


Steering towards a GREEN ECONOMY



Steering towards a Green Economy: A reference guide

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PREFACE

The global financial crisis of 2008, coupled with climate change, environmental degradation and poverty, triggered worldwide policy debate on the need for a new economic paradigm. A global response, “Rethinking the Economic Recovery: A Global Green New Deal”, was first proposed by UNEP in 2009 to revive the global economy and boost employment; while simultaneously accelerating the fight against climate change, environmental degradation and poverty. There has been a marked global uptake of the approach; with many countries incorporating the concept of a green economy in their national policies and strategies, and are on the road to implementation. A green economy can be viewed as a path to sustainable development that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.

South Africa has a resource intensive economy, which is faced with declining natural resources and deepening inequalities between the rich and poor. In the words of the South African President: *“Ecosystem failure will seriously compromise our ability to address our social and economic priorities... there is significant opportunity for the development of a green economy in Southern Africa, which extends to other parts of the continent”* (President Jacob Zuma, Green economy Summit, 2010). The green economy concept is poorly understood and will depend on the context in question. It offers a point of departure for reinterpreting current development pathways which do not account for the complex relationship between natural and social capital, and economic development. The green economy is not an ‘add-on’ or an emerging sector, but an imperative and framework for all economic activity. It brings effect to the concept of sustainable development, and requires co-ordinated action of government, the private sector, and civil society.

This Guide has been created to provide a concise understanding of the green economy, and to relate this to South Africa’s development path. It is not intended to provide specialist knowledge or policy analysis, but rather contribute to a broad awareness in support of emerging green economy strategies, policies and initiatives. It is hoped that stakeholders and decision-makers at all levels and in a range of different contexts (government, business, communities and individuals) engaged in

the development process might find this a useful reference for understanding the concepts, intent and opportunities for a green economy for South Africa. *Steering towards a green economy* is an introduction to green economy concepts, ideas and actions with particular relevance to South Africa. Information on the origin and meaning of a green economy, and how a green economy can be implemented in South Africa, is described. Five focus areas- transport, water, energy, waste, and agriculture- are used to illustrate South Africa's unique challenges and to identify practical opportunities to realise a green economy. These actions will reorient the economy to be more inclusive, resource efficient and low carbon; and thereby provide pathway to sustainable development.

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1 KEY MESSAGES

The economies of the world have, to date, overexploited natural resources and severely undervalued the ecological goods and services that form the basis of all economic activity. The African Consensus Statement to Rio+20 clearly articulated this aspect- *“The combined stream of economic, social and environmental crises that have plagued the global economy in recent years points to a need to reorient the current development models towards a more efficient, inclusive and sustainable economy by enhancing the resource efficiency of national economies, and decoupling economic activity from environmental degradation.”* The green economy concept has renewed the global efforts to transform our current unsustainable economic model into one which better aligns with the overarching goals of sustainable development.

The green economy requires that economic development is decoupled from the use of resources and environmental degradation. Decoupling refers to reducing the environmental impact (in terms of both resource use and the generation of pollution and wastes) associated with any economic activity. A distinction can be made between relative decoupling (a reduction in environmental impact per unit of economic output), and absolute decoupling (a reduction in the overall environmental impact of an economy). There is an urgent need to ‘act now’ and reorient the economy, since adopting a ‘business as usual’ approach will result in the investments that lock us in to high carbon emissions and unsustainable consumption and production patterns for decades to come. Therefore, strategic and integrated spatial planning, improved governance with robust policy signals, and regulatory drivers that reinforce the need for the economic system to account for externalities; are some of the most powerful mechanisms that could facilitate green investment and innovation to transition to a green economy.

South Africa has a range of supporting and enabling policy that can help steer the way to a green economy. The *National Strategy on Sustainable Development* that describes “Towards a green economy” as a strategic priority for- “a just transition towards a resource efficient, low carbon and pro-employment growth path”. Other supporting policy include the *Medium Term Strategic Framework Programme of Action*, the *New Growth Path 2020*, *National Development Plan Vision 2030* and

Green Economy Accord; that identifies viable changes in the structure and character of the production economy that can generate a more inclusive and greener economy, and set targets based on the opportunities for jobs in the green economy. The *National Climate Change Response White Paper* commits South Africa to implement a range of mitigation actions and develop a low carbon economy; and the *Industrial Policy Action Plan (IPAP 2)* aims to mainstream resource efficiency and value-adding industries in the economy. There are also a range of other policies (acts, strategies, plans and white papers) that address specific sectors and will serve to enable the transition to a green economy.

Maintaining economic performance while reducing resource intensity will require the more efficient use of materials and energy (that is, obtaining more value from the same resources, or obtaining the same value using less resources); as well as switching to alternative inputs. This will require the more efficient use of energy resources, and switching away from non-renewable fossil fuels to the use of low carbon emitting, renewable energy resources. South Africa has an abundance of untapped renewable energy resources- by international standards; an excellent solar resource, a good wind resource, a good wave energy resource, reasonable biomass resources, and limited or local of hydropower and geothermal energy resources^{1 2}

In addition, South Africa's rapid industrialisation has been reliant on the primary sectors of the economy; namely agriculture, forestry, fishing and mining. However, adding value to natural resources through the development of the secondary and tertiary sectors of the economy will assist in reducing resource intensity, while developing new skills and employment opportunities. There are various opportunities to add value along the entire product value chain, and thereby to stimulate local economic development. For example, adding value to agricultural products through the establishment of food processing industries, coupled with renewable energy supply; could assist in achieving food security and improving resource efficiency; while stimulating socio-economic development in rural areas and contributing to low carbon economic growth. There are also a range of clean technologies and solutions for a green economy that can reduce the generation of pollution and waste, improve the treatment of wastes and pollutants before discharge into the environment, and mitigate the socio-ecological impacts from wastes and pollutants. Examples of clean technologies and solutions include: green building design and

green buildings; green chemistry and materials; green product design; material efficiency; waste prevention; upcycling, recycling and recovery; waste to energy; and renewable energy technologies.

As populations continue to grow with a rapid rate of urbanisation, there is increasing pressure on natural resources to derive materials and energy need to fuel economic growth. Therefore, there is an urgent and fundamental need for the improved management of natural resources and the establishment sustainable production and consumption systems. To highlight the range of practical opportunities to steer towards a green economy, five focus areas- transport, water, energy, waste, and agriculture³⁹- were chosen to provide insight into South Africa's unique challenges and provide examples of 'what can be done?' to transition to a more equitable, resource efficient and low carbon economy.

Examples in the various focus areas include:

Transport and Urban efficiency

- Integrated spatial planning to improve urban efficiency
- Promote and enable green building design and green building materials and standards.
- Promote and enable low carbon transportation

Energy

- Promote and enable energy efficiency and demand side management
- Increase the proportion of renewable energy in the national energy supply mix
- Enhance the universal access to clean, renewable energy services

Waste

- Measures to improve supply chain efficiency and prevent the production of waste
- Reduce the waste going to land-fill by increasing reuse and recycling
- Invest in clean technology and value adding to waste

Water

- Enhance the provision of water and sanitation services
- Increase water-use efficiency and equitable distribution through appropriate incentives
- Improve monitoring and reporting to ensure best practice and standards in water and wastewater management

Agriculture

- Develop sustainable agricultural systems where the dependency of agriculture on natural resources is recognised
- Focus agricultural production to improve food security and livelihoods, and create resilient ecosystems
- Develop and enable access to organic markets through the support of small-scale farmers and establishment of organic norms and standards

Since infrastructure determines how people use resources to satisfy basic needs and establish a standard of living; a green economy transition will require that infrastructure developments are low carbon and resource efficient, while also being inclusive and delivering equitable benefits that improve human well-being. These infrastructure developments include various public works for the provision of essential services (i.e. water provision, waste and sanitation services, hospitals, schools, transportation and communication). Integrated and strategic spatial planning can be used to help build sustainable communities by optimising for low-carbon and resource-efficient developments, while also providing opportunities to stimulate local economic development, enhance social cohesion, and adopt sustainable lifestyles. For example, enhancing the connectivity and mobility of people through improved mass transport systems and communications infrastructure can open up opportunities for communication, education, enterprise creation and employment; and thereby improve social cohesion and stimulate local socio-economic development.

A green economy can only be achieved through the commitment and actions of multiple sectors and stakeholders in society including government, business and individuals. Improved partnerships and cooperation is needed to build a broad front for development that involves a strong relationship between government,

labour, business, and civil society. The transition to a green economy will need citizens to act as agents of change and this will require the development of increased environmentally responsible behaviour; through awareness, education, role-models, and changes in the prevailing culture and *modus operandi*.



2 INTRODUCTION

In this chapter, the origins and characteristics of the concept of a green economy are outlined, to provide some background and orientation.

2.1 THE ORIGINS OF THE GREEN ECONOMY

The concept of a green economy was introduced as a response to the failure of neoclassical economics to effectively include the value of natural resources and environmental degradation in pricing and other market mechanisms³. Global economic growth over at least the past 50 years has been accompanied by accelerated environmental decline. From 1981 to 2005, the global Gross Domestic Product (GDP) more than doubled, but 60% of the world's ecosystems were degraded or used in an unsustainable manner. Essentially, the economies of the world have, to date, overexploited natural resources and severely undervalued the ecological goods and services that form the basis of all economic activity⁴.

Economic development has put staggering demands on the natural resource base of the earth and the world is already resource-constrained. Many resources, including water, fertile soil and fossil fuels, are fast reaching the limits of their potential for exploitation... In addition, the consequences of climate change that include unpredictable weather patterns,



"The financial, fuel and food crises of 2008 are in part a result of speculation and a failure of governments to intelligently manage and focus markets...But they are also part of a wider market failure triggering ever deeper and disturbing losses of natural capital and nature-based assets coupled with an over-reliance of finite, often subsidized fossil fuels. The flip side of the coin is the enormous economic, social and environmental benefits likely to arise from combating climate change and re-investing in natural infrastructure-benefits ranging from new green jobs in clean tech and clean energy businesses up to ones in sustainable agriculture and conservation-based enterprises."

Achim Steiner, UN Under-Secretary General and UNEP Executive Director, 2008

increased frequency and severity of natural disasters and disrupted ecosystems, are already threatening food security and economic activities. Furthermore, the increasing prevalence of social and socio-political dissent and unrest, various social pathologies and violent conflict across the world, are partly the result the inequitable sharing of limited resources that are unequally distributed. A new development path is therefore urgently needed...

The green economy was brought into international focus in response to the multiple crises that the world has been facing in recent years— climate change, the food and economic crises, and the rise in poverty⁵ and social inequality. The United Nations Environment Program (UNEP) proposed a 'Global Green New Deal' to revive the global economy and boost employment while simultaneously accelerating the fight against climate change, environmental degradation and poverty. Subsequently, a number of intergovernmental green economic initiatives were developed; including: UNEP's Green Economy Initiative⁶; The International Labour Organisation's (ILO) Green Jobs Initiative⁷; and the Organisation for Economic Cooperation and Development's (OECD) Green Growth Strategy⁸.

2.2 WHAT IS THE GREEN ECONOMY?

The causes of the climate change, food, social and economic crises that have

“The combined stream of economic, social and environmental crises that have plagued the global economy in recent years points to a need to reorient the current development models towards a more efficient, inclusive and sustainable economy by enhancing the resource efficiency of national economies, and decoupling economic activity from environmental degradation.”

African Consensus Statement to Rio+20, following the Africa Regional Preparatory Conference for the United Nations Conference on Sustainable Development (Rio+20), Addis Ababa, Ethiopia, October 2011



unfolded during the last decade vary, but they all share one common feature- the gross misallocation of capital. During the past two decades, much capital was poured into property development, fossil fuels and structured finance. By comparison, relatively little was invested in the development of renewable energy, improving energy efficiency, promoting and developing appropriate public transportation, sustainable agriculture, ecosystem and biodiversity protection, and land and water conservation. Decades of creating new wealth through this 'brown economy' model powered by fossil fuels, has not succeeded in substantially addressing social marginalisation, environmental degradation and resource depletion.

The green economy requires that economic development is decoupled from the use of resources and environmental degradation. Decoupling refers to reducing the environmental impact (in terms of both resource use and the generation of pollution and wastes) associated with any economic activity. A distinction can be made between relative decoupling (a reduction in environmental impact per unit of economic output), and absolute decoupling (a reduction in the overall environmental impact of an economy).

Selected definitions of a green economy

"...is one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities".

(United Nations Environment Programme, 2011)

"...is fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies."

(Organisation for Economic Co-operation and Development, 2011)

"...is a fair and resilient economy, which provides a better quality of life for all achieved within the ecological limits of one planet"

(Green Economy Coalition)

"... implies the decoupling of resource use and environmental impacts from economic growth."

(National Strategy for Sustainable Development, South African Department of Environmental Affairs, 2011)

How will the green economy help combat climate change?

Human activities that have released greenhouse gases into the atmosphere are the cause of recent climate change, often referred to as global warming. Climate change is the shift of average weather conditions over long-time horizons (decades and longer). The average temperature on the planet has been increasing in recent decades; resulting in more extreme and unpredictable weather across the world and a range of impacts on economic activity and human well-being. To combat climate change we need to act now since the benefits of strong, early action on climate change can have significant and lasting benefits that improve the resilience of society.

The main human activities responsible for greenhouse gas emissions are the use of non-renewable fossil fuels, land-use change from deforestation and agricultural expansion, and other industrial activities. Many countries are signatories to the Kyoto Protocol (and related mechanisms under the United Nations Framework Convention on Climate Change), that commits countries to reduce greenhouse gas emissions through the adoption of a range of mitigation measures and defined emission reduction targets. The transition to a green economy, which is resource efficient and low carbon, will therefore be essential in reducing greenhouse gas emissions and mitigating climate change by decoupling future growth from the use of non-renewable fossil fuels and other natural resources.

The green economy therefore presents an opportunity to reorient the economy along a development path which is **resource efficient** and generates **low levels of carbon emissions**. Broad-based, free and open participation in decision-making is needed to define development options and priorities that will transition South Africa to a green economy. This will help to ensure that the green economy is **socially inclusive**, with the more **equitable** sharing of wealth and benefits that improve human **well-being**. These benefits may include economic goods and services, such as money, material goods and services, ecosystem goods and services such as clean air and water, and public infrastructure goods and services such as roads and rail, sanitation, schools, education, policing and fire protection). Also central to the green economy transition and a more inclusive and equitable society is a focus on

poverty alleviation, and the generation of **green jobs** and **decent work** that contribute significantly to maintaining and enhancing the environment⁴.

What are 'green jobs' and 'decent work'?

Green jobs are work in agriculture, industry, services and administration that contribute to preserving or restoring the quality of the environment.

Decent work is productive work in conditions of freedom, equity, security and human dignity.

Decent, green jobs effectively link Millennium Development Goal 1 (poverty reduction) and Millennium Development Goal 7 (protecting the environment) and make them mutually supportive. Decent work is central to efforts to reduce poverty, and is a means for achieving equitable, inclusive and sustainable development.

http://www.ilo.org/global/About_the_ILO/Mainpillars/WhatIsDecentWork/index.htm

The green economy is therefore a broad concept that defies simple definition. The concept can perhaps best be understood by referring to the defining principles of a green economy. A number of attempts have been made to set out these principles⁵; and the United Nations Department of Social and Economic Affairs (UNDESA, 2011) has consolidated this information to derive a list of eleven principles, shown in the box below:

In essence, the green economy concept has renewed the global efforts to transform our current unsustainable economic model into one which better aligns with the overarching goals of sustainable development.

Green economy Principles

The most common green economy principles identified from a review of eight published sets of principles or characteristics:

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

UNDESA (2001). A Guidebook to the Green Economy, Issue 2: exploring green economy principles

United Nations Division for Sustainable Development.

3 TOWARDS A GREEN ECONOMY IN SOUTH AFRICA

In this chapter we explore the policies that can help steer the way to a green economy, and a range of mechanisms that could be used to transition to a green economy.

3.1 POLICY FOUNDATIONS FOR A GREEN ECONOMY

Similar to many other countries, the urgent need for new economic paradigm includes the slowing of previously strong economic performance, the need to reduce reliance on unsustainable resources to drive economic growth, the challenge of rising unemployment rates, and the future risks associated with climate change. Therefore, the transition to a green economy will require a reorientation and restructuring of the existing economy towards a more sustainable development path using a combination of mechanisms.

A green economy transition requires action and implementation through a range of investments, as well as policy and pricing reforms. This includes support and integration of existing policy as well as fiscal reform and the development of new policy and partnerships. Although currently led at the national level by the Department of Environmental Affairs (DEA) and the Economic Development Department (EDD), the implementation of the green economy will see maximum success through cooperation between all government departments and the formation of partnerships with a broad range of public and private sector organisations at multiple levels.



“In the midst of the global economic crisis the United Nations Environment Programme called for a Global green New Deal..... Today at this summit we are responding to that call..... We have no choice but to develop a green economy....”

Presidential address at the South Africa green economy Summit (May 2010)

The *South African Constitution* affords every person with the right to an environment which is not harmful to their health and well-being¹⁰. A strong policy and regulatory framework exists to give effect to these rights and includes legislation and regulations, policies, as well as strategies and action plans relating to sustainable development, spatial planning, land-use management, and environmental management. Within this strong existing framework, the key national policies that are explicitly driving the transition to a green economy include: the *National Framework for Sustainable development (NFSD)*¹¹, the *National Strategy for Sustainable development and Action plan (NSSD)*¹², the *National New Growth Path 2010*¹³, the *Green Economy Accord*¹⁴ and the *Medium Term Strategic Framework Programme of Action*¹⁵.

3.1.1 Towards a green economy: the National Strategy for Sustainable Development

Following the *World Summit on Sustainable Development* (Johannesburg, South Africa 2002), the *National Framework on Sustainable Development (NFSD)* and the *National Strategy for Sustainable Development (NSSD)* were developed to guide South Africa's growth and development. The NFSD defines the key sustainable development principles for the country and recognises the important role that a green economy will play in sustainable development. The country's sustainable development vision is outlined as "*South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration*".

The economic system, socio-political system and ecosystem are seen as being embedded within each other and integrated via the governance system with a legitimate regulatory framework (Figure 1). Sustainability requires the continuous integration of these systems over time, while sustainable development means making sure that these systems remain mutually compatible as the key development challenges are met via specific actions and interventions to eradicate poverty and severe inequalities. There are 5 strategic priorities of the National Strategy for Sustainable Development:

1. *Enhancing systems for integrated planning and implementation*
2. *Sustaining our ecosystems and using natural resources efficiently*
3. *Towards a green economy*
4. *Building sustainable communities*
5. *Responding effectively to climate change*

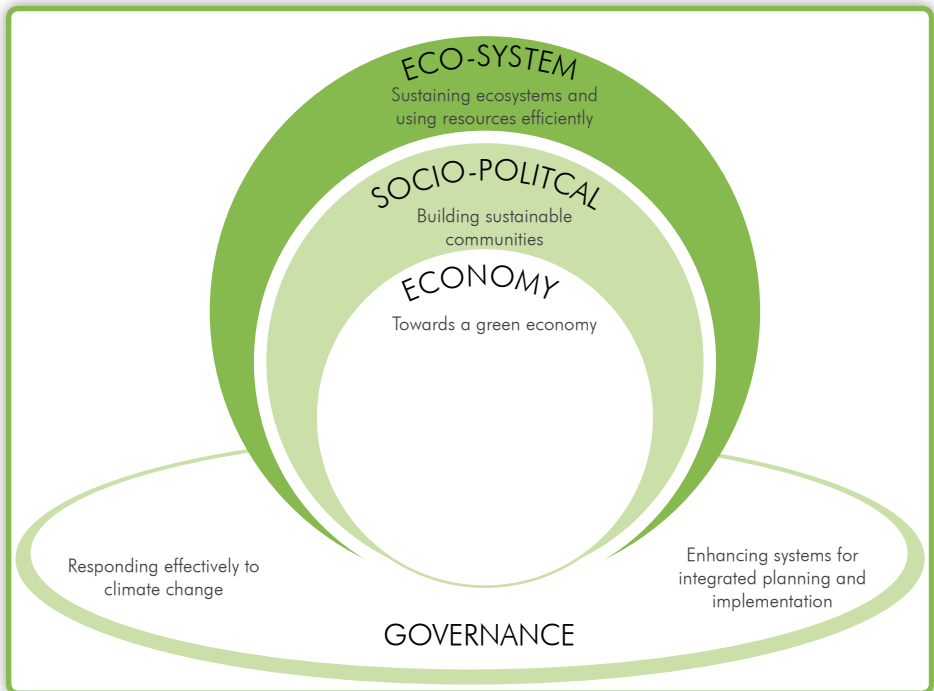


Figure 1: Representation of Sustainable development showing the spheres of Ecosystem, Socio-political and Economy and Governance, with the *five strategic priorities of the NSSD in italics*¹². To steer development “Towards a green economy”, there will need to be “A just transition towards a resource efficient, low carbon and pro-employment growth path”(NSSD strategic priority 3).

In the NSSD, the objective of strategic priority 3 - Towards a green economy- is given as: “A just transition towards a resource efficient, low carbon and pro-employment growth path”.

3.1.2 Other policies supporting a green economy

In addition to the NSSD, there are several other policies which support and provide the enabling environment for a transition to a green economy (Figure 2).

- A clear commitment to the green economy is made in the *Medium Term Strategic Framework Programme of Action* through the protection and continual enhancement of environmental assets and natural resources, the use of renewable energy resources, creation of green jobs and green industries to mitigate the impacts of climate change, and economic development to create decent work, sustainable livelihoods and reduce income inequality.
- South Africa’s potential to mitigate climate change has been explored through Long Term Mitigation Scenarios (LTMS)- studies that provided a sound scientific analysis to draw up a long-term climate policy. A strategic view of carbon emissions was taken to peak (at the latest by 2020-25), then plateau for a decade or so, and then decline. This balances the country’s contribution as a responsible global citizen to the international effort to curb global emissions (with the aim of limiting temperature increase to 2°C above pre-industrial levels) with the economic and social opportunities presented by the transition to a lower-carbon economy, and the requirement to tackle development challenges facing South Africa. These studies have informed the *National Climate Change Response White Paper*, which commits South Africa to implement a range of mitigation actions and develop a low carbon economy that will result in a 34% and a 42% reduction below its ‘business-as-usual’ emissions by the year 2020 and 2025, respectively. This will involve a range of economic instruments to support the system of desired emissions reduction outcomes; including the appropriate pricing of carbon and economic incentives, as well as the possible use of emissions offset or emission reduction trading mechanisms for relevant sectors.

- Significant progress has been made in mainstreaming resource efficiency into development plans and strategies such as the second *Industrial Policy Action Plan* (IPAP 2), which identifies the green economy as a major new thrust for the South African economy and presents multiple opportunities to create jobs and value-adding industries.
- The *National New Growth Path and Green Economy Accord* identify viable changes in the structure and character of the production economy that can generate a more inclusive and greener economy and set targets based on the opportunities for jobs in the green economy. The *New Growth Path 2020*, focuses on creating decent work, reducing inequality and defeating poverty, and identifies the green economy as one of the key drivers of employment and the creation of green jobs. For example: “Jobs Driver 3: Seizing the potential of new economies. The *New Growth Path* targets 300 000 additional direct jobs by 2020 to green the economy, with 80 000 in manufacturing and the rest in construction, operations and maintenance of new environmentally friendly infrastructure. Additional jobs will be created by expanding the existing public employment schemes in natural resource management, energy generation, energy and resource efficiency, and emissions and pollution mitigation”¹⁶. The *Green Economy Accord* aims to shift the economy to a lower carbon-intensity whilst increasing jobs and industrial development. It contains commitments in twelve areas, ranging from installation of solar water heating systems, to increased investment in green industry activities and the promotion of green skills at a technical level.
- Policy also exists to develop the human capacity and capability for the green economy transition, such as in the *Ten-Year Innovation Plan and National Skills Development Strategy* that aims to end poverty through the creation of decent work to drive South Africa towards a knowledge-based economy.
- Furthermore, many of the green economy developmental goals are also embedded in the *National Development Plan Vision 2030*¹⁷ and specific National government outcomes¹⁸; namely:- decent employment through inclusive economic growth (Outcome 4), a skilled and capable workforce to support inclusive growth (Outcome 5), an efficient, competitive and responsive economic

infrastructure network (Outcome 6), vibrant, equitable and sustainable rural communities and food security for all (Outcome 7), environmental assets and natural resources that are valued, protected and continually enhanced (Outcome 10) and an efficient, effective and development oriented public service and an empowered, fair and inclusive citizenship (Outcome 12)¹⁹.

In addition to these fundamental policies that can assist in driving and supporting the green economy in South Africa, there are many others that can enable and facilitate the transition to a green economy. These are shown in Figure 2 and referred to in the relevant sections on green economy focus areas- transport, water, energy, waste and agriculture (Chapter 4).

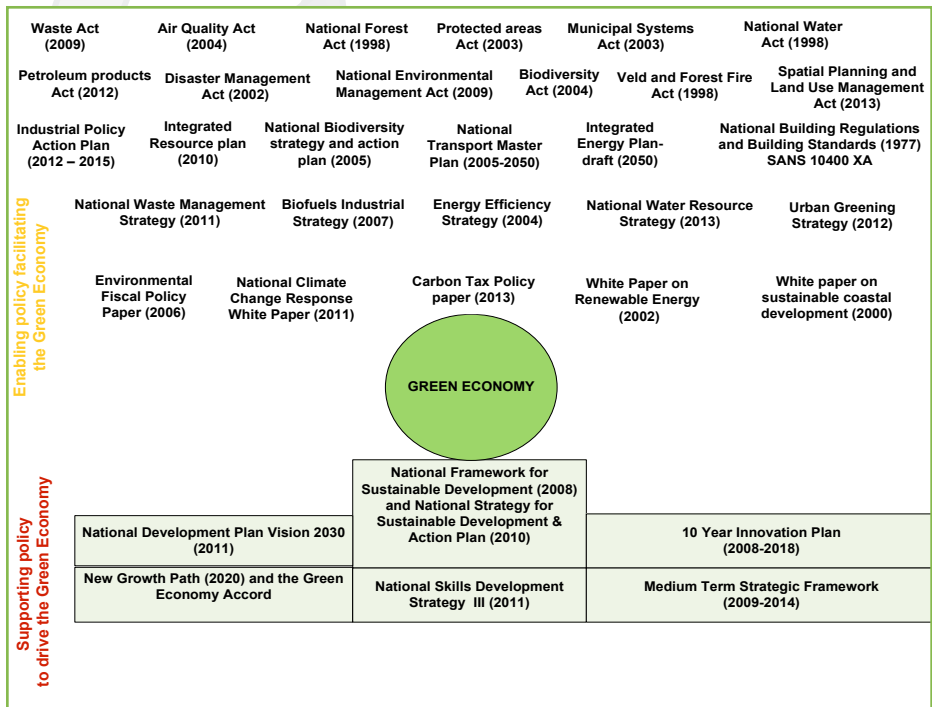


Figure 2. Select policies and strategies that support and facilitate South Africa's transition to a green economy. The main supporting policies that help to drive a green economy are shown (boxed), together with other enabling policies that can facilitate the transition to a green economy (un-boxed).

3.2 MEANS OF IMPLEMENTATION

A green economy can only be achieved through the commitment and actions of multiple sectors and stakeholders in society including government, business and individuals. In addition to national and international policy making, initiatives at the sub-national and local levels of government are necessary for the transition to a green economy. Decisions at these levels have the potential to transform local and regional economies, while having a pronounced impact on the way in which communities and individuals within society live.

A range of enabling conditions, strategic priorities and policy reforms will be required for the redirection of investments and the reconfiguration of infrastructure to support a green economy. These mechanisms are the necessary strategic actions for a green economy (Figure 3), and described in detail in the sections below.

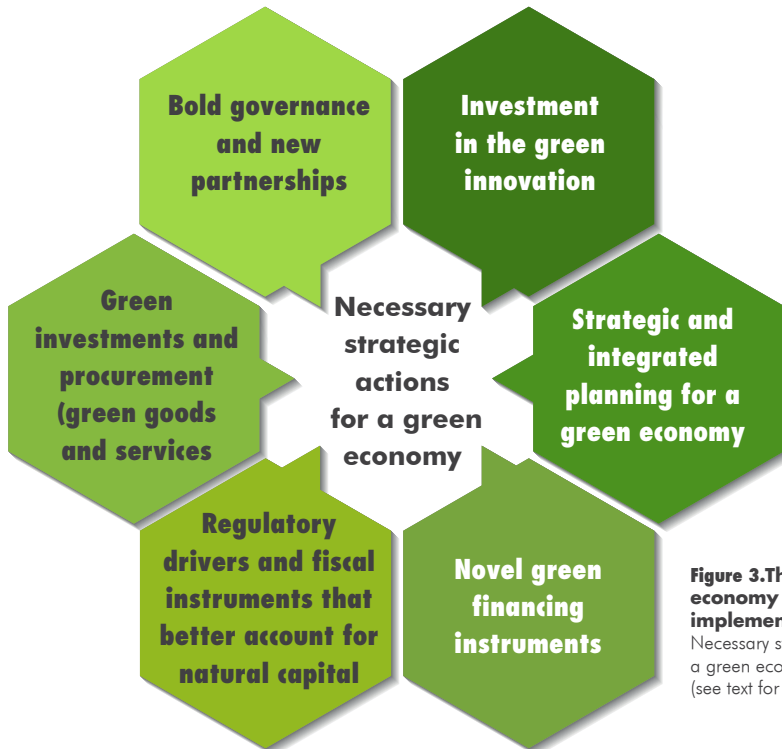


Figure 3. The green economy means of implementation. The Necessary strategic actions for a green economy are shown (see text for details).

3.2.1 Regulatory drivers and fiscal instruments that better account for natural capital

The escalating impacts of human activities on biodiversity and natural ecosystems threaten the delivery of ecosystem goods and services that are needed to sustain all life. Furthermore, as the human population continues to grow, so too will the demand for these ecosystem goods and services.

Accounting for the economic value of ecosystem goods and services involves two main aspects:

- The valuation of ecosystems and biodiversity. Ecosystem goods and services refer to the range of provisioning (food, water, air), regulating (e.g. climate regulation and water purification), cultural (e.g. aesthetic and recreational) and supporting (e.g. nutrient cycling and soil formation) services provided by nature or natural capital, and which are the foundation for all life on Earth, including all economic activity. However, such goods and services are typically not accounted for within current economic activities and markets. The externalisation of these costs contributes to the ongoing exploitation of the natural environment. Accounting for these goods and services will therefore enable proper evaluation of the contribution of the environment to economic performance, which is conventionally measured by Gross Domestic Product (GDP). For example, the Economics of Ecosystems and Biodiversity (TEEB, www.teebweb.org) is a global initiative aimed at helping decision-makers recognise, demonstrate and capture the values of ecosystem services and biodiversity.
- Defining the the Environmental Goods and Services Sector (EGSS) in order to assess the investment in green growth and to measure the contribution of the environmental sector to the economy. The EGSS is defined as all producers



of goods and services produced for environmental protection and resource management. This includes all activities to measure, prevent, limit, minimise or correct environmental damage to water, air and soil, as well as problems related to waste, noise and ecosystems. Increasing the economic contribution of the Environmental Goods and Services Sector should, by definition, increase environment-related employment opportunities through the provision of green jobs. These green jobs help to protect ecosystems and biodiversity; reduce energy, materials, and water consumption through high efficiency strategies; redirect the reliance of the economy away from high carbon emitting activities; and minimise the generation of all forms of waste and pollution.

Both these aspects involve a range of difficult and complex issues; including: defining the boundaries of what can be included in such assessments, how the costs and benefits vary with scale; the need to value all goods and services in monetary terms; and how the various goods and services derived from ecosystems are distributed to members of society.

A range of new regulatory drivers will be required to incorporate the value of ecosystem goods and services into development decisions, and to improve the governance of natural capital. New and enhanced fiscal instruments are needed to better account for the use of natural capital and the impacts on ecosystems. These fiscal instruments provide disincentives in the form of taxes, levies and fines for inefficient resource use and polluting activities; or incentives in the form of tax exemptions, rebates and subsidies for the enhanced provision of ecosystem services. These fiscal instruments could be:

- **Tax policy:** environment-related taxes on goods, services, incomes and assets can influence behaviour in terms of the nature of the goods and services produced and provided, consumer choices and spending and the kind of assets acquired.
- **Expenditure policy:** Governments incur significant expenditure on public goods and services that should better account for the environment to prevent inefficient resource use and environmental impacts.
- **Pricing policy:** The government can influence or determine the pricing of goods and services in a variety of ways- either by directly setting the price of certain products, or indirectly influencing prices.

Some examples of green economy incentives and disincentives in the form of fiscal instruments

- Applying stepped-pricing mechanisms to encourage water and energy efficiency with the application of inclining block tariffs
- 'Buy-back' schemes for waste recycling and materials recovery
- Fines for littering
- Taxes and tariffs for inefficient and polluting transportation options
- Payment for ecosystem services.

3.2.2 Green investment and procurement

The transition to a green economy requires a broader understanding of how to account for the value of ecosystem services and how to optimise the use of natural capital for green economic growth. This will require a re-orientation in investments; whereby ecological and social criteria are taken into account in decisions involving investments and the procurement and purchasing of goods and services.



Some examples of green investment that avoids the erosion of natural and social capital

- Investing in public services infrastructure such as waste and wastewater treatment facilities and reticulation, water supply infrastructure, public transport and renewable electricity supply
- Investing in the promotion of sustainable farming practices which increase food production and accessibility and decreases stresses on the natural environment
- Investing in clean water and sanitation services for the poor
- Investing in the promotion of energy efficient and other clean technologies
- Investing in empowerment for the increased and more effective participation of local communities
- Investing in ecological protection in the tourism industry

Maintaining economic performance while reducing resource intensity will require the more efficient use of materials and energy (that is, obtaining more value from the same resources, or obtaining the same value using less resources); as well as switching to alternative inputs. This will involve, for example, more efficient use of energy resources and a switch away from non-renewable resources to the use of low carbon emitting, renewable sources. Furthermore, South Africa's rapid industrialisation has been reliant on the primary sectors of the economy; namely agriculture, forestry, fishing and mining. However, adding value to natural resources through the development of the secondary and tertiary sectors of the economy will assist in reducing resource intensity, while developing new skills and employment opportunities. There are various opportunities to add value along the entire product value chain, and thereby to stimulate local economic development. For example, adding value to agricultural products through the establishment of food processing industries, coupled with renewable energy supply; could assist in achieving food security and improving resource efficiency; while stimulating socio-economic development in rural areas and contributing to low carbon economic growth. There are also a range of clean technologies and solutions for a green economy that can

reduce the generation of pollution and waste, improve the treatment of wastes and pollutants before discharge into the environment, and mitigate the socio-ecological impacts from wastes and pollutants. Examples of clean technologies and solutions include: green building design and green buildings; green chemistry and materials; green product design; material efficiency; waste prevention; upcycling, recycling and recovery; waste to energy; and renewable energy technologies.

Since infrastructure determines how people use resources to satisfy basic needs and establish a standard of living, a green economy transition will require that infrastructure developments are low carbon and resource efficient, while also being inclusive and delivering equitable benefits that improve human well-being. These infrastructure developments include various public works and the provision of essential services (i.e. water provision, waste and sanitation services, hospitals, schools, transportation and communication) that are vital for livelihoods. Integrated and strategic spatial planning can be used to help build sustainable communities by optimising for low-carbon and resource-efficient developments, while also providing opportunities to stimulate local economic development, enhance social cohesion, and adopt sustainable lifestyles. For example, enhancing the connectivity and mobility of people through improved mass transport systems and communications infrastructure can open up opportunities for communication, education, enterprise creation and employment; and thereby improve social cohesion and stimulate local socio-economic development. The building of social capital and the 'know how' for a green economy will also need citizens to act as agents of change. This will require increased awareness and improved education relating to the green economy, the availability of role-models, the advocacy of environmentally responsible behaviour and changes in the prevailing culture.

The economic modelling of investments in four of the country's key economic sectors (agriculture, energy, transport and natural resource management) demonstrates that a green economy approach, which takes into account the country's economic, social and ecological aspirations, can deliver as much economic growth as a business-as-usual model, but in a more sustainable manner²⁰. In the *South African Green Economy Modelling (SAGEM)* study, it was determined that, by 2030, green economy investments could contribute to 46% more restored land and to improved water availability, without reducing the amount of land used for agriculture. Investment in

ecological farming practices in the agricultural sector could increase crop yields by as much as 23.9% by 2030, while avoiding further greenhouse gas emissions. The study found that current investment in the transport sector were insufficient to meet the country's 2005 energy efficiency goals, but a 5.5% improvement in transport efficiency could be achieved by 2030. The study also recommended that an aggressive green economy investment strategy be implemented in the energy sector to reduce energy demands and increase the proportion of renewable energy in the electricity supply mix²¹ to reach the targets of the national *Integrated Resource Plan*⁵².

Various initiatives will be need to invest in natural capital and improve the management of natural resources. Two recent examples of South African green economy initiatives that have invested in natural capital are:

- The national environment related Expanded Public Works Programmes (EPWP, <http://www.epwp.gov.za>) are a good example of where investments in natural capital have enhanced the provision and maintenance of ecosystem services and the creation of green jobs. The Environment and Culture sector within the EPWP is led by the Department of Environmental Affairs, who has implemented a range of natural resource management programmes; including: Working for Water, Working for Wetlands, Working for Ecosystems, Working for Energy, Working for Eco-furniture, Working for Forests, Working on Fire, and Working for Biosecurity.
- The South African National Botanical Institute (<http://www.sanbi.org>) has also invested in natural capital through their ecosystem-based adaption programme. This initiative supports poverty alleviation by providing safer and more secure livelihoods through maintaining and enhancing rich biodiversity and healthy ecosystems to help mitigate climate change²².

Procurement systems and processes in the public and private sector will also need to be redesigned and restructured for the preferential procurement of green goods and services, as well as to direct investments into the green economy. Procurement in a green economy will require improvements in the efficiency of procurement processes (i.e. through standardisation, integration and mass procurement), and the adoption and formalisation of measures to assess the ecological and social footprint of goods and services. These measures would need to be used to evaluate products and

services to be purchased, to assess the credentials of suppliers, and to define the specifications of products and services.

3.2.3 Novel green financing instruments



Novel green financing includes green financing policies and plans such as guarantees and concessional loans, and payment for the provisioning and maintenance of ecosystem services. It includes green finance options such as carbon market finance through International Emissions Trading, the Clean Development Mechanism (CDM) and Joint implementation (JI) as well as a variety of other international carbon finance options. These include the green Climate Fund, Global Environment Facility, Strategic Climate Change Fund, and other bilateral funding mechanisms. There are also several financial mechanisms of the South African government that could facilitate investment in the green economy; including:

- Municipal infrastructure grant;
- Urban settlements development grant;
- Electricity demand side management programme;
- Public transport infrastructure and systems grant;
- Provincial and municipal disaster grant;
- Municipal drought relief grant;
- Regional bulk infrastructure grant; and
- Manufacturing competitiveness enhancement programme.

There have been significant investments in the Green economy to date. This includes commitments from the Department of Environmental Affairs, Development Bank of South Africa, Industrial Development Corporation, and private financiers. In addition, South Africa has received support by the Climate Technology Fund; a multi-donor trust fund under the global Climate Investment Funds (CIF).

Several green financing instruments are being explored and implemented in civil society and the private sector to transition South Africa to a green economy³⁸. Examples include:

- The South African Green Fund (www.sagreenfund.org.za), an initiative of the Department of Environmental Affairs and the Development Bank of Southern Africa, provides finance to catalyse and facilitate investment in green economy initiatives that will support poverty reduction and job creation in three focus areas:
 - **Green Cities and Towns.** Local government can play a significant role in generating the demand for green products and services through public sector procurement and alignment of spending on infrastructure and services, with environment performance indicators. This, in turn, can create greater development and localisation of green technologies.
 - **Low Carbon Economy.** The decoupling of economic growth from its impact on natural resources will be driven by private sector efforts to lower environmental impact and resource consumption. This can be achieved through clean production methods and other climate change mitigation and adaptation measures; including: interventions targeting industrial efficiency and the carbon intensity of the economy.
 - **Environmental and Natural Resource Management.** Natural Resource Management involves the protection of biodiversity, and securing the sustainable delivery of ecosystem goods and services. This includes interventions targeting ecosystem based adaptation to climate change that could drive rural development models, as well as managing and reducing the impact of agriculture and land use changes through demand management and resource conservation.
- The Green cities component of the Cities Support Programme is an initiative of the South African National Treasury in collaboration with other government line departments. It aims to assist cities to scale up their climate adaptation and mitigation interventions. There is a strong focus on achieving climate resilient

cities that are equipped to manage the transition to a low carbon economy and to cope with the effects of climate change. Cities' climate resilience will require the building of capacity across eight key priority areas: energy, air quality, waste management, water and sanitation, transport, land use, ecological infrastructure and biodiversity assets, and environmental governance. The Green cities component of the Cities Support Programme promotes a more integrated fiscal approach to improving service delivery in cities, and currently consists of four supporting components:

- Core city governance capacity support- strengthening core capacity of city governments on transversal aspects of city management such as planning and financial management.
- Human settlements support- supporting cities to effectively take on their new human settlements management functions.
- Public transport support- supporting cities to assume their responsibilities for public transport management in terms of the National Land Transport Act.
- Climate resilience and sustainability support- assisting cities to scale up their climate adaptation and mitigation interventions.

3.2.4 Strategic and integrated spatial planning for a green economy

The greening of infrastructure in the construction, energy and transport sectors, is urgent and critically important given the dependency of this infrastructure on non-renewable fossil fuel use with its corresponding emissions. In addition, Infrastructure systems typically have a long lifespan and, as a result, they commit built environments to certain patterns of production and consumption for many years. Once commitments have been made to an unsustainable form of infrastructure, like a coal-fired electricity network, the "lock-in effect" can prevent the implementation of more sustainable alternatives for decades. Therefore, new strategic design and planning approaches to infrastructure service provision that are resource –efficient can save on the costs of resource inputs and waste treatment, making services more affordable to government and the public in the longer term whilst contributing to a green economy. The building codes, land-use policies and plans, as well as standards pertaining to the efficient use of material and energy resources, can be formulated and/or revised

so that they strongly influence the nature and efficiency of resource consumption. In addition, local government plays a critical role in reducing resource use and energy consumption through the planning, design and management of the urban environment. Therefore, strategic and integrated planning that is directed towards the efficient use of resources and low-carbon growth will be required to ensure that infrastructure investments re-orient developments towards a green economy.

The protection and enhancement of ecosystem services should be a central concern within development planning and decision-making for a green economy. Numerous national and provincial plans and tools have been developed to prioritise and integrate ecosystem services into strategic planning. These include: the *National Biodiversity Strategy and Action Plan*; the *National Biodiversity Framework*; and the *Provincial Bioregional Plans and Environmental Management Frameworks (EMF)* drafted in terms of the *National Environmental Management Act*. The national, provincial and local State of the Environment Report (SOER) and municipal Integrated Environmental Management Plans also provide useful information on biodiversity and ecosystem services that should be incorporated into municipal *Integrated Development Plans (IDPs)* and *Spatial Development Frameworks (SDFs)*. The transition to a green economy will require frameworks, strategies and action plans to maintain and enhance ecosystems services, while ensuring that there is inclusive participation and the equitable sharing of wealth and benefits from the use of natural resources.

Some examples strategic and integrated spatial planning for a green economy

- Promoting sustainable land-use and agriculture as a means of contributing to regional economic vitality while ensuring food security for all citizens;
- Preventing urban sprawl and improving social cohesion through urban compaction and densification that reduces the related inefficiencies and inequities natural resource use, municipal infrastructure developments and the delivery of public services; and
- Raising awareness of the connections between ecosystem health and human-health to stimulate environmentally responsible behaviour amongst the public and thereby develop more resilient and sustainable communities.

Stakeholder engagement is central to the process of integrated development planning and provides an important opportunity to understand the needs of local communities; and plan an inclusive and equitable manner. Coherence between different strategic plans is also necessary so that, for example, the municipal Environmental Management Framework (EMF) informs the municipal Integrated Development Plan (IDP) and all local development decisions. Examples include:

- Conducting biodiversity assessments to determine the status of sensitive areas in order to inform their rehabilitation; where needed.
- Establishing actions to meet existing SANBI targets for the conservation of biodiversity;
- Developing and continuously improving green servitudes, biodiversity corridors and public open space; and
- Developing remediation plans for the rehabilitation of degraded and contaminated lands.

The Spatial Development Frameworks (SDFs) provide a regional context for development and present information contained in Integrated Development Plans in a spatial format. This can provide a cohesive framework within which infrastructure investments can be steered towards developing a green economy. In the SDFs, appropriate land-use is identified for different geographical areas; based on the local context, as well as land use plans and policies. These land uses should be allocated in a way

DID YOU KNOW?

Green economy strategic and integrated spatial planning tools

ICLEI's Local Biodiversity Strategy and Action Plan Guidelines assist local authorities in formulating strategies and identifying specific actions aimed at maintaining and enhancing biodiversity.

<http://cbc.iclei.org/lbsap>

The Let's Respond Toolkit is an initiative between the South African Local Government Association, the Department of Environmental Affairs, and the Department of Cooperative Governance. This initiative assists in integrating climate change risks and opportunities into municipal planning. It provides a cross reference to key IDP milestones to facilitate the integration of climate response and IDP planning

http://www2.gtz.de/wbf/4tDx9kw63gma/GIZ_Lets-Respond_TOOLKIT.pdf

that dynamically enhances the resilience of human settlements against future impacts of climate change such as floods, fires, or the spread of disease; as well as other risks such as major technological accidents. This approach is supported by South Africa's *Spatial Planning and Land Use Management Act* (No. 16 of 2013) that promotes the efficient use of social, economic and environmental resources and the principle of resilience. Examples include:

- Limiting urban sprawl through the enforcement of an urban edge;
- Providing minimum density standards in support of compact cities;
- Promoting mixed-use development around transport nodes, and the use of smart metering and time-of-use tariffs to reduce electricity and water consumption.

In addition to the strategic and integrated spatial planning needed to improve resource efficiency and reduce carbon footprints that will mitigate climate change, there is also a need for adaption to inevitable climate change and future extreme weather events. South Africa's resilience to climate change can therefore be enhanced by measures such as: developing early warning systems, implementing flood-control and other precautionary measures, as well as coordinating preparedness activities will be required to help adapt to climate change. Many of these activities are central to fulfilling the requirements of the *Disaster Management Act* (No. 57 of 2002)¹⁵. These activities include:

- Establishing disaster management centres and fulfilling the responsibilities of the centres, such as providing risk and preparedness information in relation to disasters,
- Recruiting and training volunteers in disaster management,

DID YOU KNOW?

South African Risk and Vulnerability Atlas

The *South African Risk and Vulnerability Atlas* (SARVA) is aimed at equipping decision-makers with information on the impact and risk associated with global change in the region. It provides easily understood global change sensitivity and vulnerability information at regional, national, provincial and municipal levels. It also helps support national initiatives such as the National Disaster Management Framework.

<http://www.rvatlas.org>

- Monitoring the likelihood that disasters may occur; and
- Responding with contingency plans and emergency procedures

3.2.5 Investment in green innovation

Green Innovation is defined as the introduction of a new or significantly improved product, process, or method that results in a reduction of environmental impact, and/or optimises the use of resources throughout the lifecycle. The human capacity and capability to steer the way to a green economy will need to be developed by building the appropriate knowledge and skills for a low-carbon, resource-efficient, inclusive economy. This will require research and development in low carbon, clean technologies and solutions, as well as education, training and advocacy. These efforts should focus on the needs of South Africa to define the relevant expertise required for green innovation, and to further initiatives that aspire to an economy with zero emissions- where waste is converted to revenues, and unused yet widely available resources are cascading into a chain of value generation (e.g. the Zero Emission Research and Initiatives- www.zeri.org). In addition, awareness, and the development of environmentally responsible behaviour can catalyse a fundamental green economy transition; whereby citizens are custodians of nature that manage natural resources to ensure the sustainable consumption of goods and services. This will require a multi-faceted approach of improved education, awareness raising, providing advice and information on green economy activities, promoting the purchase of more sustainably produced goods, and solutions to adopt low-carbon and sustainable lifestyles. For example, providing eco-labelling and information on aspects such as water and energy efficiency; ensuring that packaging materials can be upcycled or reused; and establishing recycling centres.



3.2.5 Bold governance and new partnerships

The transition to a green economy will require good governance with a new mind-set of doing business that relies on broad participation to stimulate public confidence. This is particularly relevant to building the public confidence and partnerships needed to re-orient the current unsustainable economy, with its vested business interests, to a more equitable and sustainable economy- a green economy. Good governance is inclusive, participatory, consensus orientated, accountable, transparent, responsive, effective, efficient, equitable, and follows the rule of law. Good governance ensures that corruption is minimised, the views of minorities are taken into account and that the voices of the most vulnerable in society are heard in decision-making. It is also responsive to both the present and future needs of society and therefore aims for inter- and intra- generational equity.¹⁶



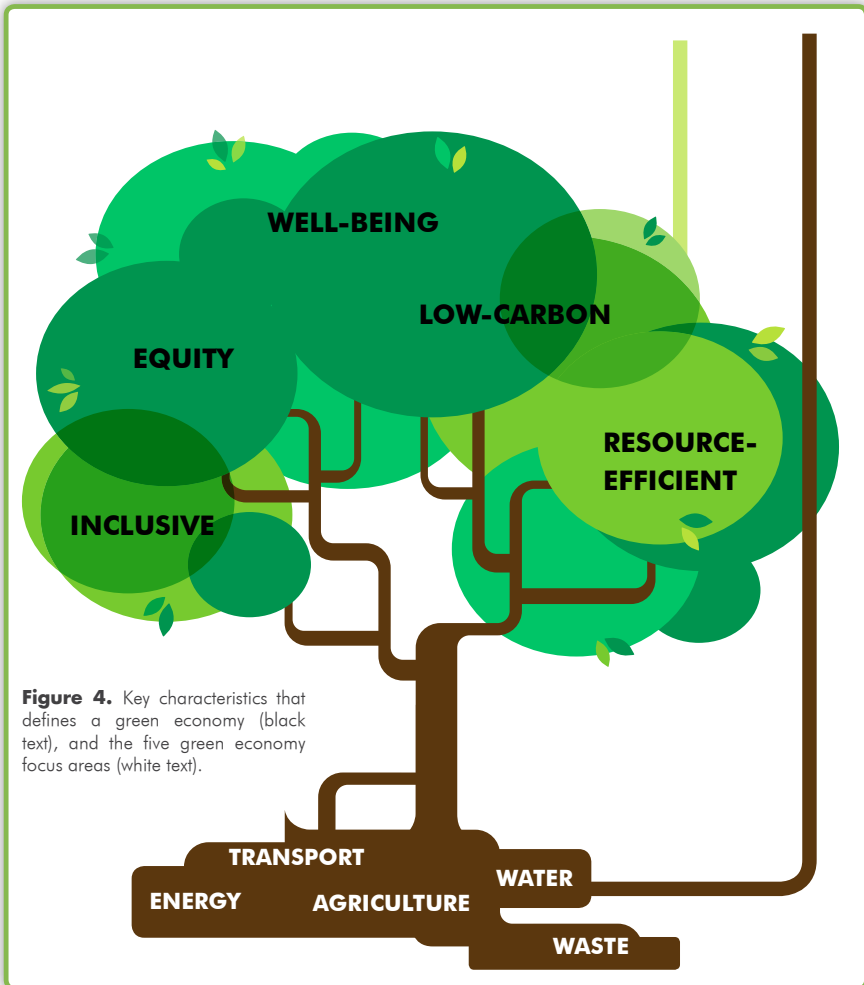
Broad public participation in decision-making, through more inclusive processes and the equitable sharing of benefits, can contribute to improving the security of human livelihoods reducing environmental risks and ecological scarcities^{17 18}. Broad public participation can also help to form new partnerships that can help address market failures or failures of governance- where neither the market nor government is able, on its own, to deliver public goods or meet crucial social and environmental challenges. Many types of cooperation are contract-driven, transaction-based or one-off events- all of which make an important contribution, but tend to be limited in scale and scope. True partnerships are about shared agendas and vision as well as combined resources, risks and rewards, focused on meaningful outcomes. They are voluntary collaborations that build on the respective strengths and core competencies of each partner, optimise the allocation of resources, and achieve mutually beneficial

results over a sustained period. There are several recommendations that can support the development of effective public-private partnerships for the green economy¹⁹, namely:

- Ensure good governance and improve enabling frameworks for private investment and partnerships, especially measures to tackle corruption and unnecessary red tape and bureaucracy;
- Provide better funding and incentives to encourage business involvement in the development of the green economy through innovative public-private funding mechanisms, as well as awards and public recognition;
- Engage business in policy dialogue and planning to work together in integrating plans and actions to achieve green economic growth; and
- Provide better information and coordination that helps all sectors of society better understand the government's development priorities in the context of a green economy.

4 FOCUS AREAS OF SOUTH AFRICA'S GREEN ECONOMY

The transition to a green economy requires not only policy, and regulatory frameworks with good governance, but also actions from all sectors and members of society. This will require new partnerships between all levels of government, business and civil society. The South African government originally identified nine key focus areas in green economy programmes- Green buildings and the built environment; Sus-



tainable transport and infrastructure; Clean energy and energy efficiency; Resource conservation and management; Sustainable waste management practices; Agriculture, food production and forestry; Water management; Sustainable consumption and production; and Environmental sustainability²⁹. However, several of these relate to human demand for natural resources; whilst the others are more concerned with sustainable management practices that is a fundamental thread achieving a green economy. Therefore, five focus areas - **transport, water, energy, waste, and agriculture**³⁹ have been chosen to highlight the challenges and opportunities to realising a Green economy. These are discussed below to identify actions to transition to a **resource efficient, low-carbon, inclusive** economy which improves **equity** and human well-being (Figure 4).

Table 1. Green economy initiatives and benefits in the transport, water, energy, waste and agriculture focus areas

Green economy focus area	Key green economy Initiatives	Examples of green economy Benefits
Transport and Urban efficiency	<ul style="list-style-type: none"> · Integrated spatial planning to improve urban efficiency · Promote and enable green building design and green building materials and standards. · Promote and enable low carbon transportation 	<ul style="list-style-type: none"> · Increased mobility and connectivity without the need for additional transport · Increased urban efficiency through the efficient use of resources such as water, energy and materials · Reduced traffic congestion, improved vehicle fuel efficiency and low carbon transport through switching to biofuels, shared use of vehicles, mass transit and non-motorised transport
Energy	<ul style="list-style-type: none"> · Promote and enable energy efficiency and demand side management · Increase the proportion of renewable energy in the national energy supply mix · Enhance the universal access to clean renewable energy services 	<ul style="list-style-type: none"> · Provides consumers with information needed to reduce energy consumption and increase energy efficiency · Reduced demand for fossil fuel-based energy supply, reduction in emissions and the promotion of local innovation and economic development · Reduced inequalities related to clean, modern energy services with universal electricity grid availability and access to renewable energy sources
Waste	<ul style="list-style-type: none"> · Measures to improve supply chain efficiency and prevent the production of waste · Reduce the waste going to land-fill by increasing reuse and recycling · Invest in clean technology and value adding to waste 	<ul style="list-style-type: none"> · Reduces costly waste treatment and unnecessary raw material demands by-promoting resource efficiency · Reduces costly waste and opens up green jobs and new opportunities in reuse and recycling · Reduced production of wastes and pollutants and improved waste management with new enterprise opportunities
Water	<ul style="list-style-type: none"> · Enhance the provision of water and sanitation services · Increase water-use efficiency and equitable distribution through appropriate incentives · Improve monitoring and reporting to ensure best practice and standards in water and wastewater management 	<ul style="list-style-type: none"> · Universal and equitable access to water and sanitation services to improve human well-being · Improved water use efficiency to improve the management of water quality and quantity, and the fair and equitable allocation of water resources · Improved water resources management and best practice towards water security
Agriculture	<ul style="list-style-type: none"> · Develop sustainable agricultural systems where the dependency of agriculture on natural resources is recognised · Focus agricultural production to improve food security and livelihoods, and create resilient ecosystems · Develop and enable access to organic markets through the support of small-scale farmers and establishment of organic norms and standards 	<ul style="list-style-type: none"> · Increased resource efficiency and investment in natural capital to maintain and enhance the provision of ecosystem goods and services · Agriculture is geared to improve food security and creating resilient ecosystems; thereby reducing poverty, improving livelihoods and creating green jobs. · New market opportunities for small scale farmers and SMMEs with increased rural socio-economic development and the localisation of the food value chain to deliver equitable benefits

4.1 TRANSPORT AND URBAN EFFICIENCY

The spatial planning and design of urban centres fundamentally affects the degree of connectivity and mobility of goods and people. It therefore pre-determines the nature of transport facilities and infrastructure required and hence the urban efficiency.

Cities are cultural, economic, and social hubs that continue to attract migration from rural areas due to the promise of economic opportunities. It is estimated that approximately 62% of South Africans currently live in urban areas, and this number is expected to reach 70% by 2030 and 80% by 2050, as the trend of increasing urbanisation continues³⁰. Transport systems have a significant impact on the environment and account for nearly a quarter of the world's energy consumption and greenhouse gas emissions. The size of the transport sector is predicted to double between 2005 and 2050 as a result of economic development, population increase and urbanisation⁶. Therefore, greater resource efficiency and environmental responsibility is needed in the planning, design, construction, operation, maintenance, refurbishment, and eventual deconstruction of the built environment in order to improve urban efficiency³².



The concept of green construction and green buildings was introduced to reduce the overall impacts of the built environment on the well-being of humans and ecosystems. Green buildings are designed, built and operated or managed in ways that increase the efficient use of material resources, energy and water, produce minimal wastes and pollution, and improve the health and productivity of occupants or users. In addition to the development of new green buildings, existing buildings can be 'greened' by retrofitting for increased water and energy efficiency and improved waste management. Green spaces in towns and cities (e.g. parks and wetlands) are

also an important part of the built environment that provide valuable ecosystem services, many of which are seldom recognised in the urban context. Ecosystem services provided by urban green space include:

- Absorbing and filtering air pollution and waste water,
- Controlling floods,
- Storing carbon,
- Regulating local temperature extremes,
- Providing recreational opportunities,
- Promoting a sense of place, and
- Providing the opportunity for urban food garden development³³.

Transportation is a derived demand that reflects the need for mobility. Transportation efficiency therefore depends on the transport modality, infrastructure, and demand for the movement of goods and services. Increasing traffic volumes, especially the use of personal vehicles with single occupancy, are the result of insufficient, inadequate and inappropriate public transport infrastructure, and facilities that cannot respond to the rapid pace of urbanisation. The consequent increases in traffic congestion results in inefficient fuel consumption, loss of productivity of the work force due to time with associated economic losses, and the continuous deterioration in local and global air quality. Personal motor vehicles consume much more energy and emit far more greenhouse gases per passenger-kilometre compared to other passenger modes, such as mass transit and non-motorised transport. Non-motorised transport options, such as cycling, pedi-cabs and walking, are the most energy efficient form of transport. However, unlike comparable towns and cities internationally, South African urban centres are lagging far behind in providing appropriate infrastructure to support a cycling culture.

South African urban mass transit services consist of bus and minibus-taxi systems, with rail services in the main metropolitan cities. Despite the fact that rail services suit the transportation of bulk commodities over long distances at low prices, only 11% of freight was transported by rail in 2009, with the remainder being transported by road. Similarly, the city bus and train public transportation systems are underutilised, because of issues, such as: inconvenience (bus and train systems do not service many informal settlements and are often not well linked into an efficient network), a perception that these modes are slower than minibus-taxis or private vehicles, and several safety concerns (personal safety on public transport, the risk of accidents).

Furthermore, the legacy of apartheid era segregation policies exacerbate these challenges since certain parts of cities were established with poor access to transportation infrastructure and these residents live great distances from urban and economic centres. The universal lack of access to affordable transportation has deepened inequality with low-income earners spending disproportionately more of their income and time on transportation^{37,38}.

In a green economy, the mobility and connectivity of goods, services and people are provided for in a way that contributes to urban efficiency, improved resource efficiency, low levels of carbon emissions, and with and equitable socio-economic benefits. A number of initiatives, activities and actions are described below, that can increase urban efficiency and enhance mobility and connectivity through improved transportation system³⁹.

4.1.2 Integrate spatial planning to improve urban efficiency

The mobility and connectivity of people and goods can be improved by integrating land-use and transportation infrastructure so that the number, distance and frequency of necessary journeys are reduced. This may involve developing denser and more compact settlements and locating places where goods are

DID YOU KNOW?

Green Star SA rating developed by the green Building Council of South Africa provides an objective measurement of green buildings in South Africa. The rating system provides a menu of green measures that can be used in the design, construction and management of a building to make it more sustainable. The objectives of green Building Council of South Africa are to:

- Establish a common language and standard of measurement for green buildings;
- Promote integrated, whole-building design;
- Raise awareness of the benefits of green building;
- Recognise environmental leadership; and
- Reduce the environmental impact of development.

<http://www.gbcsa.org.za/rating-tools/green-star-sa-rating-system/>

produced or manufactured and services provided in close proximity to where these goods and services are consumed or accessed.

Spatial design of the urban landscape can be done according to green building principles so that resource consumption and negative impacts on ecosystems are minimised. Urban densification enhances the connectivity of people with goods and services while allowing for the protection and provision of green spaces that help reduce the impacts of waste and pollution on human health. Green spaces also provide enhanced opportunities for recreation and social interaction, contributing to wellbeing. Many of these ideas fit into the 'Smart City' concept. A city can be defined as 'smart' when investments in human and social capital, transport and modern communication infrastructure (ICT) fuel sustainable economic development and a high quality of life, while natural resources are managed wisely through participatory action and engagement⁴⁰. One of the aims of spatial planning should be to integrate and build social capital by developing the infrastructure to address social disparities and inequalities. Improving the mobility and connectivity of poor marginalised communities through improved transport and communications can enable access to markets, education, skills and training that can stimulate socio-economic development and help steer the way to a green economy.

4.1.3 Promote and enable green building design, materials and standards

The focus of green building design is to optimise the use of energy and other resources by considering the location, position, aspect, and technical design of buildings in a way that enhances the connectivity of people with goods and services, and increases human productivity and well-being. The use of materials and energy needed for construction and throughout the operation of the building over its entire lifetime, is taken into account.

The updated National Building standards (SANS 204), and the Green Building Council of South Africa provide guidance for voluntary green building initiatives. In addition, the recent SANS 10400 XA standard provides energy efficiency standards that are mandatory for new buildings. Some examples of green building design include:

- Using insulation and passive heating and cooling systems for reducing energy requirements;
- Using renewable energy supply to fulfil energy demands;
- Incorporating and applying measures to improve water use efficiency and reduce wastes; and
- Using low carbon and resource efficient building materials.

Although the cost of construction of a green building can be 2-3% above those of a conventional building, the reduced operational costs over the entire life-span of the building can significantly reduce the overall cost. The retrofitting of existing buildings can yield remarkable savings in energy and water use, such that the costs of the retrofitting are returned through long-term operational savings with reasonable payback periods, thereby also reducing the demand for these public services. The Green Building Council of South Africa indicates that buildings certified by them can consume 85% less energy, 65% less potable water and send 69% less waste to landfill than non-certified buildings⁴¹. The United Nations Environment Programme has estimated that for every US \$1 million invested in efficiency retrofitting, 10 to 14 direct jobs and 3 to 4 indirect jobs can be created.

4.1.3 Promote and enable low carbon transportation

Low carbon options are resource efficient and reduce the per capita greenhouse gas emissions per kilometre travelled. Low carbon transportation will require a shift to non-motorised transport (walking and cycling) and mass transit systems (buses and trains carrying many passengers and/or different kinds of freight) that are more cost-efficient and reduce congestion, air pollution and the carbon footprint per passenger travelled. However, mass transit systems must operate at design capacity and be accessible, affordable, reliable, and safe for these benefits to be achieved. Both rail and bus transport can operate as efficient mass transit systems. For example, the bus rapid transit (BRT) system is a mass transit system using exclusive right of way lanes that mimic the rapidity and performance of the metro rail systems of Europe and the USA, but utilise bus technology rather than rail. In addition, improving the integration of transport modalities and traffic flow (such as through the synchronisation of

traffic lights and the installation of roundabouts) can also significantly reduce urban congestion and improve transportation efficiency.

Low carbon transport options will also require improvements in the fuel efficiency of vehicles and the use of renewable fuels to reduce the emission of greenhouse gases and other air pollutants. This will require a shift to the use of biofuels, low-sulphur diesel, and electric vehicles; as well as enforcement of vehicle emission standards. Other measures to promoting the adoption of low carbon transportation could include discouraging the continued expansion of city parking areas, applying reduced road toll fees for car-pooling (more than one passenger per vehicle), and promoting awareness of the environmental, financial and human health benefits of mass transport and non-motorised transport options.

4.2 ENERGY

The energy demanded by society for heating/cooling, electricity and transportation accounts for the majority of global greenhouse gas emissions⁴³. Since this is largely due to combustion of non-renewable fossil fuels (i.e. coal and oil), the transition to a green economy will require a low carbon development path where energy is used more efficiently and where renewable energy (e.g. solar, wind, geothermal, hydro, biomass) plays a central role in energy supply and use^{6 44}.

Energy is a necessity and also a factor of production. Energy enables a variety of services such as transportation, heating and food production, and the price of energy directly affects the price of other goods and services. Access to secure, sustainable and affordable energy is also seen as being essential for achieving the Millennium Development Goals such as the reduction in hunger and poverty, improving education and communication, enhancing health care services, and responding to climate change. Energy sufficiency and security is a key to development and prosperity since it is essential for economic development and the public services that improve the quality of life. However, the universal and equitable access to energy services is an ongoing developmental challenge. The need to deliver affordable electricity to the peri-urban and rural poor, with the associated prohibitive infrastructure costs of the national electricity grid extension⁶, must be balanced with the need to provide industry with sufficient and affordable energy to stimulate the economy.

To date, economic development in South Africa has relied mainly on the primary and secondary production of the mining, agriculture and manufacturing sectors.



"To continue to extract and combust the world's rich endowment of oil, coal, peat, and natural gas at current or increasing rates, and so release more of the stored carbon into the atmosphere, is no longer environmentally sustainable" (IPCC, 2007) .

Economic activity in these sectors has contributed to the economic growth and global competitiveness of the country in commodity markets. However, the high energy intensity and reliance on fossil fuels in these sectors has resulted in a per capita carbon footprint that ranks South Africa as the 13th highest carbon emitter in the world^{45, 46}. In addition, the current electricity supply capacity in relation to rapidly growing demand, estimated to be 25 to 40 GW by 2025, already reached a crisis in 2008 with unplanned electricity blackouts and subsequent load-shedding. A transition to a green economy will therefore require a combination of:

- i. Improved energy demand side management, entailing energy efficient behaviour, technologies and solutions; and
- ii. The substantial inclusion of renewable sources in the energy supply mix to reduce carbon emissions and other environmental impacts from the current use of finite fossil fuels⁴⁸.

There are several initiatives, activities and actions that can enhance energy efficiency and renewable energy supply to deliver equitable socio-economic benefits to society³⁹. Some of these are described below.

4.2.1 Promote and enable energy efficiency and demand side management

Rolling out energy-efficient lighting, solar water heaters, smart electricity meters with 'time of use' tariffs, investing in retrofitting and the construction of new energy-efficient buildings, and delivering low carbon transport systems, could all contribute to improving energy efficiency and demand side management. An energy efficiency approach should also include promoting energy efficient behaviour and the manufacture and use of energy efficient appliances; through the implementation of energy efficiency standards and ratings, and education and awareness programmes. These initiatives can support the *Energy Efficiency Strategy* of South Africa; that aims for a 15% reduction in energy use by 2015⁴⁹. For example the Integrated Demand Management programmes of South Africa's national electricity utility, Eskom, has:

- Promoted efficiency in electricity use through technology enhancements and behavioural change;
- Facilitated the roll-out of solar water heaters and more efficient lighting;

- Provided information and coordination for internal energy efficiency and improved energy management programmes;
- Provided incentives for customers to reduce their electricity demand during periods when there is insufficient supply capacity to meet the national demand.

Action and coordination between all sectors of society will be needed to leverage the benefits of increased energy efficiency and demand side management that will reduce South Africa's carbon footprint and the depletion of non-renewable resources. Improved knowledge and understanding of energy efficiency can be achieved through education and awareness campaigns, demonstration projects, audits and the publication of corporate commitment programmes, and the implementation of energy efficiency programmes in public buildings.

There are also numerous opportunities for improved resource efficiency by integrating energy management with the management of waste and water. Energy is required for waste treatment and water purification, while waste to energy technologies can generate renewable energy and avoid the need for traditional waste treatment³⁹.

4.2.2 Increase the proportion of renewable energy in the national energy supply mix

There are several renewable energy sources available in South Africa with a potential to supply a significant portion of the power required by the nation. By international standards, South Africa has an abundance of renewable energy resources. There is an excellent solar resource, a good wind resource, a good wave energy resource, reasonable biomass resources, and a limited or local of hydropower and geothermal energy resources^{50 51}.

There are several policies that support the switching to renewable energy; such as the *White Paper on Renewable Energy*, the *White Paper on the Renewable Energy Policy*, the *Integrated Resource Plan* and the *Integrated Energy Plan* (draft). Although less than 1% of South Africa's electricity is currently supplied by renewables (over 90% is generated from coal), 42% of the future electricity generation capacity is planned to be generated from renewable resources so that renewables will contribute to 9% of the electricity supply mix by 2030^{52 53 54}. However, there are challenges to the

widespread deployment of renewable energy technologies and the provision of clean energy services, including:

- Electricity costs were in the past kept artificially low due to incomplete accounting for previous government infrastructure investments in coal power stations.
- The ecological costs and social burdens of coal fired power stations are not accounted for. These external costs and burdens include carbon dioxide and sulphur dioxide emissions causing air pollution; and acid mine drainage causing water pollution.
- An entrenched dependency on petroleum fuels and the monopolisation of the electricity supply and transmission system can make it very difficult for renewable energy to compete and become established in the market.

The recent liberalisation of the energy supply market in South Africa has opened up the opportunity for independent power producers to feed into the national electricity grid and received favourable tariffs for renewable energy supply. This strategy could significantly change South Africa's carbon footprint and reorient the economy to a low carbon, resource efficient development path. The diversification of energy supply to substantially include renewables in the energy supply mix can stimulate economic development and generate green jobs, with the development of skills in the manufacturing, installation and maintenance of energy efficient and renewable energy technologies and solutions. A change of focus towards the use of renewable energy can also stimulate local economic development and reduce vulnerability to in external markets and financial shocks, thereby increasing national energy security and sovereignty. For example, since South Africa imports the bulk of its oil and liquid petroleum gas, there are opportunities to develop local production of renewable fuels, such as: biogas from sewage and organic wastes, bioethanol from sugary and starchy agricultural crops, biodiesel from oil-rich crops, and biosynfuels from the thermochemical processing of biomass.

4.2.3 Enhance the universal access to clean, renewable energy services.

Universal access to energy and the delivery of essential energy related services, such as lighting, telecommunications and refrigeration, improves people's access to so-

cio-economic opportunities and improves their wellbeing... The use of electricity has several advantages over other energy carriers. It powers a range of energy services from communications, to heating, cooling, cooking and transportation with little local pollution and therefore provides clean energy for users, compared to alternatives like firewood, charcoal and paraffin. South Africa has significantly increased people's access to electricity, from 35% of households in 1990 to 84% in 2012⁴⁶. This universal electrification programme has been supported by establishing a free basic electricity allowance in recognition that poor households may have access to electricity but cannot afford to use it. Universal electricity access increases the inclusivity of energy services, and facilitates the equitable distribution of the socio economic benefits that accompany access to electricity.

However, in order for these developments to contribute to a green economy, the energy services should be low carbon and resource efficient over the whole energy life-cycle i.e. production or harnessing of the resource, processing, delivery, and energy use. This will require switching away from fossil fuels to renewable energy for national electricity supply (see above) and for end users to switch to clean and renewable fuels. Such a transition will require an increase in the use of renewable biofuels such as bioethanol, biodiesel and biogas to replace non-renewable fuels such as petrol, diesel, paraffin, and liquid petroleum gas (LPG). Although policy exists to support the switch to biofuels, the adoption rate has been slow. The *Biofuels Industrial Strategy* (2007) aimed for a mere 2% penetration of biofuels in the national liquid transportation fuel supply by 2013 and provided incentives such as a rebate of 50-100% on the general fuel levy for biofuels. However, limited success to date indicates that a more enabling and supportive regulatory framework is needed and the mandatory blending of biofuels with petrol and diesel (5% biodiesel and 2-10% bioethanol) will be introduced from 1 October 2015 (Government Gazette No. 35623, 23 August 2012)⁵⁵. These changes will stimulate investment in biofuels, reduce the carbon footprint of transportation, and reduce South Africa's reliance on imported fossil fuels.

The transition to a green economy will also require improved education, skills development, training and awareness in energy efficiency, energy management and renewable energy. Given South Africa's availability of renewable energy resources, there is a clearly an opportunity to develop and reorient the manufacturing sector

to produce renewable energy technologies and solutions, such as solar water heaters, photovoltaics, wind-turbines and anaerobic digesters, whilst simultaneously developing skills, creating decent work and green jobs for a green economy. Specific opportunities in this regard, include:

- The development of appropriate hybrid renewable energy systems (solar, wind, biomass, geothermal, and hydro power) that can deliver energy as needed in 'on-grid', 'mini-grid' or 'off-grid' applications
- Technologies and solutions to generate energy from agricultural and industrial waste, municipal sewage, and invasive alien plants; and
- Technologies and solutions for the production of liquid transportation biofuels.

4.3 WASTE

Rapid economic growth is usually accompanied by a corresponding increase in waste that is generated. However, as the waste accumulates, the ability of our environment to assimilate it is diminishing, with consequences for the provision and maintenance of ecosystem services and human wellbeing. In 2011, an estimated 59 million tonnes of general waste, 48 million tonnes of unclassified waste, and 1 million tonnes of hazardous waste were generated in South Africa⁵⁶. However, only 10% of the total annual waste produced is recycled⁵⁷ and there is a backlog in waste service

delivery and infrastructure provision; including landfill sites, waste storage facilities, materials recovery facilities and waste transfer facilities. As a result, the environment is being polluted and ecosystems services eroded, with negative impacts to human health and well-being.

To improve the management of waste in the context of a green economy, the production of economic goods and services should generate less wastes and pollutants through improvements in resource efficiency. Where wastes and pollutants that are produced are unavoidable, these should be mitigated by using clean technology.

What is required is a move up the waste hierarchy- away from landfilling towards waste prevention and reduction, reuse, recovery and recycling. Diverting waste from landfill and extracting useful constituents to feed back into the economy improves resource efficiency and generates green jobs. Waste diversion activities could include materials recovery, recycling, composting, and waste used in the generation of energy. A strategy to move up the waste hierarchy has been given legal effect through the and the *National Waste Management Strategy*. At the local level, this places a



responsibility, not only on industry and civil society as generators of waste, but also on municipalities who are tasked with the collection of local waste and the provision of waste treatment services.

There are many initiatives, activities and actions for more appropriately dealing with waste, consistent with the transition to a green economy. Some of these are outlined below.

4.3.1 Measures to improve supply chain efficiency and prevent waste production

Creating awareness and informing consumer trends and behaviours towards minimising waste and increasing resource efficiency, are fundamental for the transition to a green economy. Concerted efforts will need to be made to increase the efficiency of industrial and agricultural production systems to prevent the production of wastes, while also improving the provision and management of the waste collection and waste disposal systems.

Applying an industrial ecology approach in these contexts could improve resource efficiency by optimising and integrating the material and energy flows from production and consumption. This involves the shifting from open-loop systems, where resources and capital investments move through the system to ultimately become waste, to a closed-loop system where wastes or by-products can become inputs for new processes. This means that synergies can be found between different production processes, so that one waste from one industrial process becomes a resource or input for another. Efforts to find these synergies can be assisted through spatial planning and development of Industrial Development Zones (IDZ) and eco-Industrial parks. There are also opportunities for industrial and agricultural supply chains to be integrated and diversified, to generate value added products and thereby increase resource efficiency and produce little or zero-waste.

4.3.2 Reduce waste-to-land fill by increasing reuse and recycling

The recovery and re-introduction of waste back into the economy reduces its impacts on ecosystems and society and prevents valuable land which could be used for more beneficial uses, from being used for land-filling waste. Recycling and recovery can also open up new opportunities in the manufacturing sector to add value to wastes and thereby create green jobs and decent work. It has been estimated that the sorting and processing of recyclable waste can sustain ten times more jobs per tonne compared to land filling or incineration⁶. This is particularly relevant in developing countries, where the informal waste sector plays a significant role in the recovery of recyclables. An opportunity exists to create cooperatives and Small Medium and Micro Enterprises (SMMEs) through the integration of this informal sector into the formal waste sector, thereby enhancing the potential of green jobs and improving income generating activities for the unemployed.

Local government has a key role to play in enhancing the provision of appropriate waste collection, recovery and recycling facilities and services. Possibilities include:

- Collecting recyclables at kerbside and ensuring that adequate and accessible drop-off and buy-back centres exist to encourage households to separate their waste⁵⁸;

- Collecting suitable garden and kitchen waste for composting at centralised sites;
- Enabling the manual sorting of household waste at materials recovery facilities to separate reusable materials such as valuable plastics, metals and electronic equipment; and
- Generating useful energy for heat and electricity as part of the municipal waste treatment processes.

4.3.3 Invest in clean technology and appropriate value-adding to waste

Reducing the production of pollutants and waste requires the use of clean technologies that offer efficiency improvements in industrial, manufacturing and agricultural processes. Clean technologies deliver the same level of production with less resources and/or less wastes and pollutants being generated. One option

to reduce waste production is adding value through innovative technologies and solutions that find new economic uses or applications for wastes. Some examples include:

- Reuse of safe wastewater for irrigation
- Using organic wastes and sewage for the generation of heat and electricity
- Recovery and reuse of waste materials to produce innovative green goods
- Rehabilitate degraded lands using ecological engineering solutions to improve ecosystem integrity and the ability of nature to manage and process wastes

It is important that the appropriate level of incentives and support regarding value adding to wastes are provided in policy and strategy. This will avoid the unintended consequences of increased waste production when wastes start to be perceived as valuable assets with economic value and not burdens to be disposed of.

4.4 WATER

South Africa is a semi-arid country with limited water resources and most of the water available is already allocated for various uses and to various users⁵⁹. The country's water supply is therefore already precariously limited; a situation which is made worse by effects of climate change that will increase water scarcity in the future⁶⁰. South Africa has already invested heavily in water infrastructure and there are fewer suitable sites for the construction of new dams, than were available in the past. Water supply challenges also cannot be solved by simply building more dams or creating more infrastructure. Water provision relies on maintaining and conserving the natural areas that form the critical catchments for the country.



Growing water demand, rapid industrialisation and urbanisation in South Africa result in localised water scarcity as well as the deterioration of water quality from inappropriate management of wastes. Currently, many water sources are polluted by industrial effluent, domestic and commercial sewage, acid mine drainage, agricultural runoff, and litter. This polluted water degrades ecosystems and thereby exposes people to significant social, economic and health risks⁶¹.

Against this backdrop of water availability and quality issues, a critical challenge of the Department of Water Affairs is to ensure the equitable distribution and use of water resources, which is expressed in the *National Water Act* (1998) as: "Some for all, forever"⁶². Therefore, a more integrated approach to water resources management is needed to help steer the way to the green economy. Integrated Water Resources Management (IWRM) entails the coordinated development and management of water, land and related resources so that economic and social welfare is maximised in an equitable manner without compromising the sustainability of vital ecosystems⁶³.

Some initiatives, activities and actions that could enhance Integrated Water Resources Management and thereby steer the way to a green economy, are described below.

4.4.1 Enhance the provision of water and sanitation services

The provision of water and sanitation services has significant effects on economic growth and human well-being. The average rate of economic growth in developing countries with a high rate of access to clean water and adequate sanitation is 2.7 % higher than in countries where these services are not supplied⁶. So, the universal provision of safe, clean drinking water and the appropriate collection and treatment of sewage and other wastewater, can help to address poverty, human health issues and other fundamental inequalities in South African society. Water supply and wastewater treatment infrastructure should be designed, upgraded and maintained in a way which maximises water and energy efficiency, and uses clean technologies for the collection, reticulation, treatment and disposal of wastewater, and minimises pollution and impacts on ecosystems.

It is also important that wastewater treatment and water supply options adopted are appropriate to the municipal contexts in which they are applied. Affordability, operations and maintenance requirements, as well as skills and energy requirements must be taken into account by local authorities when deciding on specific approaches and technologies⁶⁴. Examples of water supply and wastewater treatment opportunities that can improve Integrated Water Resources Management for a green economy include:

- Universal provision of water and sanitation services with appropriate technology for water, materials and energy efficiency
- Capture and use of biogas for energy at municipal wastewater treatment works and landfill sites to improve overall efficiency and convert organic wastes to a valuable fuel
- Development of ecological infrastructure such as artificial wetlands, to assist with treatment of wastewater before disposal of final effluent into the environment
- More appropriate use of water resources such as relying on municipal tap-water for human consumption while using rainwater harvesting to provide water for household bathing, irrigation and industrial processes

4.4.2 Increase water-use efficiency and equitable distribution through appropriate incentives

Reducing leaks and the wastage of water by improving investment in the upgrading and maintenance of infrastructure, monitoring water use, and improving water conservation behaviour, are all needed to improve water resource efficiency. Household water efficiency can make a significant contribution in this regard. Water-wise gardening and rainwater harvesting can result in a 5% to 25% reduction in water use⁶⁵.

However, there is also an urgent need to advocate and provide incentives, for improved water resource management in sectors that use significant amounts of water and impact the quality of water resources, specifically mining and agriculture. Examples of the more efficient use of water in agriculture include:

- Rainwater harvesting and greywater reuse
- Use of drip irrigation systems
- Mulching and no or minimum tillage practices
- Keyline design and contour farming practices

Examples of the more efficient use of water in mining include:

- Water recycling and remediation in the bioremediation of post mining landscapes
- Using on-site ecological engineering and water treatment solutions to purify acid mine drainage to standards suitable for domestic or agricultural use

Appropriate incentives and disincentives to ensure equity in the use of water resources will be essential in developing

DID YOU KNOW?

South Africa's Working for Water Programme

is one of the most successful green job creation and skills development programme in the country. Through the removal of invasive alien plants and the restoration of biodiversity, the program increases water availability and creates green jobs. These investments enhance the supply of public services and create work opportunities for hundreds of thousands of unemployed people in improving the management and restoration of natural areas for the benefit of all.

www.dwaf.gov.za/wfw

a green economy. The enhanced roll-out of a universal free basic water allowance for households to help ensure water security,; an improved inclined block tariff system to discourage high levels of water use and levies, charges and fines for the production of wastewater and the pollution of water resources are good examples.

These initiatives should be supported by campaigns to raise awareness and public education programmes to improve water use efficiency. One such initiative is the 'War on Leaks' programme of the Department of Water Affairs. This is a municipal-level initiative that includes a range of activities such as addressing the problem of water wastage as a result of leaking pipes and taps, creating awareness in water use efficiency, and providing job opportunities and equipping young people with useful, marketable skills, such as basic plumbing. As part of this programme, the project's young 'Water Conservation Warriors' visited and educated 3017 households about water conservation in the Randfontein Local Municipality and there are plans to extend the implementation of the programme to nine other municipalities⁶⁶.

Improving water storage options and capacity can help to reduce risks to sustained water supply; thereby contributing to long term water security. The capacity of ecosystems to store and provide clean water and to manage wastes should be explored as adjuncts or alternatives to conventional approaches to the storage and treatment of water; with investment redirected towards these options. Improving the status of natural areas, particularly wetlands and water catchment areas, through conservation and rehabilitation can help regulate the flow of water and filter pollutants to improve the provision of clean water.

4.4.3 Improve monitoring and reporting to ensure best practice and standards in water and wastewater management

A variety of infrastructural and institutional arrangements will need to be put in place to achieve best practice and attain international standards of water supply and wastewater treatment. Municipalities should be encouraged to monitor their performance towards achieving Blue Drop and Green Drop certification by implementing best practice and standards in water services provision and municipal wastewater treatment, respectively. In addition, fiscal incentives, appropriate policy, awareness raising and knowledge-building will be vital to ensure that the investments

in water and wastewater deliver equitable and inclusive benefits, while also ensuring that ecosystems are continually protected and enhanced.

4.5 AGRICULTURE

The agricultural sector is a fundamental, yet often undervalued, component of the economy. Agriculture is well placed to contribute to a green economy as it can significantly contribute to alleviating many of the social, economic and ecological challenges that the world currently faces. These challenges include the need to feed a rapidly expanding population, the risk of climate change, and meeting energy needs in the face of dwindling reserves of fossil fuels. However, there is overwhelming evidence that the way agriculture has generally been practised since the mid-20th century, has come at a huge cost to the environment, with the loss of valuable ecosystem goods and services⁶⁷. Change in land-use resulting from deforestation and the expansion of agricultural lands for crops and livestock is responsible for 31%⁶⁸ of the greenhouse gases emitted by human activities, and agriculture already consumes 70% of all global freshwater extracted worldwide. Land degradation due to unsustainable agricultural practices has been widely documented, both in South Africa and in other parts of the world. Agriculture has depleted soil nutrients, caused soil salinisation, polluted water resources



“Business as usual is not an option.... continuing to focus on production alone will undermine our Agricultural capital and leave us with an increasingly degraded and divided planet.”

“If a large part of the world isn’t to go hungry in the 21st Century, the focus must be on a more rational, ecologically-based use of scarce land and water resources, an equitable trade regime, and widespread recognition and action on climate change.”

Prof Bob Watson, Director IAASTD and former Chief Scientist, World Bank, March 2008

and resulted in the loss of biodiversity and its associated ecological functions - all of which adversely affect agricultural productivity and human well-being.

Renewed interest in the concept of sustainable agriculture has emerged in response to the decline in the quality of the natural resource base associated with modern agriculture. Although existing agricultural science and technology can tackle some of the underlying causes of declining agricultural productivity, further developments based on sustainable agriculture and agro-ecology will be essential to steer the way to a green economy. Agro-ecology is an approach to sustainable agriculture that is resource efficient, reduces environmental risks and ecological scarcities, and improves food production efficiency and food security. Agro-ecology approaches are found in a range of agricultural practices that are used to maintain and enhance natural capital by mimicking natural ecological processes and include organic, conservation, and biodynamic farming and permaculture. These agricultural practices incorporate methods such as:

- Intercropping and polyculture to diversify farm products and increase biodiversity;
- Mulching and minimum tillage to conserve soil moisture and health; and
- Recycling of wastes for fodder, fertiliser and fuel.

A range of initiatives, activities and actions in which agro-ecology and sustainable agricultural practices could help steer the way to a green economy, are described below.

4.5.1 Develop sustainable agriculture through agro-ecology approaches

The interdependence between natural resources, agriculture and food security will increasingly need to be recognised to realise sustainable agriculture and the transition to a green economy. This will require measures to account for the use of natural resources and the provisioning of ecosystem services in agriculture. An increase in investments in agro-ecology approaches to develop sustainable agricultural systems is an imperative. In addition, the degradation of ecosystems caused to date by conventional agricultural practices will also need to be addressed by the active restoration of natural resources. Examples of restorative actions for depleted and damaged natural resources in agriculture include:

- Improving soil fertility and soil carbon through practices such as minimum tillage and addition of mulch, compost, manures and biochar;
- Increasing water availability through contour farming and improved land and land use management of water catchment areas; and
- Improving biodiversity and water resources through the establishment of on-farm conservation areas and conservation corridors.

Many actions can be taken to raise awareness, improve knowledge, and provide incentives that recognise the dependency of agriculture on natural resources, to encourage the development of sustainable agricultural systems. Some of these are:

- Providing incentives for the payment of ecosystem services and resource efficient behaviour, such as the maintenance of water catchments and wetlands which store and purify water;
- Providing disincentives such as taxes, fines and levies for the unsustainable use of resources; including excessive water use and the pollution of water resources; and
- Education, training and technology development to promote greater uptake of agro-ecology.

4.5.2 Focus agricultural production on increasing food security, improving livelihoods and creating resilient ecosystems

An essential aim of agriculture in the green economy is to improve food security and livelihoods while reducing environmental risks and ecological scarcities. Therefore, the entire food value-chain should be considered with the aim of increasing the resource efficiency and resilience of food production systems, minimising waste, and providing universal food security for optimal nutrition and human well-being. Improved management of the food production chain to enhance nutrition and prevent waste can significantly contribute to food security and resource efficiency.

There are also key opportunities to address poverty in rural areas, to improve livelihoods and opening up socio-economic opportunities through the localisation of agriculture and food value adding industries. This will facilitate food security and ensure agriculture contributes to rural socio-economic development and the green economy. Capacity building in agro-ecological farming practices; as well as the knowledge, skills and

infrastructure to add value to agriculture products, will be required. Some examples of agriculture related activities that can enhance food security and livelihoods while reducing environmental risks and ecological scarcities, include:

- Establish agro-ecological farming practices that incorporate mixed farming and polycultures with the maintenance of ecological infrastructure to reduce the risks to variability in market prices and extreme weather events.
- Use renewable energy and appropriate technology to provide cold storage, preservation, packaging, and transportation so that the nutritional quality of the food is enhanced, less wastes and pollutants are produced, and better markets can be accessed.
- Establish community co-operatives and local food markets to promote organic farming and farm produce.
- Develop packing houses and processing facilities that add value to agricultural produce; and
- Expand existing feeding schemes and nutrition centres to serve as educational platforms for sustainable agriculture and good nutrition.

What is food security?

Concepts of food security have evolved in the last thirty years to reflect changes in official policy thinking.

A current definition of food security that can help steer the way to a green economy is: *Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life* (World Food Summit, 1996).

Food security consists of several elements:

- The availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports.
- Access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet (entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal, political, economic and social arrangements of the community in which they live; including traditional rights such as access to common resources).
- Utilisation of food through adequate diet, clean water, sanitation and health care to reach a state of nutritional well-being where all physiological needs are met. This brings out the importance of non-food inputs in food security.
- Stability in food provision so that populations, households or individuals have access to adequate food at all times and are more resilient to sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity).

FAO's policy brief on food security: ftp://ftp.fao.org/es/ESA/policybriefs/pb_02.pdf

There is also an opportunity to increase the resource efficiency of food supply systems by bringing agriculture to the cities, where the majority of people reside. Urban agriculture is highly relevant to the growing challenges of urbanisation, urban sprawl and land degradation. Agriculture located in or near urban centres can improve the efficiency of resource use by reducing the requirements for packing, storage and transport through spatially linking food supply and consumption. Promoting and enabling urban cooperative food gardening and greening programmes, developing food markets and gardens in public spaces and at institutions such as clinics, hospitals, schools and state correctional facilities, and provide training centres for the development of urban agro-ecology with the associated building of knowledge and skills could all form part of an urban agricultural initiatives.

4.5.3 Develop and enable access to organic markets by supporting small-scale farmers and establishing organic norms and standards

Organic agriculture is a production system that sustains the health of soils, ecosystems and people since it relies on ecological processes, biodiversity and cycles adapted to local conditions. It is a highly appropriate farming modality for a green economy. Organic agriculture avoids the use of synthetic chemicals such as pesticides, fertilisers, fungicides and insecticides or genetically modified seeds, and uses a range of techniques that help sustain ecosystems and reduce pollution, while improving both the production and quality of nutrition.

There are well established international standards that govern organic farming, such as the *Codex Alimentarius*, the European and American regulations and the International Federation of Organic Agriculture Movements. Unfortunately, there is fragmentation of the organic sector in South Africa with no clear policy on organic agriculture and no established national certification body. This has necessitated certification by various international certifying and accreditation systems. International certification is expensive and its considerable cost is a barrier for new entrants in the sector. The urgent need for a national organic production policy and the establishment of a South African organic certification body is currently being addressed by the public-private cooperation platform: the Organic Sector Strategic Implementation Committee of the South African Organic Sector Organization (OSSIC-SAOSO, <http://www.saoso.org>).

Since agricultural value chains link farmers to markets, giving smallholders the socio-economic opportunities to access organic markets can lead to an increased income and ensure sustainable production. However, the majority of approaches for linking smallholder farmers to markets use arrangements such as contract farming and out-grower schemes that link smallholder farmers to large growers. This can leave them vulnerable to economic shocks and changing market conditions due to a lack of skills and knowledge to effectively engage in markets. There is a need to enable rural innovation and an entrepreneurial culture in rural communities through strengthening the capacity of smallholder, resource-poor farmers to access market opportunities and actively engage in them. This will require the building of knowledge, skills and tools for product development and diversification, as well as

for market analysis, market penetration and market development. These initiatives should also be participatory and inclusive, with a focus on marginalised members of society- rural women and the poor. Examples of such activities that can develop rural agriculture related enterprises and increase market opportunities include:

- Enabling remote access to up-to-date market pricing information;
- Developing well-functioning markets through accessible and transparent information;
- Encouraging co-operative approaches to marketing for smallholders; and
- Improving the marketing skills of smallholder farmers through entrepreneurship training.

A key initiative is the National Organic Produce Initiative (<http://nopi.co.za>) that is dedicated to developing skills in organic production and agro-ecology practices, while facilitating communities and local government to attain local food security through a value chain clustering approach that empowers smallholders with access to land, resources, training, education, skills, appropriate technologies and markets.

There are also important global market forces such as the concentration of corporate power in food supply systems, subsidies to farmers in developing countries, and trade tariffs, which have done little to improve the prospects for rural producers in the developing world in terms of opening new markets and reducing poverty. Although value addition to primary goods would offer a major income opportunity for many developing countries, the lack of progress in multi-lateral trade negotiations has meant that tariff barriers often prevent export of agricultural products. Consequently, most value addition to agricultural and agro-industrial products takes place in the importing country. Aside from addressing these global trade imbalances by the removal of subsidies or other trade tariffs through initiatives such as UNCTAD (<http://unctad.org>), there are opportunities to explore alternative markets. This may include accessing global markets with certification, such as Fair Trade, that supports equity and inclusivity in agriculture and food supply systems, and the tailoring of agriculture and food production systems to supply local markets with the development of local regional economies. The transition to a green economy will therefore require increased localisation of food supply systems as well as increased food sovereignty- the right of peoples and sovereign states to democratically determine their own

agricultural and food policies. This empowers farmers to innovatively manage soils, water, biological resources, pests, disease vectors, and genetic diversity, and to conserve natural resources in a culturally appropriate manner⁷¹.

5 CONCLUSION

To date, the world's economy has been resource intensive and economic developments have often led to increased poverty and a widening of the gap between the rich and poor. The economy has overexploited natural resources and severely undervalued the ecological goods and services that form the basis of all economic activity. A new economic development path is urgently needed.

The transition to a green economy will require the adoption of a new economic model and different approach to development, with the reconfiguration of investments. Improved governance with robust policy signals, and regulatory drivers that reinforce the need for the economic system to account for externalities, are some of the most powerful mechanisms that could facilitate green investment and enhance the transition to a green economy.

This will require improved partnerships to build a broad front for development that involves a strong relationship between government, labour, business, and civil society. The transition to a green economy needs citizens to act as agents of change and this will require the development of increased environmentally responsible behaviour; through awareness, education, role-models, and changes in the prevailing culture and *modus operandi*.

Despite the current and gloomy global economic outlook, and the growing risks from climate change, poverty, natural resource depletion and environmental degradation, there is an opportunity for a bright green economic future. This will require a reorientation of investments to avoid the depletion of natural capital, and to reduce environmental risks and ecological scarcities. New regulatory frameworks with management criteria and performance indicators are urgently needed to guide these investments so that they contribute to green economic growth. The opportunity to 'act now' and reorient the economy should not be delayed since there are costs of no action, and adopting a 'business as usual' will result in the investments that

lock us in to high carbon emissions and unsustainable consumption and production for decades to come. South Africa is a rapidly industrialising country that has a high rate of urbanisation, and a significant per capita carbon footprint; compared to other countries in the world. There is therefore immediate need to guide the economy towards developing secondary and tertiary industries and value-adding; with investments in energy efficiency and low-carbon energy supply, green innovation and natural resources management. These investments will deliver various socio-economic benefits over time. There are new opportunities for developing skills, creating jobs and developing businesses, while mitigating climate change, and maintaining and enhancing ecosystem services needed for economic activity and all life. In addition, measures to improve the adaptation to climate change will increase South Africa's resiliency to future extreme weather events and natural disasters. The transition to a green economy demands an inclusive approach through the building of new partnerships, with the participation and action from all members and sectors of society. A shared vision of the green economy and "the future we want" will provide the advocacy that is needed to mobilise joint action. There is an immediate need for the improved management of natural resources which will help tailor the economy to reduce environmental risks and ecological scarcities. Collective efforts from all members of society and a culture of environmentally responsible behaviour will be needed for more equitable, resource efficient and low carbon economy that provides a pathway to sustainable development.

Glossary of terms:

Agro-ecology is the science of applying ecological concepts and principles to the design, development, and management of sustainable agricultural systems.

Ecosystem goods and services. Ecosystems and the biological diversity contained within them (i.e. natural capital) provide a stream of goods and services; the continued delivery of which remains essential to our economic prosperity and other aspects of our welfare. Ecosystem goods refer to the natural products harvested or used by humans such as wild fruit and nuts, forage, timber, game, natural fibres, medicines and so on. More importantly, ecosystem services support life by regulating essential processes such as purification of air and water, pollination of crops, nutrient cycling, decomposition of wastes, and generation and renewal of soils, as well as by moderating environmental conditions by stabilising climate, reducing the risk of extreme weather events, mitigating droughts and floods, and protecting soils from erosion. The benefits of these services manifest themselves at local, regional and global scales with often conflicting demands between stakeholders at these different levels. Ecosystem goods and services grouped into four broad categories: *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; and cultural, such as spiritual and recreational benefits

Environmental goods and services sector consists of a heterogeneous set of producers of technologies goods and services that: Measure, control, restore, prevent, treat, minimise, research and sensitise environmental damages to air, water and soil as well as problems related to waste, noise, biodiversity and landscapes. This includes clean technologies, goods and services that prevent or minimise pollution. This results mainly in resource efficient technologies, goods and services that minimise the use of natural resources. These technologies and products (i.e. goods and services) must satisfy the end purpose criterion, i.e. they must have an environmental protection or resource management purpose (hereinafter 'environmental purpose') as their prime objective.

Inclining block tariff is a demand side management tariff structure aims to improve resource efficiency. The more units of a good or service that is used (ie water or electricity), the higher the unit price. In South Africa, both water and electricity services have an inclining block tariff system with a free basic allowance that that essentially helps to cross-subsidise low-income customers and facilitate the more equitable delivery of essential public services.

Mass transit is a shared passenger transport service which is available for use by the general public. It can include both public transport and private transport systems that increase the efficiency of transportation by reducing the cost per person travelled, compared to single occupancy vehicles.

Natural resources are physical inputs, both renewable and non-renewable that can potentially be withdrawn from the natural environment. Natural resources are those elements of the environment that provide use benefits through the provision of materials used in economic activities (e.g. fossil energy, raw materials or water); or that may provide such benefits one day, and that are subject to quantitative depletion through human use.

Natural capital is the stock of natural ecosystems that yields a flow of valuable ecosystem goods or services into the future. It is the extension of the economic notion of capital (manufactured means of production) to goods and services relating to the natural environment.

Organic Agriculture is a holistic production management system which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasises the use of management practices in preference to the use of off-farm inputs, taking into account that regional conditions require locally adapted systems. This is accomplished by using, where possible, agronomic, biological, and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system.

Social capital refers to the institutions, relationships, and norms that shape the quality and quantity of a society's social interactions. Increasing evidence shows that social cohesion is critical for societies to prosper economically and for development

to be sustainable.

Structured finance encompasses all advanced private and public financial arrangements that serve to efficiently re-finance and hedge any profitable economic activity beyond the scope of conventional forms of on-balance sheet securities (debt, bonds, equity) in the effort to lower cost of capital and to mitigate agency costs of market impediments on liquidity.

Technology refers to the state of knowledge concerning ways of converting resources into outputs. Technological innovations comprise new products and processes and significant technological changes of products and processes.

Urban efficiency is usually defined in terms of travel patterns, infrastructure and energy use, and social and environmental costs including water use, congestion costs and the costs of sprawl. Societies which consume less land for urban purposes use roads less, infrastructure more efficiently and can transfer more investment to productive sources. Better urban design reduces social costs by increasing social cohesion. Cities function less efficiently as they expand and reduce their average population density.

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