deforestation and land degradation in Kenya. Petroleum fuel is the major source of energy used by commercial and industrial establishments.²³

Electricity (9 per cent) is the third-most used form of energy in Kenya, after wood fuel (68 per cent) and petroleum products (22 per cent) (see Figure 3), and remains the most sought-after form of energy in Kenyan society. Access to electricity is normally associated with a rising quality of life; total installed electricity generation capacity is estimated at 1,593 MW as of June 2012.²⁴

In 2010, about 18 per cent of households had access to electricity. However, access to electricity in rural households is estimated at about only 4 per cent, while the commercial and industrial sectors together account for roughly 60 per cent of the electricity consumed in the country.²⁵ The lack of an effective transmission system is a hurdle to access and reliability.

The proportion of green energy out of the total installed capacity to generate electricity is 992 MW (62 per cent), including hydropower (see Figure 4). However, this energy source is highly vulnerable to weather conditions and climate change.

The energy sector in Kenya is at an important transition point with increased development of geothermal electricity generation and exploitation of newly-discovered coal and oil deposits. Mining and minerals currently contribute less than 1 per cent

FIGURE 3. SOURCES OF ENERGY CONSUMED IN KENYA

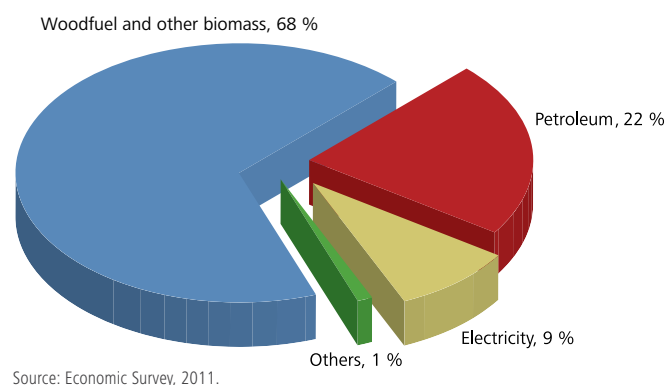
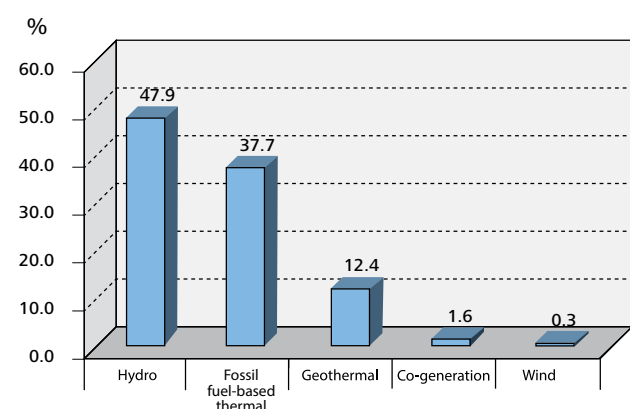


FIGURE 4. SOURCES OF ELECTRICITY IN KENYA



to GDP but this is expected to increase. Kenya has options to develop these resources by:

- taking green and low-carbon considerations into account;
- encouraging the use of clean coal technologies with international support;
- making use of natural gas that is a by-product of oil production instead of flaring it; and
- allocating a percentage of royalties to a green development fund to support reforestation, low-carbon and other green actions.

3.2.1 CURRENT POLICIES

The Sessional Paper No. 4 of 2004 provides the overall policy framework for the energy sector. However, there are several supporting pieces of legislation, including the Energy Act, No. 12, Geothermal Resources Act No. 12, and Petroleum (Exploration and Production) Act, Chapter 308 of the



Sugar cane/Creative Commons

Box 2. Policy sweetens rural livelihood; sugarcane energizes economy

In March 2008, Kenya's Ministry of Energy adopted a Feed-in Tariff (FiT) based on the realization that renewable energy sources, including solar, wind, small-hydro, biogas and urban solid waste energy, have the potential for income and employment generation, while also contributing to the energy supply and diversification of electricity-generation sources.

As Kenya's greatest renewable energy potential lies in its rural areas, the effects of the FiT policy are expected to trickle down and stimulate rural employment. This can happen through the construction of power plants; and in the context of agro-industries, in particular the sugarcane industry that is synonymous with Kenya. Some of the FiT projects have commenced operation. The cogeneration plant of western Kenya's Mumias Sugar Company Limited, for instance, is now adding 26 MW to the grid out of the 38 MW it produces. The company produces power through the burning of bagasse, a waste product from sugarcane.

Stakeholders have expressed the need to review the FiT in order to increase uptake and include other sources, such as wave, tidal, and ocean thermal energy conversion. It is estimated that the sugar factories have directly and indirectly contributed to employment generation by supporting about 200,000 small-scale farmers within the sugar belt of western Kenya; and that between five million and six million people either directly or indirectly benefit from the sugar factories.

FiT allows power producers to sell to the national grid and obligates the distributors to buy, on a priority basis, all renewable energy source-generated electricity at pre-determined fixed tariffs for a given period of time. The FiT is expected to trigger the generation of an additional 1,300 MW of electricity from clean sources over the next five years. A 1,311 MW project was recently approved and two Power Purchase Agreements were signed. Consequently, this will nearly double the country's current installed capacity, while enhancing economic competitiveness and job creation. Other advantages of the FiT's environmental integrity include the reduction of GHG emissions, enhancing energy-supply security by reducing the country's dependence on imported fuels and, thus, coping with the global scarcity of fossil fuels and their attendant price volatility.

Laws of Kenya. Some of the policies are implemented through the Least Cost Power Development Plan (LCPDP) and Rural Electrification Master Plan. At the end of 2012, the energy policy to replace the Sessional Paper No. 4 of 2004 underwent a review.

The FiT Policy, introduced in 2008, was designed to promote investment in renewable energy (see Box 2). The policy allows producers of electricity from renewable sources to sell to a distributor at a pre-determined fixed tariff for a given period of time, thereby guaranteeing a market. In 2011, the government introduced a zero-rate (0 per cent) import duty on renewable energy equipment and accessories, and removed Value-Added Tax (VAT) on renewable energy materials, equipment, and accessories. Prior to 2011, there was a 16 per cent VAT on renewable energy materials. By the end of 2012, the government was developing solar water heating regulations, with a proposal that all owners of existing and new buildings that require more than 100 litres of hot water per day be required to install and use a solar water heater.

Approximately 43 per cent of the development budget (2011/12) is allocated to energy and other infrastructure development. The country is diversifying and expanding its electricity generation, with a long-term focus on green energy (geothermal, wind, solar and hydro imports). The government has several green energy projects committed to increasing/diversifying generation in the current to mid-term, including geothermal (404 MW), wind (530 MW) and hydroelectric power (278 MW).²⁶

3.2.2 GREENING THE ENERGY SECTOR

Greening the energy sector will require investments in energy supply and technology. Kenya's GHG emissions are rising quickly and energy sector emissions are estimated to have increased by approximately 50 per cent over the last decade. Green energy supply in Kenya comprises renewable and low-carbon sources of electricity and heat, including geothermal, solar, wind, hydroelectricity and biofuels. Increased generation of renewable energy also has the benefit of increased energy security, by reducing reliance on fossil fuel imports. At the same time, climate resilience is also important and includes electricity-generating systems and a national grid that can withstand extreme weather events expected as a result of climate change. The exploitation of abundant geothermal

resources, considered a strong option for Kenya with an estimated potential of 7,000 MW to 10,000 MW, is being fast-tracked. In addition, Kenya has excellent solar, wind, biofuels and small hydro resources for the supply of electricity.

About 70 per cent of households in Kenya rely on wood fuel. Use of improved cookstoves can improve the lives of individuals, particularly women and children, in rural and urban areas – by reducing the time to collect wood fuel, reducing indoor air pollution thus potentially introducing cost savings to households. Access to modern energy solutions enables income-generating activities, health services, access to communication and improved education outcomes.

With regard to energy demand, distributed clean energy solutions for households and institutions – such as solar lanterns, improved and liquefied propane gas (LPG), cookstoves, and energy efficient-lighting and appliances – can reduce greenhouse gas (GHG) emissions and bring about significant social and economic benefits. The economic case for solar lighting is clear: buying a lamp that charges in the sun during the day and produces light at night can eliminate spending on the kerosene that fuels conventional lamps. The potential savings are enormous. According to a recent study by the International Finance Corporation, US\$10 billion a year is spent on kerosene in sub-Saharan Africa alone to illuminate homes, workplaces and community areas. Globally, the figure is estimated at US\$36 billion. Kerosene is also dangerous as it is a fire hazard. The wick's smoke, the glass cracks and the light may be too weak to read by. According to the World Health Organization, the fine particles in kerosene fumes cause chronic pulmonary disease. Burning kerosene also produces climate-changing carbon-dioxide emissions.²⁷

3.3 MANUFACTURING SECTOR

The manufacturing sector is one of the key pillars of the Kenya Vision 2030, which aims to encourage a “robust, diverse and competitive” manufacturing sector. Even as the contribution of the manufacturing sector to GDP has stagnated at about 10 per cent for many years, implying limited industrial transformation, Kenya still has one of the largest manufacturing sectors in sub-Saharan Africa. The key



Women in export processing zone/Creative Commons

Box 3. Tissue company plying cleaner production practices

In 2005, the Nairobi-based Chandaria Industries Ltd (CIL) adopted Resource Efficient and Cleaner Production (RECP) practices, following an audit by the Kenya National Cleaner Production Center (KNCPC). CIL's core business is the manufacture of tissue paper through waste paper recycling and virgin pulp blending into hygiene grades that include toilet tissues, tissue napkins, paper towels, facial tissues; and recycling of cotton fibres into absorbent cotton wool. RECP addresses three sustainability dimensions individually and synergistically: production efficiency; environmental management; and human development (minimization of risk for people and communities and support for their development). In CIL, RECP has been achieved by raising awareness, improving technology and changing attitudes through regular audits, training and capacity-building activities. The company began by implementing 'no and low-cost investment options' such as sub-metering of electricity and water consumption, process monitoring, a preventive maintenance programme, wastewater treatment and recycling.

CIL has so far achieved great economic and environmental benefits, in addition to ensuring compliance with the national legislative framework governing environmental management. The table below shows the results of the initiative from an analysis done by CIL:

The absolute indicators provide a measurement of how much resource use/pollution output has changed in absolute terms. For CIL, energy use, materials use and water use have all declined by -25, -29 and -63 per cent respectively. The volume of pollution generated has also declined. Relative indicators provide a measurement of changes in resource use/pollution in relation to production output. Productivity has increased, while pollution intensity has declined.

Absolute indicator	Change (%)	Relative indicator	Change (%)
Resource use		Resource productivity	
Energy use	-25	Energy productivity	40
Materials use	-29	Materials productivity	48
Water use	-63	Water productivity	181
Pollution generated		Pollution intensity	
Air emissions (e.g., global warming, CO ₂)	-24	Carbon intensity	-28
Wastewater	-63	Wastewater intensity	-64
Waste	-60	Waste intensity	-62

As a result of the successful implementation of RECP, CIL has improved operations through cost reduction, efficient resource use and improved environmental performance. Subsequently, the company's contribution towards sustainable development has increased. Specifically, implementation of RECP audit by CIL has led to annual savings of KES 46, 886, 400 (US\$0.6336 million) and has facilitated the attainment of ISO 9000:2001 certification in Quality Management Systems. In addition, the company has won several awards. CIL has gained considerable recognition and, thus, access to a larger market share. The company has acquired sole supplier status of an array of hygiene tissue products to UN agencies and several multinationals doing business in the country. The company has proceeded to play a leading role by assisting other companies, such as Madhu Paper (K) and Kenya Paper Mill Ltd, to embrace RECP and related best practices.

challenges identified are high energy costs and poor infrastructure. Unreliable electricity generation and distribution in Kenya means that most manufacturing firms operate a standby emergency power system. Furthermore, many cement manufacturers intend to switch to coal as a reliable and cheap source of electricity, thus contributing to increased GHG emissions. The agro-processing industry, amongst other industries, is a major consumer (and polluter) of water. Water resources are generally scarce and likely to become more so with climate change.

The manufacturing sector in Kenya is dominated by food processing industries, such as grain milling, sugarcane processing and beer production. Cement, another important sub-sector, contributes to climate change through GHG emissions resulting from fossil fuel combustion. Yet, emissions in the manufacturing sector are relatively low when compared to other sectors. At present, there is no systematic monitoring of industrial effluents and emissions, although Kenya's environmental legislative framework requires Environmental Impact Assessments (EIAs) and annual Environmental Audits (EAs) from large industrial establishments. Some industries have installed plants to partially treat industrial wastewater before discharging effluents into surface water bodies and sewerage systems. Other industries have adopted and installed environment-friendly technologies that significantly reduce effluent discharges and emissions. Companies are becoming more informed and taking up energy-efficiency measures.

Nonetheless, the manufacturing sector faces various challenges unique to the transition to a green economy, such as:

- weak and fragmented policy coordination among relevant ministries and government agencies;
- low technology, innovation and Research and Development (R&D) uptake;
- weak capacity to meet quality and technical standards; and
- an influx of counterfeit and sub-standard goods.

In addition, strategic management and technical skills are weak, especially in Small and Medium-Sized Enterprises (SMEs).²⁸

3.3.1 CURRENT POLICIES

Various initiatives are in place and continue to be undertaken to enhance manufacturing. These include the implementation of the private sector development strategy; streamlining business registration and licensing; providing access to finance; and improving physical infrastructure. Efforts are underway to scale up Kenyan firms' operations by reforming the industrial structure, including the establishment of special zones, SME parks and industrial clusters. The target is to increase productivity and competitiveness across the manufacturing sector. The government, through the National Environment Management Authority (NEMA) and the Kenya Bureau of Standards (KBS), is also keen to adopt eco-labelling. An eco-label identifies a product that meets specified environmental performance criteria or standards. In addition, the Ministry of Energy in conjunction with the Kenya Association of Manufacturers (KAM) established the Centre for Energy Efficiency and Conservation in 2006. The Centre runs energy efficiency and conservation programmes designed to help companies identify wastage, determine saving potential and give recommendations on measures to be implemented.

The country is also encouraging and promoting the use of cleaner and resource-efficient production through the Kenya National Cleaner Production Centre (KNCP) (see Box 3). Resource Efficient and Cleaner Production (RECP) assessments conducted by the KNCP in sectors such as tea, textile, sugar, dairy, manufacturing and the fish industry indicate that some of the challenges in the transition to a clean and resource-efficient production include lack of knowledge and awareness, limited technical and professional management skills, and investment costs.²⁹

3.3.2 GREENING THE MANUFACTURING SECTOR

According to UNEP, the supply-side approach to greening manufacturing involves the re-design of products and processes, substituting green inputs for conventional inputs, recycling and reuse in internal production processes, use of cleaner technologies and production processes with greater water and energy-efficiency, and the redesign of transport and infrastructure systems.³⁰ The demand-side approach, on the other hand, involves production of manufactured goods to meet the changing composition of demand, both from within the industry



Interior of AREX commuter train, Nairobi/Creative Commons

Box 4. Public transport: speeding up green economy transition

The provision of an efficient and reliable public transport, such as the Mass Rapid Transit System (MRTS) in Nairobi Metropolitan Area, will encourage more commuters to use low-carbon sustainable transport. Furthermore, the MRTS has the potential to improve social equality; reduce overall vehicle demand, fuel consumption and GHG emissions and benefit road users. The project will be implemented in various phases.

One of the first phases of the project involves the Greater Nairobi Commuter Rail Services Project. Part of the rehabilitation and expansion of the Nairobi Metropolitan Commuter Rail Services, the project involves the construction of the Syokimau Railway Station, rehabilitation of the existing Nairobi–Embakasi rail track, construction of a new track to Syokimau Station and an extension of the railway line from Syokimau Railway Station to the airport. This line will provide high-frequency, comfortable and affordable commuter services between Jomo Kenyatta International Airport (JKIA) and Nairobi's Central Business District (CBD). Journeys will take less than 20 minutes, compared to the current 90 minutes by road. The station is built for intermodal exchange for passenger traffic originating from Syokimau Estate, Mlolongo, Athi River, Kitengela and the surrounding area. The development is expected to offload passenger traffic from Mombasa Road, which will decongest Uhuru Highway and provide alternative access to JKIA through a five-minute shuttle service. As of September 2012, the construction of the station was 75 per cent complete.

The economic analysis conducted involved an analysis of the development scenario with and without the MRTS project. The results show that the proposed MRTS project for Nairobi Metropolitan Area is economically viable. With the implementation of the transport plan, society will benefit immensely. In addition to the benefits quantified in the economic analysis, other benefits of the MRTS project include savings in fuel consumption and a drop in pollution and accident rates. However, in view of the huge investment involved, the level of implementation would depend on the availability of resources.

and from final consumption. Other supportive measures could include eco-labelling of manufactured products and mandatory energy-efficiency audits for large manufacturers.

3.4 TRANSPORT SECTOR

Kenya's transport and communication sector is rapidly growing, accounting for about 10 per cent of GDP. The sector encompasses key modes of transport, namely road, rail, air and maritime transport. Kenya has identified development of this sector as a key pillar and critical enabler for achieving the Kenya Vision 2030.

The sector has seen significant growth over the past decade, with the construction of the Nairobi-Thika superhighway and the modernization of the Mombasa-Nairobi highway. Transport sector emissions are growing rapidly, with the NCCAP reporting that emissions from the sector are expected to triple between 2010 and 2030, from six million tonnes of CO₂-equivalent in 2010.³¹ Much of this increase is due to the increase in the number of vehicles, estimated to have doubled from 600,000 in 2000 to 1.2 million in 2010. That said, the majority of individual trips in cities are still done on foot because public transport services are comparatively expensive and private cars are beyond the reach of most Kenyans. Public transport is relatively underdeveloped and dominated by privately-owned mini-buses, known locally as *matatus*.

Some of the key challenges facing the sector include lack of adequate funding for required infrastructure as well as lax enforcement of relevant laws and regulations. Stringent donor conditionality requirements and long procurement process have been blamed for low uptake of donor funds and implementation of infrastructure projects. Furthermore, plants and equipment fall short of the ever-increasing demand and huge maintenance backlog of the road network. The lack of adequate local construction capacity has limited the number of local jobs the industry can generate and implement.

3.4.1 CURRENT POLICIES

Kenyan authorities are adopting various measures to improve the transport sector. Recent initiatives include the development of an Integrated National Transport Policy (INTP) to focus attention, guide development, direct investments and promote

institutional, legal and regulatory reforms. The GoK is constructing a Mass Rapid Transport System (MRTS) in the Nairobi Metropolitan Area and the first phase of the Nairobi Commuter Rail Network was launched in November 2012 (see Box 4).

Kenya does not have vehicle fuel economy standards or emission standards for light duty vehicles. However, a policy on Motor Vehicle Emissions Control (MVEC) is currently being developed. Inspection certification is only required for public service and commercial vehicles, and as a result, less than 20 per cent of vehicles are subject to inspection.³²

A study conducted at a motor vehicle inspection centre in Nairobi showed that 69.5 per cent and 71.1 per cent of the tested petrol and diesel vehicles respectively failed to meet the required test criteria.³³ This is largely because the vehicles were old and had high accumulated mileage. About 30 per cent of petrol vehicles were 16-20 years old. Recent regulations have stipulated that vehicles imported into Kenya are required to be no older than eight years from the year of manufacture. In mid-2011, the Ministry of Finance announced an exemption on import duty for "battery operated vehicles" but it is unclear if this will include hybrid electric vehicles or other types of low-emission vehicles.³⁴

The government has taken steps to reduce emissions of certain harmful pollutants. For example, in 2006, Kenya eliminated lead in petrol and reduced sulphur in imported refined diesel. In addition, the Ministry of Environment, Water and Natural Resources has finalized air pollution regulations.

3.4.2 GREENING THE TRANSPORT SECTOR

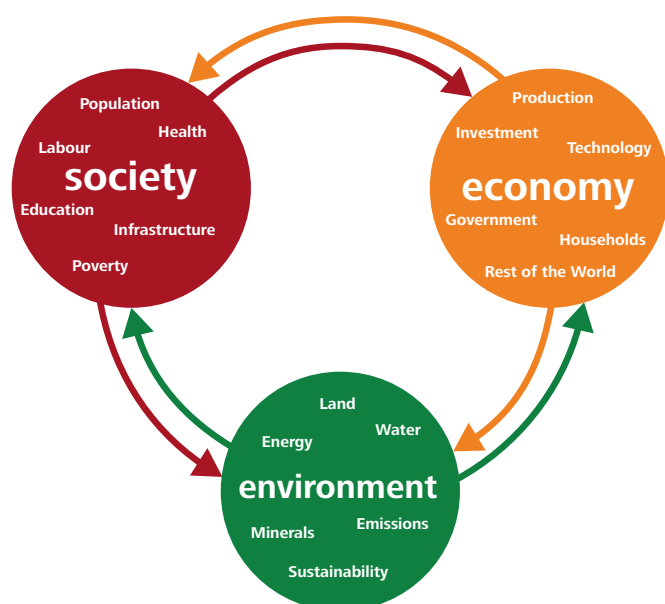
Green transport is defined as one that supports sustainable mobility. Strategies for greening transport include a shift to environmentally-efficient modes such as public transport, increasing pedestrian roads, improving fuel efficiency of vehicles, and integrating land use and transport planning to enhance efficiency.³⁵

Public policy can support greening of the sector by creating incentives to facilitate transition of Kenya's passenger and freight vehicle fleet to one with a lower-age profile, and fast-tracking mass transit, especially rail and public transport.

4 GREENING MODEL SCENARIOS

The study relied on the T21 model to carry out a quantitative analysis of greening the economy. As mentioned earlier, T21 is a System Dynamics (SD) based model designed to support national development planning. In a single framework, the model integrates economic, social, and environmental aspects of development, thereby providing insight into the potential impact of green investment and policy interventions across a wide range of sectors and revealing how different strategies interact to achieve desired goals and objectives (see Figure 5). T21 is structured to analyse medium to long-term development issues at the national level. Data was obtained from various sources, including the Kenya National Bureau of Statistics, government ministries and related parastatals. For example, in the agriculture module, data on crop yield, crop losses, factor inputs (labour and capital) and crop production, among others, were used.

FIGURE 5. CROSS-SECTORAL LINKAGES IN THE T21 MODEL



The T21-Kenya model developed for this study consists of 50 modules (a module is a piece of the T21 model, whose internal mechanisms can be understood in isolation from the rest of the model but are nonetheless linked to the other modules) across 16 key sectors (see Table 5), including

energy, agriculture and infrastructure in economic, environmental and social spheres. Modules have been added to the Kenya customization to analyse green economy interventions and climate-related impacts.

T21-Kenya has three spheres: society, economy and environment (see Figure 5). All sectors of T21 belong to one of the three spheres. The economy sphere contains major production sectors (agriculture, industry and services) characterized by the Cobb-Douglas production function,³⁶ with inputs of resources, labour, capital, technology and an inclusive Total Factor Productivity (TFP) variable. A Social Accounting Matrix (SAM) is used to elaborate the economic flows and to balance supply and demand in each of the sectors. Demand is based on population and per capita income and distributed among sub-sectors using Engle's Curves. This helps calculate relative prices, which are the basis for allocating investment among sectors. The Standard IMF budget categories are employed and key macro balances are incorporated into the model. The Rest of the World sub-sector comprises trade, current account transactions and capital flows (including debt management).

The society sphere contains detailed population dynamics by age-sex cohort; health and education challenges and programmes; basic infrastructure; employment; poverty levels and income distribution. These sectors take into account, for example, the interactions of income, healthcare, and adult literacy rates on fertility and life expectancy that, in turn, determine population growth. Population determines the labour force over time, which, interacting with the level of economic activity, influences employment. Education and health influence labour productivity and life expectancy. In the model, employment and labour productivity affect the level of production from a given capital stock. An HIV/AIDS sector is also included, which shows the potential impact on population and productivity, and the effects of different treatment programmes. Food sufficiency and nutrition, reproductive health and vocational training are also modelled.

TABLE 5. MODULES, SECTORS AND SPHERES OF THE T21-KENYA MODEL

Society	Economy	Environment
Population sector	Production sector	Land sector
1. Population 2. Fertility 3. Mortality	15. Production and income 16. Agriculture 17. Husbandry-fishery-forestry 18. Livestock 19. Fisheries 20. Forestry 21. Industry 22. Services 23. Tourism	34. Land
Education sector		Water sector
4. Primary education 5. Secondary education		35. Water demand 36. Water supply
Health sector		Energy sector
6. Access to basic health care 7. HIV/AIDS 8. HIV positive children and orphans 9. Nutrition		37. Energy demand 38. Energy supply
	Households sector	Emissions sector
	24. Households accounts	39. Fossil fuel and GHG emissions
	Government sector	Sustainability sector
Infrastructure sector	25. Government revenue 26. Government expenditure 27. Public inv. and consumption 28. Gov. balance and financing 29. Government debt	40. Ecological footprint
10. Roads 11. Irrigation		Extra modules
Labour sector		41. MDGs 42. HDI and GDI 43. Indicators 44. Climate impacts 45. Climate interventions 46. Climate investments 47. Malaria transmission 48. IVM interventions 49. Malaria treatment 50. Malaria cost accounting
12. Employment 13. Labour availability and unemployment	Rest of the World sector	
	30. International trade 31. Balance of payments	
Poverty sector	Investment sector	
14. Income distribution	32. Relative prices 33. Investment	

The environment sphere tracks pollution created in the production processes and its impacts on health and production. This sphere also estimates the consumption of natural resources – both renewable and non-renewable – and the impact of the depletion of these resources on production and other factors. It also examines the effect of soil erosion and other forms of environmental degradation and their impact on other sectors, such as agricultural productivity and nutrition. Additional issues addressed are fossil-fuel use, forest depletion, land and water degradation, air and water pollution, and GHG

emissions. This sphere is normally expanded to take into account country-specific concerns, including the effects of climate change.

Climate has been integrated into the T21-Kenya model to represent the impacts of climate change on various sectors and to evaluate the implications of green economy interventions on climate adaptation. Overall, the sectors that have received specific attention on climate impacts and investments are: agriculture, livestock, fisheries, forestry, irrigation, water, energy and tourism.

4.1 SECTOR MODELLING AND FORMULATION IN T21

Quantitative assessment of Kenya's transition to a green economy involved modelling green investments in the selected sectors, namely agriculture, energy, manufacturing and transport. These sectors were selected through a multi-stakeholder consultation workshop held on 15 February 2012 in Nairobi. In the model, the broad production sectors, namely agriculture, industry and services, are based on the Cobb-Douglas production function, where land, labour and capital are the main factors of production and are influenced by water availability, energy prices, education and access to roads.

The sectors are modelled to analyse the impacts of climate change, green investments and interventions, and cross-sectoral synergies and side effects. In this regard, specific climate impacts in 11 sectors were analysed. The sectors were distributed across crop production, livestock, tourism, forestry, fishery, transport, communication, energy, land use, health and issues related to biodiversity. In addition, nine green economy investment categories were evaluated across sectors, practically impacting every sphere, sector and module of T21-Kenya. The list of the green

economy investments and climate impacts simulated in the model are based on the NCCRS as main reference (Annexes 1 and 2 respectively). Due to the disparity of data availability, the model has a more detailed sector analysis for agriculture and energy.

4.1.1 AGRICULTURE

The agriculture module includes crop production (which differentiates between production utilizing conventional and organic fertilizers), livestock, forestry and fishery sub-sectors. The crop production sub-sector is modelled as illustrated in the causal loop diagram (see Figure 6) and has an influence on macroeconomic indicators related to a green economy. Investment in 'resource conservation' and 'agriculture capital' will lead to an increase in 'agricultural production' with a consequent increase in GDP, thereby creating opportunities for further investments.

Under crop production, the specific interventions modelled and analysed for this study include investments in irrigation, fertilizers and pesticides, organic fertilizer, agriculture R&D, as well as investment in water conservation – specifically investment in new dams. Similarly, under fisheries,

FIGURE 6. CAUSAL LOOP DIAGRAM – GREEN ECONOMY EFFECTS OF INVESTMENT ON AGRICULTURAL PRODUCTION

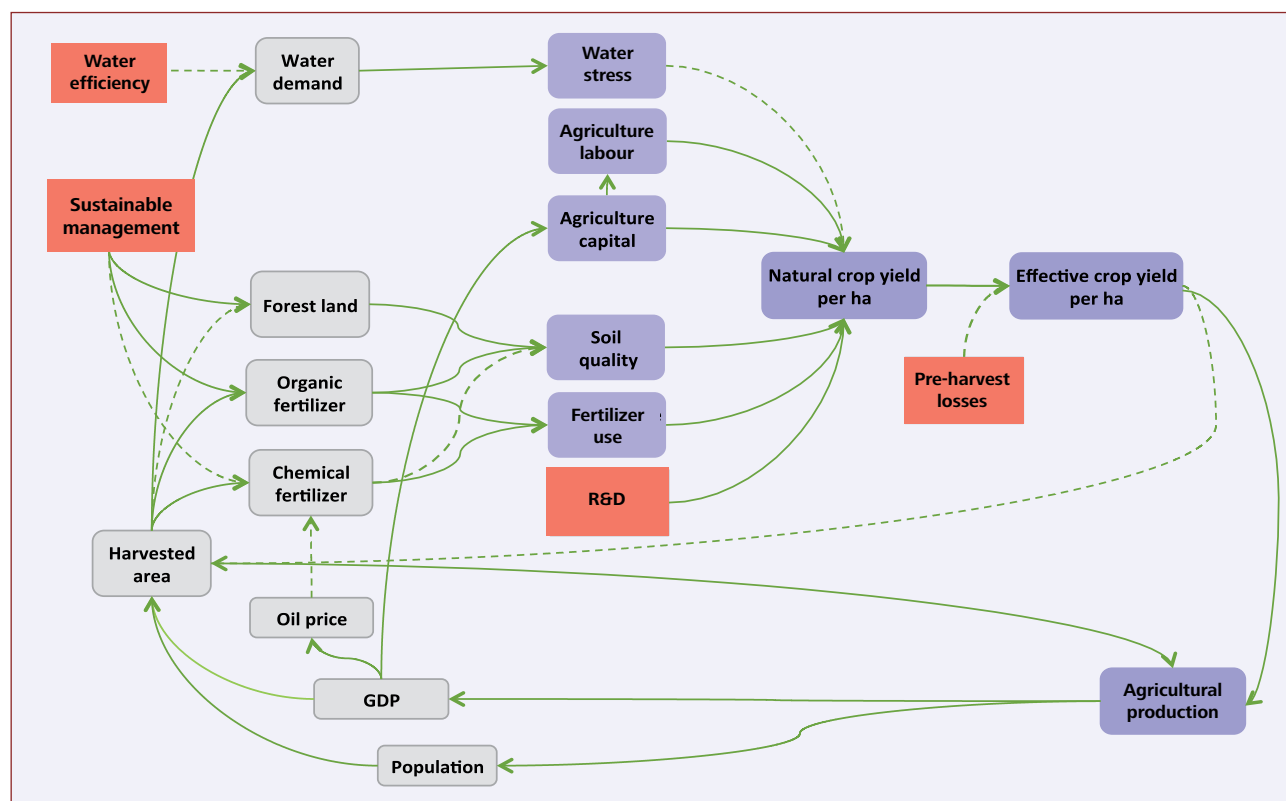


FIGURE 7. TREE DIAGRAMME – POWER GENERATION BY SOURCE

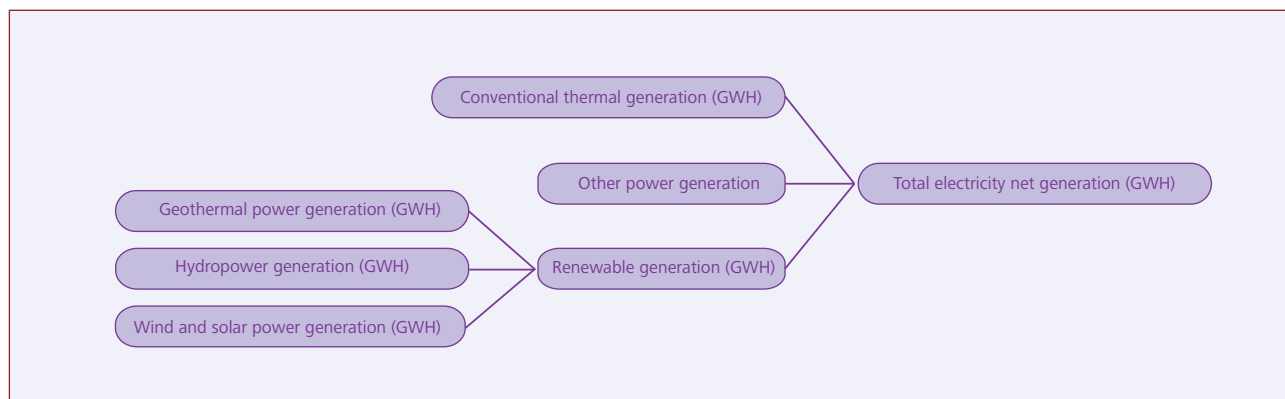
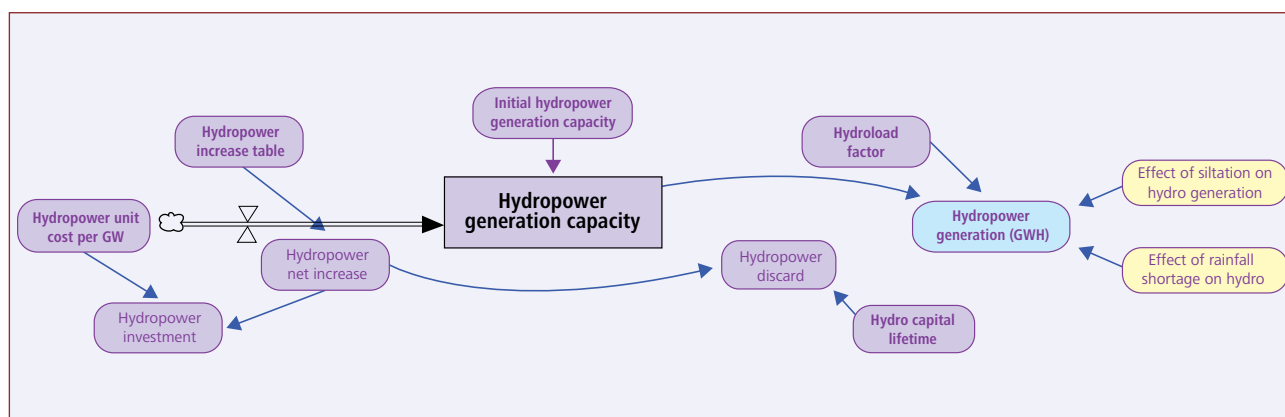


FIGURE 8. STOCK AND FLOW DIAGRAMME – POWER GENERATION BY SOURCE



investment in fishery adaptation measures and ecosystem restoration were modelled and analysed. Under forestry, three main investments were analysed: investment in afforestation, forest management, and forestry R&D.

4.1.2 ENERGY SECTOR

The energy sector is categorized into energy production and energy demand. Since electricity remains a major source of energy for industry and households, particular emphasis is given to electricity power supply. Electricity supply is disaggregated into four primary energy sources (or type of plants): hydro; wind and solar; geothermal; and conventional thermal (oil and coal), as well as other sources (see Figure 7). Production from each source is influenced by investments to increase the capacity of the power plants (measured in MW) and a specific load factor. The efficiency of each technology is also considered, as are the investment costs. Figure 8 shows the structure for hydropower generation in the T21-Kenya model.

The energy demand module represents a variety of endogenous and exogenous drivers of energy demand for each energy source in the medium and long term. These include GDP, energy price, technology, energy service availability and climate factors (temperature).

4.1.3 TRANSPORT INFRASTRUCTURE (ROADS)

Transport infrastructure, specifically road transport, is the other key area of green economy interventions that has been modelled. In the roads module, the process of road construction is considered to be influenced by investment in public transport and infrastructure and the unit cost of road construction and maintenance. While the increased occurrence of floods, due to climate change, would cause more destruction to physical infrastructure, green economy investments in infrastructure would mitigate the negative climate impacts. Access to roads is estimated in this module as influencing the production sectors.³⁷



4.2 DEFINITION OF SCENARIO AND ASSUMPTION USED TO SIMULATE GREEN ECONOMY INTERVENTIONS

The quantification of the level of investment required to support the transition to a green economy is in progress (UNEP, 2011). Analysis and modelling conducted for the *Green Economy Report* suggest that the level of additional investment needed is between 1 per cent and 2.5 per cent of global GDP per year from 2010 to 2050. Based on a range of specific sectoral policy targets, the *Green Economy Report* modelling results allocate investments totalling 2 per cent of global GDP across a range of sectors, with the heaviest investment in energy and transport. These investment allocations are largely consistent with assessments taken from other sources, such as the IEA and estimates associated with achieving the MDGs.

Following the '2 per cent of GDP' assumption from the *Green Economy Report*, this study allocates 2 per cent of GDP (Kenya Economy GDP) per annum to investments in green economy interventions. These investments are based on the selected key sectors using the prioritization in the NCCRS. Since the interventions are additional investments in the economy, it is fair to compare the green economy scenario with a similar amount of investment in the conventional path for effective policy analysis.

Hence, the analysis includes the comparison of conventional and green economy scenarios assuming the same share of GDP (2 per cent) being invested respectively in conventional sectors or activities (brown scenario or BAU2%) and in interventions

that would support resource efficiency, low carbon development and natural capital preservation (green scenario or GE2%). Total investment of approximately KES 1.2 trillion (US\$14.9 billion) (in nominal or current terms) between 2012 and 2030 is analysed in a variety of interventions. This investment is equal to approximately 2 per cent of GDP annually, with most of the interventions to be implemented by 2020. In summary:

- The BAU or baseline scenario assumes no fundamental changes in policy or external conditions up to 2030;
- The BAU2% allocates an additional 2 per cent of GDP per annum as investments to the current BAU investment path; and
- The GE2% scenario assumes an additional 2 per cent of GDP per annum as green investments to the baseline.

Due to data limitations, detailed green economy interventions are analysed in two (agriculture and energy) of the four selected key sectors. A comparison between additional investments in the BAU and the green economy (GE) scenarios are discussed below.

4.2.1 OVERVIEW OF RESULTS

This section presents the results from the modelling exercise. A variety of scenarios were simulated to analyse the impact of green investments on Kenya's development. Specifically, modelling was done to assess the impact of the green economy transition on society, economy and the environment. Although the modelling includes a number of scenarios, this report generally compares only GE2% scenario with BAU2% scenario, for consistency. More results are given in Annex 3.

From an economy-wide perspective, positive economic returns are expected approximately seven to 10 years after green economy policy interventions. The national real GDP is projected to exceed the BAU2% by about 12 per cent by 2030, to reach KES 3.6 trillion (US\$45 billion). Annual real GDP growth rates with GE and BAU interventions are 5.2 per cent and 4.6 per cent, respectively, in the 2012-2030 period on average (see Figure 9).

The Kenyan population will also benefit from this economic development as real per capita national

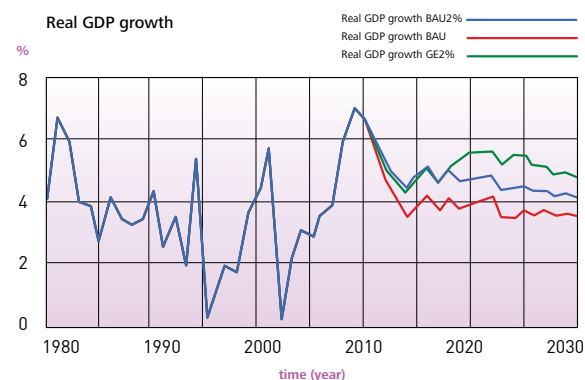
income will rise from KES 39,897 (US\$498.7) to KES 69,702 (US\$871.3) in 2030 under the GE2% scenario, compared to KES 39,721 (US\$496.5) in 2012 and KES 53,146 (US\$664.3) in 2030 under the BAU2% scenario. The proportion of the population below the poverty line under GE2% is expected to be about 2 percentage points lower on average between 2015 and 2030 than that of the BAU2% (see Figure 10).

As a result of green investments, average agricultural yield is expected to exceed BAU2% by about 15 per cent in 2030 (see Figure 11). In terms of crop production, a number of green economy measures (such as water and land-use investments) will mitigate the impact of climate change on productivity, promote more sustainable farming and boost crop yields relative to the BAU case, consequently improving nutrition and food security.

Policy simulations under different assumptions suggest that the same amount of investments allocated to the agriculture sector in the BAU case would result in greater use of chemical fertilizers, which is projected to increase yields in the short run. However, the increased use of chemical fertilizers is also projected to lower soil quality, which reflects negatively on yield in the medium and long term. With green economy interventions, the use of chemical fertilizers is phased out (or greatly complemented) by organic fertilizers and ecological agricultural practices. According to existing studies, the use of ecological practices in Africa yields great benefits in terms of productivity and production, at least in the medium term, by avoiding negative impacts on soil quality.³⁸

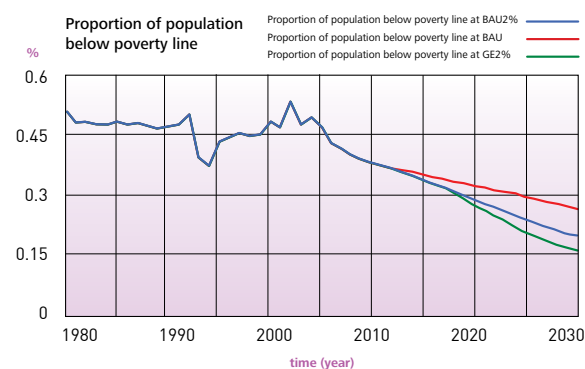
In the energy sector, green economy investments are allocated to reduce energy consumption and to expand the supply of electricity from renewable energy. Energy savings will reach 2 per cent of future BAU energy consumption in 2030. Concerning renewable energy, public and private sector interventions are projected to increase geothermal power capacity from 0.1 GW (2011) to 1.34 GW by 2030 (twice as much as in the BAU scenario). Other new renewables would grow from 0.01 GW to 1.2 GW by the year 2030, reaching a total 20 per cent of power supply.

FIGURE 9. TRENDS IN REAL GDP GROWTH RATE IN BAU, BAU2% AND GE2% SCENARIOS



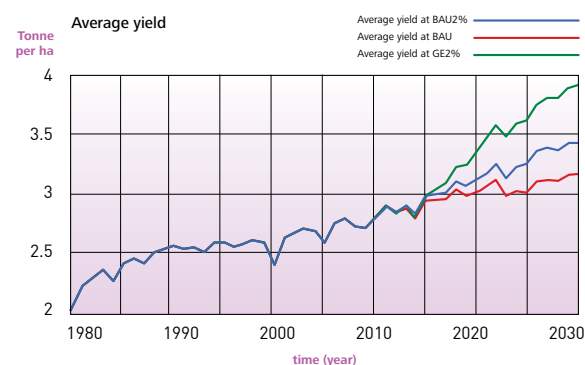
Source: Kenya T21

FIGURE 10. TRENDS IN THE NATIONAL POVERTY RATE IN BAU, BAU2% AND GE2% SCENARIOS



Source: Kenya T21

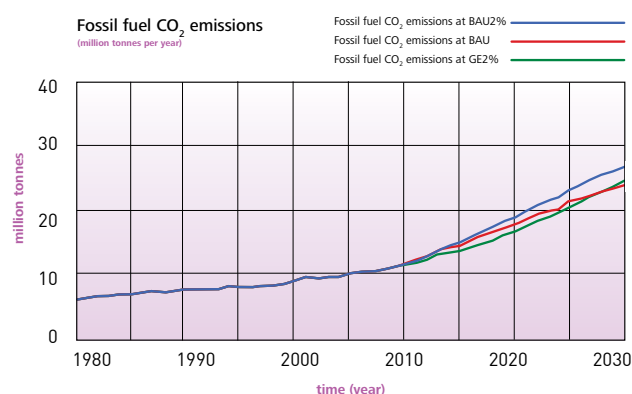
FIGURE 11. TRENDS IN AVERAGE AGRICULTURAL YIELD IN BAU, BAU2% AND GE2% SCENARIOS



Source: Kenya T21

Green economy-related investments in agriculture and energy allow reduction in energy consumption and carbon emissions (see Figure 12). As a result of green economy investments, CO₂ emissions are projected to increase from 12 million tonnes per year in 2012 to 24.35 million tonnes per year in 2030, approximately 9 per cent lower than the BAU2% case (26.7 million tonnes) by 2030.

FIGURE 12. TRENDS IN FOSSIL FUEL CO₂ EMISSIONS IN BAU, BAU2% AND GE2% SCENARIOS²



Source: Kenya T21

In addition, the investments will improve the overall performance of MDGs. In the model, a composite indicator calculated using equal weighting for each MDG measures the MDG performance. The MDGs' composite indicator is projected to improve to 0.78 in 2030 in the GE2% scenario, compared to 0.63 when there is no intervention (BAU), and 0.69 in the BAU2% scenario. Considering the social, economic and environmental indicators included in the MDGs aggregate indicator calculation, this means that the overall development of the country is projected to perform better in the green economy scenario when compared to BAU (i.e. more progress towards several goals).

Annex 3 summarizes the main results of the analysis. It is worth noting that the analysis assumes the effective implementation of all simulated investment.

The economy-wide results indicate that green economy investments yield several positive impacts in the medium- to long-term period across all sectors. However, in the short run, green economy investments may be associated with adjustment costs such that the gain in GDP is not substantial compared to BAU. Green policies associated with short-run changes in prices of final goods and services, costs of operations, and technology choices may create different welfare costs and benefits for different segments of the population.³⁹

The outcome is also likely to depend on the type and combination of green economy interventions or the policy package implemented. For instance, increasing acreage under irrigation has a relatively stronger short-

run impact on national output than afforestation and reforestation – it takes approximately eight years for a tree to grow. However, afforestation and reforestation increases long-term potential output.

Based on policy simulations for the green interventions discussed and multi-stakeholder consultations, the following policy options for agriculture emerged:

- **PROMOTE AGROFORESTRY.** The addition of trees to farms offers an opportunity for farmers to increase farm productivity and diversify their incomes, and helps combat soil erosion and nutrient depletion by providing a more balanced agro-ecological profile. Agroforestry also contributes to the government's goal of 10 per cent tree cover in farms. Significant work is already being done on agroforestry in Kenya by the government and various stakeholder groups such as the SCC-Vi Agroforestry project in Kisumu. Subsequent investment should build on this work.
- **SUSTAINABLE WATER MANAGEMENT.** Kenya is a water-scarce country and needs to strongly prioritize the efficient allocation of water in its policymaking and planning. Sectors such as industry compete for Kenya's scarce water resources. Allocation should effectively balance the conflicting priorities of economic growth and food security/agricultural productivity. Measures such as rainwater harvesting, irrigation and use of less water-intensive crop varieties should be employed extensively.
- **EDUCATION, TRAINING AND CAPACITY BUILDING.** Given the large number of smallholder farms in the country, providing a multitude of farmers with valuable information and resources will be key in assisting them to transition to greener, more sustainable farming practices. Extending and improving the services should focus on the likely areas of education and training on soil and water management, different crop strains and species, agroforestry, and livestock management.
- **RESEARCH AND DEVELOPMENT.** Export-oriented crops can be supported through R&D programmes that help producers meet

international standards, improve energy efficiency and introduce clean sources of energy (e.g., drying of tea and coffee), and reduce negative environmental impacts (e.g., reducing water, fertilizer and pesticide-use).

Under the energy sector, T21-Kenya policy simulations of a transition to clean energy indicate significant energy savings on the demand side and an increased penetration rate of renewable energy on the supply side. Kenya can achieve these targets by:

— **DISTRIBUTING CLEAN ENERGY SOLUTIONS FOR HOUSEHOLDS AND INSTITUTIONS.**

Energy efficiency can improve by disseminating clean energy solutions that require less fuel and electricity, such as solar lanterns, LPG-improved cookstoves, and energy-efficient lighting and appliances. In the case of cookstoves, these actions limit the amount of wood extracted from forests, thereby helping to address the problem of deforestation.

— **DEVELOPING GEOTHERMAL ENERGY.**

Continued development of large-scale geothermal generation to provide base load electricity through capacity building to develop required human

resources, and funding to support the high upfront investment costs of exploration, appraisal and production drilling (e.g., through climate finance mechanisms and official development assistance).

— **DISTRIBUTING RENEWABLE ENERGY.** Off-grid electricity generation systems will be important for communities where it is not economically viable or physically feasible to connect to the national grid. Currently, generation is achieved by using mainly small diesel generators in order to secure supply. It could require hybrid systems with a combination of diesel and wind, solar or small-hydro in the short term. Pilot hybrid projects are needed to identify the best approaches for Kenya, and to transition to renewable energy off-grid systems (including biodiesel). Similarly, the government should support on-grid renewable energy, including small-hydro, wind and solar.

— **STANDARDIZING SYSTEMS.** Encouraged through standardized Power Purchase Agreements, connection guidelines for small-scale renewables, electricity banking and net metering.



Lake Turkana Wind Power (LTWP/African-Development-Bank-AfDB)

5 DISCUSSION OF POLICY-ENABLING CONDITIONS

Investments in green economy have the potential to generate significant social, economic and environmental benefits in the medium and long term. However, based on policy simulations and stakeholder consultations, there is a need to mainstream and align green economy initiatives across the economic, social and environmental spheres of society. This section provides an overview of the key policy issues to be considered in supporting the transition to a green economy, broken down according to four thematic areas: regulations and standards; fiscal policy instruments; institutional and policy processes; and financing.

5.1 REGULATIONS AND STANDARDS

Regulations and standards are direct ways for governments to enhance the transition to a green economy. Conversely, if not properly designed, they can represent significant obstacles to expanding green economy initiatives. In some cases, the removal of barriers may be the most appropriate way to enable market transformation for green economy products and services, while in other cases amending regulations or creating new ones may be more appropriate. In the context of Kenya, there are two broad recommendations that are presented:

- **Improve regulatory compliance.** Kenya has several laws and regulations that can assist in its transition to a green economy such as the FiT, VAT exemption on renewable energy technologies and solar water heaters, and age limits on imported vehicles. Kenya also has environmental regulations, including EIA and audit requirements and regulations related to biodiversity, noise, water quality, waste management and physical planning. However, compliance with regulations and standards is often inadequate. Demonstrating a more considerable political will to bear on enforcement standards is required. Improved management and funding of enforcement functions are also needed.
- **Develop a robust system of environmental standards.** In addition to enhancing compliance

and enforcement of existing regulations, authorities with mandates for setting standards, such as the Kenya Bureau of Standards, should facilitate the development of a robust, harmonized system of environmental standards. These include environmental standards such as Sanitary and Phytosanitary Measures (SPS) and Hazard Analysis Critical Control Point (HACCP), which relate to food safety and animal and plant health, and technical standards, which relate to product standards and labelling. Such standards are increasingly being applied in international trade and are relevant to Kenya's international competitiveness but many SMEs are unable to meet some of these standards. There are concerns that environmental issues may be used as an excuse to introduce trade protectionism that may adversely affect developing countries. A robust national standards system, benchmarked against various international standards, is required. Support to help producers meet these standards will also be required.

5.2 FISCAL POLICY INSTRUMENTS

Fiscal policy instruments, including taxation, green subsidies, pollution charges, public expenditure on infrastructure, public procurement and market mechanisms, can encourage the transition to a green economy. The following are examples of such policy instruments:

- **Creation of a system of targeted subsidies and taxes.** Failure to reflect environmental externalities in prices can greatly hamper the ability of sustainable alternatives to compete, thereby biasing the market against investment in green sectors. Subsidies may be targeted to encourage investment in renewable energy and improve energy efficiency; or they may be removed where they exist and cause negative impacts on economic efficiency and environmental sustainability. However, a strategy to phase out negative subsidies (e.g., kerosene subsidies) should be embedded in the policy framework. Grants and rebates on

green commodities and technologies are useful instruments. Taxes can be applied to fossil fuels and other pollutants as well as use of certain natural resources and ecosystem services to help curb their use. Revenues from these taxes can be used to fund green subsidies or to support relevant research and development efforts.

- **Review and update of the Feed-in-Tariff.** Kenya's FiT policy is an instrument to promote the development of green energy. The policy needs to be reviewed with the aim of enhancing uptake, including promoting small-scale grid connected renewables.
- **Environmental fiscal reform (EFR).** There is a potential to raise revenue through taxes and/or user charges on extraction and use of natural resources in areas such as minerals, non-renewable fuels, water, forests, wildlife and fisheries. Such taxes and charges aim at internalizing externalities and supporting existing environmental regulations and, thus, support the greening of the economy. Recent discoveries of oil, coal, natural gas and other rare earth minerals clearly point to the potential contribution of the minerals and mining sector to Kenya's economic growth, which could have adverse environmental impacts. To facilitate EFR, Kenya should review the existing environmental tax landscape and identify areas where taxes or charges can be introduced or raised to support environmental protection and conservation. Key design issues that need to be considered include impact on the poor, administrative costs and impact on competitiveness.

5.3 INSTITUTIONAL AND POLICY PROCESSES TO SUPPORT REFORMS

An array of government processes and initiatives will be required to facilitate the success of the initiatives outlined in the four sectors. The following are some of the important overarching policy processes that the government of Kenya should engage in:

- **Green public procurement.** Various levels of the Kenyan government can demonstrate commitment to the green economy transition by pursuing green public procurement, which

involves purchasing goods and services that meet environmental standards. This will send the right signals to the private sector and foreign investors and allow the domestic markets of such goods and services to develop and supply non-governmental sectors more cost-effectively.

- **Development of a well-coordinated and strategic overall approach to the transition to a green economy.** An effective policy and institutional framework is key to the transition to a green economy. Following Kenya's recently adopted devolved governance system, the formulation, design, implementation and monitoring of green economy policies will need to take into account the new dispensation, given that some functions and activities have been devolved, especially those involving service delivery. The multi-sectoral and multi-stakeholder nature of green economy initiatives requires strengthening of macro-level coordination. The GKI could include the development of a national strategy or sector-specific strategies, the mainstreaming of the green economy in the national development agenda and a regulatory framework that is consistent with green economy principles and supports agreed standards and goals.
- **Engagement with local communities and county governments.** An inclusive, equitable green growth path requires the maximization of benefits from natural resources while minimizing social and environmental costs and risks. This may require local communities to participate in the policy process and share the benefits from natural resources. Kenya is well-placed to involve local communities through its county governments.
- **Encouragement of transparency and accountability in the exploitation of Kenya's natural resources.** Kenya is already facing various conflicts over natural resources. At the international level, the Extractive Industry Transparency Initiative (EITI) provides a possible framework that the government could benchmark to develop a more environmentally-sound local governance framework for exploiting natural resources (especially in mining). This would reinforce accountability and transparency, eradicate corruption and enhance the overall quality of natural resource management.



Planting crops /© Curt Carnemark/World Bank

- Improvement of data collection and dissemination of statistical findings. Kenya lacks a robust system of national accounting and data to support the policy planning process. The Kenya National Bureau of Statistics (KNBS), in collaboration with NEMA and other relevant institutions, will need to collaborate and develop a database in key areas, such as a biodiversity inventory, GHG emission inventories and environment satellite accounts, to enhance information and knowledge as the country transitions to a green economy.
- Engagement with the international community. At the regional and international levels, Kenya will need to actively engage in Multilateral Environmental Agreements (MEAs), as well as with the World Trade Organization, to ensure that an appropriate international policy environment for promoting green economy is developed. Developing countries are concerned about ‘green protectionism’, donor conditionality, and financial and technical support – issues on which Kenya should voice its opinion.

5.4 FINANCING

There are significant opportunities to access international funding sources for Kenya's transition to a green economy. The country has demonstrated the ability to mobilize international funding sources, and projects already exist across the energy, transport, agriculture and manufacturing sectors. The following are recommended actions to build on the work that the government of Kenya has been doing in this area:

- Continue participating in international climate finance mechanisms. Transitioning towards a green economy requires massive financial resources. Various opportunities can be tapped to support the transition to a green economy and the development of relevant policy frameworks can facilitate access to such funds. The NCCAP has identified priority adaptation and mitigation actions that require international support, most of which can contribute to the transition to a green economy. The government should be pro-active to exploit partnerships with various donors and international frameworks, such as the United Nations Framework Convention on Climate Change (UNFCCC). Potential sources of international financing, technology transfer

and capacity building include bilateral and multilateral donors, the Green Climate Fund, Adaptation Fund, carbon markets and the emerging NAMAs and REDD mechanisms. Concerning the latter, Kenya has gained experience in REDD+ through the Kasigau Wildlife Corridor Project, the first activity to issue voluntary forestry carbon credits.⁴⁰ Kenya's participation in mechanisms such as CDM, NAMAs and REDD will not only help advance these mechanisms but also assist Kenya in funding its own green economy endeavours.

- **Demonstrate transparency and solid fiscal management to attract international funding.** Bilateral and international donors can help finance green growth. Kenya can position itself to attract international support by strengthening the management of its funding and using the framework of internationally-agreed aid effectiveness principles.
- **Encourage the transition to a green economy through domestic sources of financing.** Many actions funded by the government can support the transition to a green economy. For example, the Ministry of Energy supports scientific

research, drilling and generation of geothermal electricity, while the MEWNR funds reforestation of Kenya's water towers. Such local actions and funding can be used to leverage international and private sector support, and should be systematically categorized and communicated to potential partners. As stated, it is also possible to recycle revenue from targeted green economy-related taxes to fund green economy programmes and policies.

- **Facilitate participation of the private sector.** Despite the obvious importance of private sector participation in bringing about a green economy, such as the development of solutions to climate change and low-carbon growth as well as the massive investment opportunity offered, access to finance for private companies is limited. To facilitate access to financial markets, the government of Kenya should develop a stable financial system and improve the overall investment climate for green economy initiatives. It is important that the government makes a firm commitment to increase resource allocations to green sector activities, including using public investments to leverage private sector investment, and to build opportunities for PPPs.



6 CONCLUSION AND KEY RECOMMENDATIONS

This study provides a macroeconomic assessment of the challenges, risks and potential benefits of a transition to a green economy, and presents recommendations to the government of Kenya on how to facilitate the process. The modelling work reveals that a green economy offers major potential benefits in the medium and long term with regard to high output and productivity, a clean environment and low poverty levels.

Kenya is already implementing various green economy initiatives. The fundamental challenge is to mainstream and align green economy activities across the social, economic and environmental spheres of society. This requires an integrated approach through the development of a strategy that identifies the costs, opportunities, trade-offs and range of policy instruments that support the transition to a green economy. Some of the key thematic areas to be considered include standards and regulations, financing, fiscal policy, and

coherent and effective policy coordination.

As part of the overall strategy and taking into account Kenya's socioeconomic context, there is a need to deepen the understanding of the employment, competitiveness and equity dimensions of greening the economy, as well as to develop indicators to support policy formulation through monitoring and evaluating progress.

Kenya could also develop sector-specific strategies with a clear recognition of the interrelated nature of a green economy and, thus, the need for prioritization. Detailed sector studies might be useful to identify sector-specific risks, challenges and opportunities. As part of the efforts towards mainstreaming the green economy, a review of the fiscal landscape should help determine relevant environmental fiscal reforms and financing options available to support the transition to a green economy.



Schoolchildren in a plant nursery/Creative Commons

ANNEX 1. GREEN ECONOMY INVESTMENTS –SIMULATED AND ANALYSED⁴¹

SECTOR	SUB-SECTOR	DESCRIPTION OF SPECIFIC ACTIVITIES/INTERVENTIONS	Implementation time frame (no. of years)	Resource requirement per year (billion KES)
PRODUCTIVE	Agriculture	Increasing the acreage under irrigated agriculture	20	5.2
		Investing in water harvesting programme, e.g., construction of water pans	20	2
		Provision of farm inputs, such as fertilizers and environment-friendly pesticides, e.g., through government subsidies	20	0.8
		Promotion of conservation agriculture – agroforestry, soil and water conservation	20	0.82
		Enhanced agricultural research, including international collaborations	20	1.28
	Marine & fisheries resources	Assessment of socioeconomic impacts of climate change on livelihoods of riparian communities	20	0.026
		Developing mitigation measures against resource decline, e.g., through • enactment of necessary laws • strengthening monitoring and surveying systems • upscaling sustainable aquaculture activities in fresh, brackish and marine water systems to ensure food security	20	0.035
		Reducing the sector’s carbon emissions through promotion of solar lamps for “dagaa” fishing, solar driers for fish curing, improved energy fish smoking ovens, etc., and planting trees around ponds	20	0.13
	Forestry & wildlife	Afforestation and reforestation targeting additional 4.1 million ha of land under forest cover • Rehabilitation and restoration of all degraded forests and riverine vegetation • Production of 3.5 billion seedlings in 35 000 schools countrywide • Production of 4 billion seedlings by KFS for rehabilitation of degraded forest areas, reclaimed forests and farmlands • Establishment of additional arboreta • Other interventions	20	5.55
		Pursuit of innovative funding mechanisms for forestry development • Payment for environmental services • Preparation of tree planting proposals for funding through the Constituency Development Fund (CDF) and Local Authority Transfer Fund (LATF) • Setting up of a Forest Management and Conservation Fund (FMCF) • Revenues from sale of plantation timber • Other measures	20	8
PHYSICAL INFRASTRUCTURE AND SERVICE INDUSTRY	Water & irrigation	Research to project future climate change scenarios and likely impacts on wildlife and rangelands	20	0.39
		Lifestyle and livelihoods interventions • Promotion of energy-efficient cookstoves • Development of rural sewage treatment plants	20	0.05
		In conjunction with the Ministry of Agriculture, undertake irrigation projects	20	2.0
		Construction and maintenance of 24 large dams	20	2.8
	Energy	Exploitation of deep aquifers	20	0.018
		Artificial recharging of aquifers	20	0.005
		Accelerated development of geothermal power by the government and its development partners	10	20.3
		Accelerated development of geothermal power by the private sector (GDC will take up if there are no suitable investors)	10	12.1
		Accelerated development of green energy (solar, wind, renewable biomass, etc.) by the govt. and its development partners	5	15
		Accelerated development of green energy (solar, wind, renewable biomass, etc.) by the private sector	5	22.5
Provision of efficient (fluorescent) bulbs to domestic consumers		10	0.36	
Water catchment protection programmes, e.g., afforestation		10	0.375	
Transport	Promotion of low-end solar devices, including solar drip irrigation, solar water heating, etc.	10	3.0	
	Development of a Bus Rapid Transit (BRT) system	4	8.75	
	Development of Light Rail	4	3.1	
Roads	Road maintenance	20	20.0	
Manpower	Youth affairs and sports	Mass tree planting countrywide under the theme “Planting Our Future” using “Groasis Water Box” technology to enhance tree survival, especially in arid and semi-arid regions	20	0.3

ANNEX 2. IMPACTS OF CLIMATE CHANGE – SIMULATED AND ANALYSED

SECTOR	CLIMATE IMPACT	MAIN CAUSE(S)
Climate change evidence	Temperature and humidity changes	
	Rainfall changes – floods and droughts	
Natural system		
Biodiversity	Inland forest cover loss/depletion	Deforestation due to demand of energy, illegal encroachment, logging and livestock grazing
	Rangeland depletion and encroachment by agriculture	Strong winds and droughts
	Emergence of new species of pests/diseases/plants	Temperature and rainfall variability
Key economic sectors		
Agriculture	Reduced productivity	Changes in rainfall patterns /rainfall variability
	Low agricultural production during droughts	Changes in rainfall patterns /rainfall variability
	Excess rain leaches key soil minerals (soil salinity), reducing crop production	Rainfall pattern
	Land degradation	Drought and overexploitation
	Crop infestation by pests and increased crop diseases e.g., millipedes due to rise in temperatures in Mau area and Mt. Kenya	Rise in temperatures
	Crop disease outbreak during no/low rainfall	Low rainfall
Livestock	Infestation/outbreak of livestock diseases, e.g., RVF	Temperature and rainfall variability
	Increased livestock mortality	Temperature and rainfall variability
	Reduced livestock pastures and water reducing livestock production	Temperature and rainfall variability
	Increased pastures during excess rains	Wind erosion, flooding and drought
Tourism	Land use change leading to diminishing natural habitat, thus affecting wildlife population	Rainfall and temperature variability
Forest	Forest cover diminishing	Temperature and rainfall variability
	Forest diseases	Temperature and rainfall variability
	Retarded forest growth	Temperature and rainfall variability
Fisheries	Reduced fish stock and species	
	Reduced fish production	Rainfall variability
Transport	Destruction of roads, bridges, railway lines.	Temperature and rainfall variability
Communication	Destruction of communication infrastructure	Floods
Energy	Reduced hydropower generation during droughts and floods	Siltation and soil erosion
	Damage to power infrastructure e.g., power cable during floods	Rainfall variability
	Increased demand for electricity for services such as refrigeration, air conditioning and irrigation	
Human settlement and land use		
Land	Land degradation	Droughts
	Floods/droughts/landslide-induced deaths	
Health	Epidemic (diseases) during excess and low rainfall e.g., malaria, avian flu, cholera, malnutrition	Floods
	Increased mortality rate	Temperature increases

ANNEX 3. MAIN RESULTS OF THE QUANTITATIVE SCENARIO ANALYSIS, SELECTED YEARS

TIME (YEAR)	1990	2000	2010	2012	2015	2020	2025	2030
Real GDP growth rate, per cent (%)								
BAU2%	4.04	4.38	6.15	4.96	4.80	4.65	4.41	4.04
BAU	4.04	4.44	6.14	4.54	3.83	3.78	3.59	3.41
GE2	4.04	4.38	6.15	4.93	4.73	5.61	5.50	4.73
Real GDP factor cost, in billion KES/year								
BAU2%	690.65	931.43	1 326.82	1 460.53	1 692.14	2 136.6	2 656.65	3 264.27
BAU	690.74	932.00	1 328.24	1 453.36	1 636.46	1 975.02	2 355.55	2 800.53
GE2%	690.65	931.43	1 326.82	1 459.98	1 686.82	2 195.99	2 857.49	3 640.32
CO ₂ emission, in million tonnes/year								
BAU2%	7.339	8.749	11.24	12.49	14.69	18.60	22.83	26.71
BAU	7.340	8.754	11.25	12.44	14.29	17.47	20.81	23.74
GE2%	7.339	8.749	11.12	11.98	13.35	16.38	20.25	24.35
Real per capita GDP, KES/year/person								
BAU2%	34 504	32 701	37 936	39 912	43 357	49 407	55 699	62 371
BAU	34 508	32 722	37 981	39 721	41 938	45 649	49 241	53 146
GE2%	34 504	32 701	37 936	39 897	43 221	50 778	59 930	69 702
Proportion of population below poverty line, per cent (%)								
BAU2%	0.4666	0.4788	0.3782	0.3619	0.3333	0.2848	0.2349	0.1929
BAU	0.4665	0.4784	0.3777	0.3641	0.348	0.3212	0.294	0.2621
GE2%	0.4666	0.4788	0.3782	0.362	0.3343	0.2713	0.2033	0.1584
Overall MDGs performance (index)								
BAU2%	0.4965	0.4547	0.5418	0.5513	0.5687	0.6101	0.6493	0.6881
BAU	0.4965	0.4548	0.542	0.5498	0.5588	0.5845	0.6077	0.6331
GE2%	0.4965	0.4547	0.5432	0.5565	0.5782	0.6309	0.7097	0.7773
Fossil fuel CO ₂ emissions, in million tonnes/year								
BAU2%	7.339	8.749	11.24	12.49	14.69	18.60	22.83	26.71
BAU	7.340	8.754	11.25	12.44	14.29	17.47	20.81	23.74
GE2%	7.339	8.749	11.12	11.98	13.35	16.38	20.25	24.35
Crop average yield, tonne/ha/year								
BAU2%	2.55	2.39	2.788	2.826	2.963	3.094	3.234	3.406
BAU	2.552	2.395	2.797	2.825	2.922	2.996	2.997	3.161
GE2%	2.55	2.39	2.788	2.821	2.971	3.335	3.6	3.903

ANNEX 4. PARTICIPANTS IN THE STAKEHOLDERS CONSULTATIONS

African Centre for Technology Studies

Charles Tonui

African Development Bank

Richard Walker, Wairimu Kibe

Agence Française de Développement (AFD)

Nyokabi Gitahi

Anti-Counterfeit Agency

Elijah Rutto, Agnes Karithu

Barclays Bank

Nuru Mugambi

Capital FM

Victoria Rubadiri

CARE International

Ruth Mitei, Geoffrey Onyango

CARE – Kenya

Emma Bowa

Climate Network Africa

Grace Akumu, Janet Muia

Danish International Development Agency (DANIDA)

Anne Angwenyi

Daystar University

Cyprine Keriga

Department for International Development (DFID)

Virinder Sharma

Department of Mines and Geology

Abel Chumba, Mesheck Ogora

Department of Resource Survey and Remote Sensing

Francis Masai

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Petra Jacobi

Equity Bank Group

Beth Waweru

Geothermal Development Company

Thecla Mutia, Fridah Nkatha

Green Africa Foundation

John Kioli, Emily Awori, Gladys Gatiba

International Labour Organization

Harsdorff Marek, George Waigi

Jane Goodall Institute

Linus Wafula

Kenya Association of Manufacturers

Martha Cheruto

Kenya Broadcasting Corporation

Grace Irungu, Chris Koroba, Maureen Thuku

Kenya Bureau of Standards

Charles Gachoki

Kenya Electricity Generating Company Limited

Hussein Somow

Kenya Forest Service

Rose Akombo

Kenya Meteorological Department

Samuel Marigi, Peter Omeny

Kenya National Chamber of Commerce and Industry

Michael Gaitho

Kenya National Cleaner Production Centre

Janet Nyamusi

Kenya Power

Dennis Koimett

Kenya Private Sector Alliance

Suresh Patel

Kenyatta University

Jeremiah Kiplagat

Ministry of Devolution and Planning

Victor Orindi

Ministry of Agriculture, Livestock and Fisheries

Anne Chele, Michael Obora, Janet Oyuke, Anne Sirengo, Martin Okonji, John Maina, Robin Mbae

Ministry of Energy and Petroleum

Esther Wangombe, John Maina

Ministry of Environment, Water and Natural Resources

Lucy Kamande, David Adeg, Jacob Kimani, Faith Pesa, Elvis Kiarie, Lorraine Kojwang, Anthony Mugane, Simintei Kooke, Mware Kinyua

Ministry of Lands, Housing and Urban Development

Charles Shikuku

Ministry of Information, Communication and Technology

Nancy Mathu

Ministry of Devolution and Planning

Edwin Njue, John Nyangena, Peter Bundi

Ministry of Health

Samuel Njoroge

Ministry of East African Affairs, Commerce and Tourism

Pamela Mbogo

Ministry of Transport and Infrastructure

Indangasi Jasciah, Paul Kingori, Gerald Muthui

National Economic and Social Council

Joseph Siror

National Environment Management Authority

Andrew Kwonyike

National Treasury

Peter Odhengo

Nature Kenya

Maina Rohi, Wayua Muli

Norwegian Church Aid

Paul Mbole, Isaiah Kipyegon

Office of the Deputy President

Alex Alusa, Patrick Chabeda, Abel Nyangweso

Practical Action

Erick Kisiangani, Emmanuel Cyoy

Preferential Trade Area Bank

Simba Chikarango, Alto Chapota

Public Procurement Oversight Authority

Chris Gachanja, Henock Kirungu

Renewable Energy Venture Ltd

Joseph Nganga, Nina Marsalek

Safaricom Ltd

Karen Basiye, Mary Makau, Valentine Cheruiyot

United Nations Development Programme

Christopher Gakahu, Timothy Ranja

United Nations Industrial Development Organization

Paul Njuguna

United States Agency for International Development (USAID)

Azharul Mazumder, Enock Kanyanya, Ben Wandogo

University of Nairobi

Wilfred Nyangena

VBD Automotive Technologies Ltd

Henry Kamau, Nyaga Kebuchi

World Bank

Christian Peter

World Wide Fund for Nature

Mohamed Awer, Jackson Kiplagat, George Jambiya, Sumaya Mohamed

NOTES

¹ United Nations Environment Programme. UNEP. (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*.

Available at: http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf Kenya Vision 2030

² Government of Kenya (GoK). (2007). Nairobi. Nairobi: Government Printers.

Available at http://www.google.ca/url?sa=t&rct=j&q=kenya%20vision%202030%20pdf&source=web&cd=1&ved=0CDEQFjAA&url=http%3A%2F%2Fwww.planning.go.ke%2Findex.php%3Foption%3Dcom_docman%26task%3Ddoc_download%26gid%3D13%26Itemid%3D69&ei=gAPvUN6YFMnTswbri4DgCA&usg=AFQjCNGCt1gl07uD_Mj39J6Zq4nBSSrfew&bvm=bv.1357700187,d.Yms

³ Kenya National Bureau of Statistics (KNBS). (2012). *Kenya Facts and Figures 2012*.

Available at: <http://knbs.or.ke/downloads/pdf/Kenyafacts2012.pdf>. Page 10.

⁴ The Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2009). *Kenya Economic Report 2009: Building a Globally Competitive Economy*. Nairobi: KIPPRA.

⁵ Government of Kenya (GoK). (2008). *First Medium-Term Plan (MTP) 2008-2012*. Nairobi: Government Printers.

⁶ Rees, W.E. (2003). Economic Development and Environmental Protection: An Ecological Economics Perspective. *Environmental Monitoring and Assessment*, 86, 29-4.

⁷ Global Footprint Network. (2010). *Ecological Footprint Atlas*. (2010).

Available at: http://www.footprintnetwork.org/en/index.php/GFN/page/ecological_footprint_atlas_2010

⁸ Data on appropriate environmental indicators are not readily available from national statistical sources.

⁹ International Energy Agency, 2011. Available at: <http://www.iea.org/statistics/statisticssearch/report/?country=KENYA&product=Indicators&year=2011>

¹⁰ Government of Kenya (GoK). (2010). *National Climate Change Strategy*. Nairobi: Government Printers.

Available at: <http://www.environment.go.ke/wp-content/documents/complete%20ncrs%20executive%20brief.pdf>; and Government of Kenya (GoK). National Environment Management Agency (NEMA). (2011). *Kenya State of the Environment and Outlook 2010*. Nairobi: Government Printers.

Available at: http://na.unep.net/siouxfalls/publications/Kenya_SDM.pdf

¹¹ Government of Kenya (GoK). (2005). *Arid and Semi-Arid Lands (ASALs) National Vision and Strategy: Natural Resource Management 2005-2015*. Nairobi: Government of Kenya. Page 1.

Available at: http://csdes.uonbi.ac.ke/sites/default/files/cavs/csdes/natural_resource_management_2005-2015.pdf

¹² Kenya National Bureau of Statistics (KNBS). (2007). *Economic Survey 2012*.

¹³ The Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2009). *Kenya Economic Report 2009: Building a Globally Competitive Economy*. Nairobi: KIPPRA.

¹² The Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2009). *Youth Unemployment, Under-employment and Decent Work in Kenya (September 2012)*.

¹⁵ University of Oxford. Department of International Development. (2011). *Country Briefing: Kenya – Multidimensional Poverty Index At a Glance*.

Available at: <http://hdr.undp.org/external/mpi/Kenya-OPHI-CountryBrief-2011.pdf>

¹⁶ Government of Kenya (GoK). National Environment Management Authority (NEMA). (2012). *Status of CDM Projects in Kenya*.

Available at: http://www.nema.go.ke/index.php?option=com_content&view=article&id=241:status-of-cdm-projects-in-kenya&catid=100&Itemid=598

¹⁷ Government of Kenya (GoK). (2011a). *Medium-Term Expenditure Framework 2011/12 – 2013/14, Report for the agriculture and rural development sector*. Nairobi: Government Printers.

¹⁸ Government of Kenya (GoK). (2007). *Kenya Vision 2030*. Nairobi. Nairobi: Government Printers.

Available at: https://www.google.co.ke/search?q=medium+term+expenditure+framework+agriculture+sector&oq=medium+term+expenditure+framework+agriculture+sector&aqs=chrome..69i57l7861j0j8&sourceid=chrome&espv=210&es_sm=91&ie=UTF-8

¹⁹ Government of Kenya (GoK). Ministry of Environment, Water and Natural Resources (MEMR). (2012). *Kenya Climate Change Action Plan – The Process*.

Available at <http://cdkn.org/wp-content/uploads/2011/12/KENYA-CLIMATE-CHANGE-AP-PROCESS.pdf>

²⁰ The policy was developed in 2011 and aims at dealing with problems of eradicating hunger and addressing issues of food quality and nutrition.

²¹ CAADP is a continental framework for agriculture development and growth that is supported by NEPAD. At the country level, the Kenya CAADP Compact commits the government in collaboration with development partners to implement the common vision of the sector to address the agricultural development agenda, as described in the ASDS.

Available at: www.caadp.net/pdf/Kenya.pdf

²² Government of Kenya (GoK). (2010). *National Climate Change Strategy*. Nairobi: Government Printers.

Available at: <http://www.environment.go.ke/wp-content/documents/complete%20nccrs%20executive%20brief.pdf>

²³ United Nations Framework Convention on Climate Change (UNFCCC). (2005). *Kenya's Climate Change Technology Needs and Needs Assessment Report under the United Nations Framework Convention on Climate Change*.

Available at: http://unfccc.int/ttclear/sunsets/cms/storage/contents/stored-file-20130313115535849/TNA%20%20REPORT%20Kenya%20final%20_nov05.pdf 24 Government of Kenya (GoK). Ministry of Energy. (2012). National Energy Policy, Third Draft. Available at: <http://www.kengen.co.ke/documents/National%20Energy%20Policy%20-%20Third%20Draft%20-%20May%2011%202012.pdf>

²⁵ Bellanger, M. (2010). *Technical Assistance to the Ministry of Energy*. Nairobi: French Development Agency (AFD).

²⁶ Government of Kenya (GoK). (2010). *National Climate Change Strategy*. Nairobi: Government Printers.

Available at: <http://www.environment.go.ke/wp-content/documents/complete%20nccrs%20executive%20brief.pdf>

²⁷ The Economist (September 2012). "Solar lighting - Lighting the way".

Available at: <http://www.economist.com/node/21560983>

²⁸ Government of Kenya (GoK). (2008). *First Medium-Term Plan (MTP) 2008-2012*. Nairobi: Government Printers.

Available at: https://opendata.go.ke/api/file_data/u2Q7eIQKL61jL-IW26AFIc0FDiDRSwBpQFsLQx9fxPc?filename=Medium_Term_Plan_2008-2012%25255B1%25255D.pdf

²⁹ KNPC, UCPC & CPCT. (2011a). *Resource Efficient and Cleaner Production (RECP) Guidance Manual For Fish Processing Industry, 2011*; KNPC, UCPC & CPCT. (2011b). *Resource Efficient and Cleaner Production (RECP) Guidance Manual For the Dairy Processing Industry, 2011*; KNPC, UCPC & CPCT. (2011c). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for the Sugar Processing Industry, 2011*; KNPC, UCPC & CPCT. (2011d). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for the Tea Sector, 2011*; KNPC, UCPC & CPCT. (2011e). *Resource Efficient and Cleaner Production (RECP) Guidance Manual For Wet Textile Processing Industry, 2011*.

³⁰ United Nations Environment Programme (UNEP). (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*.

Available at: http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf

³¹ IISD & ECN. (2012). *Input to Kenya's National Climate Change Action Plan: Chapter 7, Transportation*.

Available at: http://www.kccap.info/index.php?option=com_phocadownload&view=category&id=6&Itemid=41

³² Government of Kenya (GoK). (2011c). *Motor Vehicle Emissions Control (MVEC) Workshop Report, April 2011*. Nairobi:

Government Printers.

Available at: <http://www.environment.go.ke/wp-content/uploads/2011/04/MVEC-media-pack-110330.pdf>

³³ Ibid.

³⁴ United Nations Environment Programme (UNEP). (2011). *Kenya Case Study, Global Fuel Economy Initiative*. Nairobi: UNEP.

Available at: <http://www.unep.org/transport/gfei/autotool/nextsteps/Kenya%20Baseline%20Example.pdf>

³⁵ United Nations Environment Programme (UNEP). (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*.

Available at: http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf

³⁶ The classic form of the Cobb Douglas (CD) production function is expressed as: $Y = A \times K^{\alpha} \times L^{(1-\alpha)}$. Where A represents the total factor productivity (TFP), K represents the stock of capital, and L represents labour. The constant α represents the elasticity of output to capital, and $(1-\alpha)$ is the elasticity of output to labour. This function assumes that there are constant returns to scale. In T21, the standard CD production function is transformed into a more transparent algebraic form, and TFP is expanded to include several different elements e.g., initial industry production. In addition total factor productivity of industry is calculated as the product of the effects of all input factors (health, education, relative length of road network, etc.).

³⁷ Bassi, A.M. et al. (2012). *Strengthening Institutional Capacity for Integrated Climate Change Adaptation and Comprehensive National Development Planning in Kenya*.

³⁸ Pretty, J.N. et al. (2006). Resource-Conserving Agriculture Increases Yields in Developing Countries. *Environmental Science and Technology*, 40(4).

³⁹ Porto, Guido. (2012). *The Cost of Adjustment to Green Growth Policies Lessons from Trade Adjustment Costs*, World Bank Policy Research Working Paper 6237.

Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/IW3P/IB/2012/10/22/000158349_20121022083544/Rendered/PDF/wps6237.pdf

⁴⁰ Government of Kenya (GoK). National Environment Management Agency (NEMA). (2011). *Kenya State of the Environment and Outlook 2010*. Nairobi: Government Printers
Available at: http://na.unep.net/siouxfalls/publications/Kenya_SDM.pdf

⁴¹ The impacts and interventions presented in Annex 1 form part of the action plan of the National Climate Change Response Strategy (NCCRS). The table outlines specific activities, time frames and estimated costs of various interventions. The estimates were generated by ministries as part of climate change project concepts submitted to the Ministry of Environment, Water and Natural Resources for the preparation of the NCCRS.

REFERENCES

- AEA Technology Plc. (2008). *Kenya: Climate Change Screening Information and Exchange*. London: DFID.
Available at: <http://www.dewpoint.org.uk/Asset%20Library/DFID/Climate%20Risk%20Assessment%20Report%20-%20Kenya.pdf>
- Alkire, S., Roche, J.M., Santos, M.E. & Seth, S. (2011). *Kenya Country Briefing, Oxford Poverty and Human Development Initiative (OPHI) Multidimensional Poverty Index Country Briefing Series*. Available at: www.ophi.org.uk/policy/multidimensional-poverty-index/mpi-country-briefings/
- Anthoff, D. & Hahn, R.W. (2010). *Government Failure and Market Failure: On the Inefficiency of Environmental and Energy Policy*. Oxford Review of Economic Policy, 26(2), 197–224.
Available at: http://www.smithschool.ox.ac.uk/wp-content/uploads/2010/02/Hahn_09_online.pdf
- Barbier, E.B. (2009). *A Global Green New Deal: Rethinking the Economic Recovery*. Cambridge: Cambridge University Press and UNEP.
Available at: <http://www.sustainable-innovations.org/GE/UNEP%20%5B2009%5D%20A%20global%20green%20new%20deal.pdf>
- Bassi, A.M. et al. (2012). *Strengthening Institutional Capacity for Integrated Climate Change Adaptation and Comprehensive National Development Planning in Kenya*.
- Bellanger, M. (2010). *Technical Assistance to the Ministry of Energy*. Nairobi: French Development Agency (AFD).
- CIA World Factbook. *Unemployment Rates*.
Available at: <https://www.cia.gov/library/publications/the-world-factbook/fields/2129.html>
- Food and Agriculture Organization of the United Nations (FAO). (2011). *Sustainable Land Management in Practice: Guidelines and Best Practices for Sub-Saharan Africa, World Overview of Conservation Approaches and Technologies (WOCAT)*. Rome: TerrAfrica.
Available at: https://www.wocat.net/fileadmin/user_upload/documents/Books/SLM_in_Practice_E_Final_low.pdf
- Food and Agriculture Organization of the United Nations (FAO). (2010). *Global Forest Resource Assessment Country Report: Kenya*. Rome: Food and Agricultural Organization.
Available at: <http://www.fao.org/docrep/013/al543E/al543e.pdf>
- Gakuru, R. & Mathenge, N. (2012). *Poverty, Inequality and Income Distribution in Kenya: A SAM Perspective* (AGRODEP discussion paper 001).
Available at: http://www.agrodep.org/sites/default/files/AGRODEPWP0001_3.pdf
- Global Footprint Network. (2010). *Ecological Footprint Atlas 2010*.
Available at: http://www.footprintnetwork.org/en/index.php/GFN/page/ecological_footprint_atlas_2010
- Government of Kenya (GoK). (2006). *The Energy Act 2006 (Part V)*. Nairobi: Government Printers.
Available at: <http://faolex.fao.org/docs/pdf/ken118420.pdf>
- Government of Kenya (GoK). (2007). *Kenya Vision 2030*. Nairobi: Nairobi: Government Printers.
Available at: http://www.vision2030.go.ke/cms/vds/Popular_Version.pdf
- Government of Kenya (GoK). (2008). *First Medium-Term Plan (MTP) 2008-2012*. Nairobi: Government Printers.
Available at: https://opendata.go.ke/api/file_data/u2Q7eIQKL61jL-IW26AFIc0FDiDRSwBpQFsLQx9fxPc?filename=Medium_Term_Plan_2008-2012%25255B1%25255D.pdf
- Government of Kenya (GoK). (2009). *Rehabilitation of the Mau Forest Ecosystem: A Project Concept Prepared by the Interim Coordinating Secretariat*. Nairobi: Government Printers.
Available at: http://www.kws.org/export/sites/kws/info/maurestoration/maupublications/Mau_Forest_Complex_Concept_paper.pdf
- Government of Kenya (GoK). (2010). *National Climate Change Strategy*. Nairobi: Government Printers.
Available at: <http://www.environment.go.ke/wp-content/documents/complete%20nccrs%20executive%20brief.pdf>
- Government of Kenya (GoK). (2011a). *Medium Term Expenditure Framework 2011/12 – 2013/14, Report for the Agriculture and Rural Development Sector*. Nairobi: Government Printers.
Available at: <https://www.google.co.ke/search?q>

- =medium+term+expenditure+framework+agriculture+sector&oq=medium+term+expenditure+framework+agriculture+sector&aqs=chrome..69i57.17861j0j8&sourceid=chrome&espv=210&es_sm=91&ie=UTF-8
- Government of Kenya (GoK). (2011b). *Medium-Term Expenditure Framework 2011/12 – 2013/14, Report for the Energy Infrastructure and ICT Sector*. Nairobi: Government Printers. Available at: https://www.google.co.ke/search?q=medium+term+expenditure+framework%2C+energy+sector+kenya&oq=medium+term+expenditure+framework%2C+energy+sector+kenya&aqs=chrome..69i57.18460j0j8&sourceid=chrome&espv=210&es_sm=91&ie=UTF-8
- Government of Kenya (GoK). (2011c). *Motor Vehicle Emissions Control (MVEC) Workshop Report, April 2011*. Nairobi: Government Printers. Available at: <http://www.environment.go.ke/wp-content/uploads/2011/04/MVEC-media-pack-110330.pdf>
- Government of Kenya (GoK). (2005). *Arid and Semi-Arid Lands (ASALs) National Vision and Strategy: Natural Resource Management 2005-2015*. Nairobi: Government of Kenya. Available at: http://csdes.uonbi.ac.ke/sites/default/files/cavs/csdes/natural_resource_management_2005-2015.pdf
- Government of Kenya (GoK). Ministry of Agriculture and Ministry of Livestock and Fisheries Development. (2004). *Strategy for Revitalizing Agriculture 2004-2014*. Nairobi: Government Printers.
- Government of Kenya (GoK). Ministry of Energy. (2008). *Feed-in-Tariffs Policy on Wind, Biomass, and Small-Hydro Resource Generated Electricity*. Nairobi: Government Printers. Available at: http://www.futurepolicy.org/fileadmin/user_upload/Axel/Kenya_FIT_2008.pdf
- Government of Kenya (GoK). Ministry of Energy. (2012). *National Energy Policy, Third Draft*. Available at: <http://www.kengen.co.ke/documents/National%20Energy%20Policy%20-%20Third%20Draft%20-%20May%2011%202012.pdf>
- Government of Kenya (GoK). Ministry of Environment, Water and Natural Resources (MEWNR). (2012). *Kenya Climate Change Action Plan – The Process*. Available at: <http://cdkn.org/wp-content/uploads/2011/12/KENYA-CLIMATE-CHANGE-AP-PROCESS.pdf>
- Government of Kenya (GoK). National Environment Management Agency (NEMA). (2011). *Kenya State of the Environment and Outlook 2010*. Nairobi: Government Printers. Available at: http://na.unep.net/siouxfalls/publications/Kenya_SDM.pdf
- Government of Kenya (GoK). *National Environment Management Authority (NEMA)*. (2012). Status of CDM Projects in Kenya. Available at: http://www.nema.go.ke/index.php?option=com_content&view=article&id=241:status-of-cdm-projects-in-kenya&catid=100&Itemid=598
- IISD & ECN. (2012). *Input to Kenya's National Climate Change Action Plan: Chapter 7, Transportation*. Available at: http://www.kccap.info/index.php?option=com_phocadownload&view=category&id=6&Itemid=41
- International Labour Organization (ILO). (2011). *Assessing Green Jobs Potential in Developing Countries*. Available at: <http://www.uncsd2012.org/content/documents/230assessing%20green%20jobs%20potential%20ILO.pdf>
- Kenya Forest Service (KFS). (2010). *Revised REDD Readiness Preparation Proposal Kenya, Submitted to the Forest Carbon Partnership Facility*. Nairobi: Government Printers. Available at: <http://www.forestcarbonpartnership.org/fcp/sites/forestcarbonpartnership.org/files/Documents/PDF/Oct2010/Revised%20RPP%20for%20Kenya.pdf>
- Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2009). *Kenya Economic Report 2009: Building a Globally Competitive Economy*. Nairobi: KIPPRA.
- Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2010). *A Comprehensive Study and Analysis of Energy Consumption Patterns in Kenya*. Nairobi: KIPPRA.
- Kenya Institute for Public Policy Research and Analysis (KIPPRA). (2012). *Economic Transformation in Kenya: A Report Presented to Africa Centre for Economic Transformation*. Nairobi: KIPPRA.
- Kenya National Bureau of Statistics (KNBS). (2007). *Basic Report on Well-Being In Kenya*,

- Based on Kenya Integrated Household Budget Survey (KIHBS) – 2005/06. Nairobi: Government Printers.
- Kenya National Bureau of Statistics (KNBS). (2007). *Kenya Integrated Household Budget Survey (KIHBS), 2005-06*. Available at: [http://www.knbs.or.ke/pdf/Basic%20Report%20\(Revised%20Edition\).pdf](http://www.knbs.or.ke/pdf/Basic%20Report%20(Revised%20Edition).pdf)
- Kenya National Bureau of Statistics (KNBS). (2011). *Economic Survey 2011*. Nairobi: Government Printers.
- Kenya National Bureau of Statistics (KNBS). (2012). *Economic Survey 2012*. Nairobi: Government Printers.
- Kenya National Bureau of Statistics (KNBS). (2013). *Economic Survey 2013*. Nairobi: Government Printers.
- Kenya National Bureau of Statistics (KNBS). (2012). *Kenya Facts and Figures 2012*. Nairobi: Government Printers. Available at: <http://knbs.or.ke/downloads/pdf/Kenyafacts2012.pdf>
- KNCP, UCPC & CPCT. (2011a). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for Fish Processing Industry, 2011*.
- KNCP, UCPC & CPCT. (2011b). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for the Dairy Processing Industry, 2011*.
- KNCP, UCPC & CPCT. (2011c). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for the Sugar Processing Industry, 2011*.
- KNCP, UCPC & CPCT. (2011d). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for the Tea Sector, 2011*.
- KNCP, UCPC & CPCT. (2011e). *Resource Efficient and Cleaner Production (RECP) Guidance Manual for Wet Textile Processing Industry, 2011*.
- Mutimba, S. (2012). *Sustainable Development in Kenya: Stocktaking in the run up o Rio+20*. Available at: <http://www.uncsd2012.org/content/documents/757Sustainable%20Development%20Kenya.pdf>
- Mwalulu, J. (2011). *Kenya: Arresting Youth Unemployment At Once Should Be A Priority; Here's How*. Available at: <http://allafrica.com/stories/201104250105.html>
- OECD. (2011). *Towards Green Growth: A Summary for Policy Makers*. Paris: OECD. Available at: <http://www.oecd.org/greengrowth/48012345.pdf>
- Pretty, J.N. et al. (2006). "Resource-Conserving Agriculture Increases Yields in Developing Countries" in *Environmental Science and Technology*, 40(4).
- Rees, W.E. (2003). "Economic Development and Environmental Protection: An Ecological Economics Perspective" in *Environmental Monitoring and Assessment*, 86, 29-4.
- UNDP & Government of Kenya (GoK). National Environment Management Agency (NEMA). (2009). *Fourth National Report to the Conference of Parties to the Convention on Biological Diversity*.
- United Nations Commissions on Sustainable Development (UNCSD). (2011). *The Transition to a Green Economy: Benefits, Challenges and Risks from A Sustainable Development Perspective, Report By a Panel of Experts to Second Preparatory Committee Meeting for United Nations Conference on Sustainable Development*. Available at: http://www.uncsd2012.org/rio20/content/documents/Green%20Economy_full%20report.pdf
- United Nations Environment Programme (UNEP). (2011). *Kenya Case Study, Global Fuel Economy Initiative*. Nairobi: UNEP.
- United Nations Environment Programme (UNEP). (2011). *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*. Available at: http://www.unep.org/greeneconomy/Portals/88/documents/ger/GER_synthesis_en.pdf
- United Nations Framework Convention on Climate Change (UNFCCC). (2005). *Kenya's Climate Change Technology Needs and Needs Assessment Report Under the United Nations Framework Convention on Climate Change*.
- University of Oxford. Department of International Development. (2011). *Country Briefing: Kenya – Multidimensional Poverty Index at a Glance*. Available at: <http://hdr.undp.org/external/mpii/Kenya-OPHI-CountryBrief-2011.pdf>
- World Bank. (2012). *Inclusive Green Growth: The Pathway to Sustainable Development*. Available at: http://siteresources.worldbank.org/EXTSDNET/Resources/Inclusive_Green_Growth_May_2012.pdf
- World Bank. (2013). *World Development Indicators*. Available at: <http://data.worldbank.org/data-catalog/world-development-indicators>

Principal Secretary
State Department of Environment and Natural Resources
Ministry of Environment, Water and Natural Resources
P.O. Box 30126-00100, Nairobi, Kenya
Tel.: +254 20 2710120
Email: psoffice@environment.go.ke
Website: www.environment.go.ke

