



KEY POINTS

- South Africa has a rich endowment of natural resources and mineral deposits, which, if responsibly used, can fund the transition to a low-carbon future and a more diverse and inclusive economy.
- Developmental challenges must be addressed in a manner that ensures environmental sustainability and builds resilience to the effects of climate change, particularly in poorer communities.
- Investment in skills, technology and institutional capacity is critical to support the development of a more sustainable society and the transition to a low-carbon economy. Focused, institutionalised capacity building and management structures are needed.
- Carbon-pricing mechanisms that target specific mitigation opportunities need to be implemented.
- Consumer awareness initiatives and sufficient recycling infrastructure should result in South Africa becoming a zero-waste society.
- The development of environmentally sustainable green products and services, including renewable energy technologies, will contribute to the creation of jobs in niche markets where South Africa has or can develop a competitive advantage.

Ensuring environmental sustainability and an equitable transition to a low-carbon economy

INTRODUCTION

The 20th century was a period of unparalleled growth for humanity's population and socioeconomic development. During this period, environmental constraints to human activity were often not fully recognised. The world is now experiencing a growing number of undesirable consequences as continued economic expansion and resource exploitation threatens the stability of natural systems.

Historically, as countries and individuals have accumulated wealth, their impact on the natural environment has increased. In some cases, this has been mitigated by policy action at national level, but all too often the result has been to export environmentally damaging activities to other, invariably poorer, countries. Addressing inequities in the wealth and distribution of resources between rich and poor is therefore critical, both between and within countries.

Developing countries are at particular risk due to a combination of geography, the intrinsic vulnerability of poor communities to environmental threats, and the pressures that economies based on resource extraction place on the environment. Given that the effects of climate change and environmental degradation fall most heavily on the poor, South Africa needs to strengthen the resilience of its society and economy to the effects of climate change.

South Africa has a rich endowment of natural resources and some of the world's most substantial mineral deposits, including coal and natural gas. However, the exploitation of minerals is an energy-



intensive activity. While the country's coal deposits currently represent a relatively cheap and reliable source of energy, coal is carbon intensive and in the medium to long term, its use could prejudice South Africa's interests as global restrictions on carbon emissions to mitigate climate change are introduced. South Africa is the 42nd largest emitter per capita and is among a number of developing countries that are likely to face globally imposed emissions constraints in the near future.

Aside from coal and natural gas, the country has abundant potential sources of renewable energy in the form of solar and wind energy, but these are

currently comparatively expensive, particularly when the costs of storage and transmission are taken into account. Competitively priced energy is needed to exploit mineral resources, the earnings from which will be required to fund the transformation of South African society, as well as the promotion of a

more diverse and inclusive economy. For this reason,

South Africa must leverage its solar resource and regional hydropower opportunities as competitive advantages, in parallel with the responsible exploitation of fossil fuels and minerals. For this to happen, the country must invest in the skills, technology and institutional capacity required to support a competitive renewable energy sector.

South Africa faces urgent developmental challenges in terms of poverty, unemployment and inequality, and will need to find ways to "decouple" the economy from the environment, to break the links between economic activity, environmental degradation and carbon-intensive energy consumption. In the past, resources were exploited in a way that was deeply unjust and left many



communities excluded from economic opportunities and benefits while the natural environment was degraded. The country must now find a way to use its environmental resources to support an economy that enables it to remain competitive, while also meeting the needs of society. Thus, sustainable development is not only economically and socially sustainable, but environmentally sustainable as well.

VISION 2030

By 2030, South Africa's transition to an environmentally sustainable, climate-change resilient, low-carbon economy and just society will be well underway:

- Coordinated planning and investment in infrastructure and services that take account of climate change and other environmental pressures, provide South Africans with access to secure housing, clean water and decent sanitation, and affordable and safe energy, making communities more resilient to the impacts of climate change and less socioeconomically vulnerable.
- Adaptation strategies in conjunction with national development strategies are implemented, including disaster preparedness, investment in more sustainable technologies and programmes to conserve and rehabilitate ecosystems and biodiversity assets.
- Investment in consumer awareness, green product design, recycling infrastructure and waste-to-energy projects results in significant strides to becoming a zero-waste society.
- Growth in the renewable energy sector by 2030, as envisaged in the Integrated Resource Plan (IRP 2010), takes off in response to falling technology costs, government's bold support for the sector, and the introduction of targeted carbon-pricing mechanisms to facilitate further private investment in renewable energy.
- The development and marketing of niche products and services, coupled with mutually beneficial partnerships with neighbouring countries, create jobs in domestic manufacturing of renewable energy technologies.
- South Africa reduces its carbon emissions, in line with its international commitments, while maintaining its competitiveness in the global economy by carefully managing investments in local and regional renewable energy resources and aggressively promoting just and equitable trading arrangements.
- Policy and regulatory frameworks are created for land use, to determine the environmental and social costs of new developments and ensure the conservation and restoration of protected areas.
- Public investment in new agricultural technologies and the development of resilient and environmentally sustainable strategies and support services for small-scale and rural farmers ensures the protection of rural livelihoods and the concurrent expansion of commercial agriculture, so South Africa remains a net exporter of agricultural produce.

Inevitably, in the transition to a greener and more environmentally sustainable economy, trade-offs must be made. However, the careful design and sequencing of decisions ensure that the decline of legacy sectors, such as coal-fired electricity generation, are balanced by concurrent growth in green economy sectors. The emergence of small, medium and micro enterprises in areas such as waste management contribute to reducing unemployment, poverty and income inequality.

Behaviour change on the part of ordinary South Africans, driven by a growing awareness of sustainable development, is one of the most significant factors in achieving progress towards the

transition. A revolution in social values is under way, with the culture of conspicuous consumption being steadily supplanted by one of social and environmental responsibility.

Guiding principles for the transition

The following principles can guide the transition to an environmentally sustainable low-carbon economy, moving from policy, to process, to action:

- **Just, ethical and sustainable.** Recognise the aspirations of South Africa as a developing country and remain mindful of its unique history.
- **Global solidarity.** Justly balance national interests with collective action in relation to environmental risks and existential threats.
- **Ecosystems protection.** Acknowledge that human wellbeing is dependent on the health of the planet.
- **Full cost accounting.** Internalise both environmental and social costs in planning and investment decisions, recognising that the need to secure environmental assets may be weighed against the social benefits accrued from their use.
- **Strategic planning.** Follow a systematic approach that is responsive to emerging risk and opportunity, and which identifies and manages trade-offs.
- **Transformative.** Address the structural and systemic flaws of the economy and society with strength of leadership, boldness, visionary thinking and innovative planning.
- **Managed transition.** Build on existing processes and capacities to enable society to change in a structured and phased manner.
- **Opportunity-focused.** Look for synergies between sustainability, growth, competitiveness and employment creation, for South Africa to attain equality and prosperity.
- **Effective participation of social partners.** Be aware of mutual responsibilities, engage on differences, seek consensus and expect compromise through social dialogue.
- **Balance evidence collection with immediate action.** Recognise the basic tools needed for informed action.
- **Sound policy-making.** Develop coherent and aligned policy that provides predictable signals, while being simple, feasible and effective.
- **Least regret.** Invest early in low-carbon technologies that are least-cost, to reduce emissions and position South Africa to compete in a carbon-constrained world.
- **A regional approach.** Develop partnerships with neighbours in the region to promote mutually beneficial collaboration on mitigation and adaptation.
- **Accountability and transparency.** Lead and manage, as well as monitor, verify and report on the transition.



STEPS TOWARDS THE VISION

To achieve this vision, South Africa will need clear long-term development strategies to address the challenges of poverty, unemployment and inequality while managing natural endowments in a sustainable manner. Within an increasingly resource- and carbon-constrained global economy, the challenge is to grow sustainably by building the technological base for decoupling the economy from natural resource consumption and carbon emissions. These considerations must be central to a national development strategy.

Sustaining South Africa's ecosystems and using natural resources efficiently

The maintenance of ecosystem services such as those providing food and clean water, regulating climate and disease, supporting crop pollination and nutrient cycles, and delivering cultural benefits such as recreational opportunities, is fundamental to achieving South Africa's social and economic development objectives.



The biodiversity and ecosystems in conservation areas are national assets. Long-term planning to promote biodiversity and the conservation and rehabilitation of natural assets is critical, and should be complemented by a strategy for assessing the environmental impact of new developments as an important component of overall development and spatial planning. Where damage cannot be avoided or mitigated, and where the social and economic benefits justify the development, a commensurate investment in community development and the rehabilitation and conservation of biodiversity assets and ecosystem services is required.

A planning imperative for the efficient management of ecosystem services and natural resources, in which the water sector has already made some progress, is to strengthen the regional approach. Cooperation with neighbouring countries has the potential to deliver competitive advantages not available to individual countries (refer to chapter 7), and can boost renewable energy production and bolster regional food security in response to the effects of climate change.

South Africa's natural resources endowment includes precious metals, diamonds, coal and an as yet undetermined amount of shale gas. The mining sector is a significant component of the economy,

providing jobs and a vital source of foreign exchange. Abundant coal reserves have led to a historical dependence on coal as a source of electricity, resulting in a highly carbon-intensive economy, with the electricity sector alone accounting for almost half of greenhouse gas (GHG) emissions. The mining sector is a relatively minor contributor to carbon emissions: projections by the

Department of Environmental Affairs suggest that the mining sector is responsible for 13.5 percent of carbon emissions. Emissions directly incurred by the industry (scope 1) account for 3.6 percent of the national total, with the remaining 9.9 percent consisting of scope 2 emissions, mainly embedded in the purchase of electricity.

As is true for many industrial sectors, reducing scope 2 emissions is key to reconciling the continued development of mineral endowments with the goal of building a low-carbon economy. The principle ways of achieving this are:

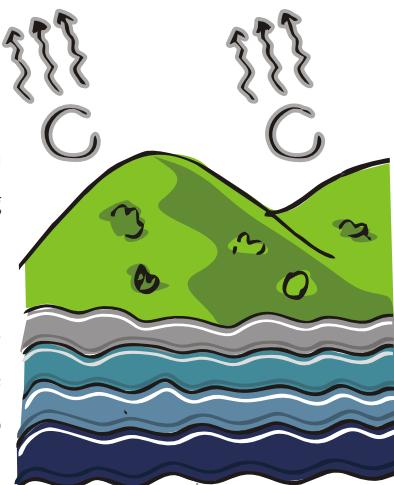
- Introducing more energy-efficient and less carbon-intensive industrial processes within the sector.
- Increasing the contribution of renewable energy to electricity generation.
- Reducing the carbon footprint of existing and planned coal-powered power stations through retrofitting, clean coal technologies and investigating the financial and environmental feasibility of carbon-capture and storage technologies.

The scope for increasing energy efficiency in the mining sector, while not insignificant, is limited – underscoring the need to transform the electricity sector.

Electricity pricing plans, predicated on the need to obtain a return on investment on new generating capacity as contained in IRP 2010, will also affect the mining and minerals sector, with energy-intensive operations like aluminium smelting likely to relocate once existing preferential pricing agreements expire, further reducing the sector's footprint.

Recognising that carbon pricing and energy costs will affect industries where production levels are tightly calibrated to input costs and international markets, such as ferro-alloys industries, measures such as carbon taxation will be implemented in a flexible manner that is sensitive to both the impact on employment, and the environmental impact of sustained production.

South Africa has significant renewable energy resources, particularly solar and wind. Efficient use of these natural resources is fundamental to achieving the shift away from coal-powered electricity towards the decarbonisation of the



economy. The allocations in terms of the IRP for the electricity sector are a good starting point. The long-term trend towards increasing the price competitiveness of renewable energy in relation to fossil fuels will continue as capacity expands, and the ability to leverage natural resources in terms of renewable energy will give South Africa an increasingly competitive advantage as carbon constraints become more important in the global economy.

Proposed interventions and planning imperatives:

- The Department of Environmental Affairs and South African National Biodiversity Institute should implement the protected areas expansion strategy and promote the biodiversity stewardship programme to build conservation partnerships around privately-owned land. National Treasury should introduce incentives to protect and rehabilitate ecosystems, such as rebates and tax reductions.

○ The Department of Environmental Affairs, together with related Departments such as Agriculture and Rural Development, should investigate the socioeconomic implications and policy requirements of a system for requiring commensurate investment in community development and the protection of ecosystem services to mitigate the environmental and social impacts of new developments.

- The Department of Water Affairs should ensure that the implementation of national strategies for water conservation and demand management are properly resourced and enjoy appropriate policy prioritisation across the economy.



○ The Department of Energy, Department of Mineral Resources, Department of Water Affairs and Department of Environmental Affairs should collaborate in developing planning instruments that ensure South Africa uses its endowment of renewable energy resources, combined with effective implementation of environmental regulations to mitigate the exploitation of strategic mineral resources.

○ The National Treasury and the Department of Public Enterprises should ensure that decisions on the use of financial incentives and disincentives, such as preferential electricity pricing agreements and carbon pricing will in future be made on the basis of evaluating both the effect on employment, and the environmental impact.

Building sustainable communities

Sustainable communities are built through well-structured development planning processes that help to guide them to optimally manage natural resources and environmental risks in the pursuit of social and economic goals.

Sustainable development indicators for local government that incorporate environmental performance is a key requirement for developing the planning capacity required to ensure environmentally sustainable development of human settlements. This needs to be accomplished in a transparent and inclusive manner to ensure that the criteria for evaluating environmental performance are relevant to the communities concerned. These performance indicators should inform the system of national-to-local fiscal transfers to incentivise environmental performance, and build planning and implementation capacity.

The challenge of building environmentally sustainable communities must inform the progressive devolution of responsibility for human

settlements to local government. When guided by effective planning, urban densification provides an opportunity to reduce the environmental footprint associated with delivering utility services such as waste management, electricity, water and sanitation, and public transport. It also improves access to social services such as health and education.

Building sustainable human settlements (chapter 8) requires more than bricks and mortar. In taking on its responsibilities for the building of vibrant human settlements the state must adhere to principles of sustainable development by:

- Reducing the carbon footprint and economic costs of transport for the urban poor by facilitating access to affordable, safe and convenient public transport and promoting the location of job-creating industries in close proximity to new housing developments (see chapter 8) as well as implementing urban greening programmes to promote quality of life in urban areas.
- Encouraging a holistic approach to low-cost housing developments that include local recreational facilities, retail opportunities, as well as community, social, and health services.
- Ensuring compliance with strengthened environmental requirements in building regulations, particularly with respect to energy-efficiency standards, and the roll-out of solar water heating.
- As per the National Waste Management Strategy, implementing a waste-management system through the rapid expansion of recycling infrastructure, and encouraging the composting of organic domestic waste to bolster economic activity in poor urban communities.

- Implementing stepped tariffs to promote the conservation of water and electricity, while ensuring continued access to free basic services. Local government must lead by example in terms of recycling and demand-side management.

Cities have begun to take the lead in developing partnerships that contribute to sustainable delivery of services, but national government needs to provide institutional support for project preparation and the replication of successful models at scale to accelerate and broaden this process.

Rural areas experience different challenges to urban areas, and in many cases it is the rural poor who are vulnerable to climate-change effects. Small-scale farming among African communities is crippled by the legacy of apartheid and has contributed significantly to the vulnerability of these communities. At the same time, commercial farms have struggled to adjust to the deregulation of the sector.

Increasingly, South African agriculture faces technical and structural challenges that require improved sector management, including adequate



funding of research, investment in skills and training, effective communication strategies and agricultural extension. However, there are also underlying structural and policy issues that need to be addressed in order for a regeneration of rural communities to take place.

The regeneration of rural areas is fraught with location-specific dynamics, and is dealt with more fully in chapter 6. Rural development is often inextricably tied to land reform and in many parts of the country, traditional leaders determine progress. The issues are complex, and involve the need for security of tenure for small-scale farmers to leverage capital against the value of traditional arrangements for land use, in terms of providing access to land on a non-commercial basis. Gender is important, with issues of equity in many cases being an obstacle to rural development. Social determinants of sustainable development that need to inform land reform include:

- Gender should not be an obstacle to access to land.
- Strategies that promote the efficient use of agricultural land should equally promote access to land and social equity and recognise the important economic role of subsistence agriculture in some rural communities.

Dispersed rural communities often struggle to gain access to basic services such as public health, electricity and water because of the costs involved. Opportunities to “leapfrog” technologies and exchange innovative approaches to common problems with neighbouring countries exist. For instance, it is often more cost effective to provide electricity to facilities and households in dispersed rural settlements through off-grid and mini-grid renewable energy than it is to connect them to the national grid.



As with any form of community building, the building of sustainable communities cannot be accomplished as a top-down process, but must be the outcome of engagement with participation by communities. Government and non-government actors are needed to promote awareness of sustainability issues within communities, and disseminate context-sensitive information about the causes and effects of climate change. Behaviour change is important to respond to developmental challenges, and particularly to reduce the environmental footprint of communities. It is likely to enhance South Africa's ability to meet national mitigation commitments. The scope of the challenge and threat requires ordinary people, especially those with higher incomes, to make changes in their lifestyles and values, and take positive action.

Proposed interventions and policy imperatives:

- The National Treasury and the Department of Environmental Affairs should work with the South African Local Government Association to develop and implement environmental performance indicators for local government that will increasingly inform fiscal allocations and capacity-building support for climate change.
- The Department of Energy and Eskom should work with the South African Local Government Association, the South African Cities Network, the South African Photovoltaic Industry Association and financial institutions to refine incentives for widespread use of rooftop solar power in the built environment.
- As part of the National Electrification Programme, the Department of Energy should address the delivery backlog in dispersed rural settlements by expanding the use of renewable energy in off-grid electrification.

Responding effectively to climate change: mitigation

Over the past few years, South Africa has increasingly stated its ambition to act responsibly to mitigate the effects of climate change. Domestic and international commitments are based on Cabinet's approval of the "peak, plateau and decline" emissions trajectory in 2008, which was formalised internationally in South Africa's Copenhagen Pledge in 2009.

The National Climate Change Response White Paper clarifies this ambition through quantifying the business-as-usual trajectory, against which the efficacy of South Africa's collective actions to reduce GHG emissions is measured.

South Africa recognises the gap between the requirements of science for a global emissions cap that restricts climate change to safe levels, and mitigation ambitions on the part of all nations. Although, as a country, South Africa is vulnerable to the impacts of both climate change and carbon constraints, it accepts that ambitious global agreements on emission reductions may emerge in the light of the Cop17 agreement to launch the "Durban Platform of Action". Although such commitments are expected to be subject to the transfer of finance and technology from developed to developing countries, there is a need to be flexible and resilient enough to adjust the national trajectory in keeping with an equitable global agreement on mitigation measures. This means aggressively promoting the development of local manufacturing and technical capacity in a broad range of renewable energy and other clean technologies to provide the country with room to manoeuvre in a carbon-constrained global economy.

A competitive advantage can be gained through becoming an early adopter of mitigation

technologies and mitigation finance mechanisms appropriate to the local context, rather than competing for carbon space with a shrinking band of countries tied to obsolete fossil-fuel technologies that may be increasingly subject to trade barriers.

Regional cooperation with neighbouring countries in terms of coordinating exploitation of hydro-electricity and biofuels (see chapter 4), as well as agreements in terms of the extraction and processing of fossil fuels, has a role that, until now, the country has failed to exploit.

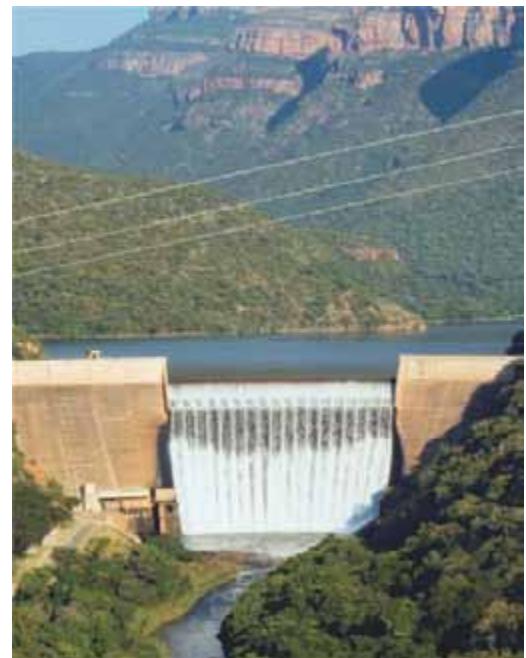
With energy generation making up 48 percent of South Africa's emissions, coupled with extensive natural coal resources, the energy sector is both the most important and most challenging to transform.

South Africa will build on the flagship renewable energy projects by investing in a range of renewable energy at a scale sufficient to build a local technological and manufacturing base and create employment. This will lay the basis for a more aggressive expansion of these sectors. South Africa will also explore other opportunities for diversifying its energy mix away from fossil fuels through for example partnering with neighbouring countries to develop hydropower resources, initially in Mozambique and Zambia, and eventually in the Democratic Republic of Congo. At the same time, the country will explore the use of natural gas as a less carbon intensive transitional fuel.

Data from the Draft National Greenhouse Gas Inventory for South Africa¹ suggests that industrial energy consumption makes up to 9 percent of South Africa's emissions, with a further 14 percent from industrial processes and product use. The chemical industry, especially coal to liquids, and the minerals industry, are primary contributors. Industry has committed itself to an energy efficiency programme, and further improvements will be achieved through South African Building Standards and a change in carbon pricing. There is also

significant potential for improvements and changes in some industrial processes. This will be combined with a change in the focus of industrial manufacturing towards greener industries over time.

The transport sector contributes 9 percent to emissions, which will be addressed through improvements in vehicle efficiency and standards, promotion of public transport, integrated transport planning, potential increase in bio-fuel content in fuel requirements, major expansion in public transport and rail freight infrastructure, promotion of electric and hybrid vehicles through public-sector investment in product development, and non-motorised transport and cycling.



Fugitive emissions make up 9 percent of total emissions, and improvements can be made through capturing coal-mine methane emissions, improvements in the design of petroleum plants, and more stringent fuel storage requirements. Increased bio-fuel production will also be effective.

Agriculture, forestry and land use contribute 6 percent to total emissions, and have significant potential to act as carbon sinks, particularly in the



context of regional sequestration initiatives, which should be incorporated into the regional strategy described in chapter 7. South Africa will seek to expand the forestry sector, and will re-establish natural plant cover in areas such as the thicket biome. Agricultural practices will reduce meat production, reduce the use of nitrogen fertilisers, and promote organic farming methods.



Waste makes up 2 percent of emissions, and South Africa will cut down on solid-waste disposal, promote composting and recycling of organic waste, and run a countrywide programme to capture land-fill gas methane.

The residential emissions make up only 1 percent of total emissions, which will be reduced through greater household energy efficiency, implementing new building design standards (including solar water heaters) and reducing domestic use of fossil fuels through universal electrification.

Given South Africa's dependence on coal, it makes sense to investigate carbon capture and storage that takes into account economic, environmental and technological feasibility.

International experience shows that the most effective way to achieve a just and managed

transition to a low-carbon economy and encourage emitters to change their practices is to internalise the social and environmental costs of their behaviour. This can be done through adequately pricing carbon.

Coordination of policy and approaches in government helps to establish a carbon-pricing strategy, and the government has identified two instruments in this respect:

- Carbon pricing
- The carbon budget approach.

A carbon budget sets the amount of carbon that can be emitted in a given amount of time, benchmarked against the national GHG trajectory range. Given the long-term structural implication of limiting emissions, the time-frame for such an approach to be feasible would need to be until 2050. A carbon budget approach would:

- Emerge from a bottom-up sector-by-sector analysis that is sensitive to:
 - The particular dynamics of the South African economy
 - The costs and risks of mitigation in particular sectors of the economy
 - The developmental imperatives of the country in terms of job creation and poverty eradication.
- Cumulative in nature and subject to regular review to allow for flexible adjustment of targets in relation to progress against the national GHG trajectory for the entire period (to 2050), and responsiveness to changing dynamics in the international mitigation regime.
- Implemented incrementally, initially targeting sectors with the greatest mitigation potential.

- Aligned with international standards established in terms of the United Nations Framework Convention on Climate Change for the monitoring, reporting and verification of GHG emissions, and supported by adequate capacity within the government in this respect.

The development of a carbon budget requires a foundation of trustworthy data to support understanding of the socioeconomic implications and strategic options for the structural changes required. The government needs to build capacity to effectively administer the monitoring, reporting and verification systems, supported by the participation of industry and other stakeholders.

While the principle of a carbon tax as a mechanism for establishing a domestic price for carbon is accepted by the government, the National Treasury is still engaged in research and consultation on its implementation. Issues that need to be considered include:

- The desirability of incrementally applying a series of carbon taxes, such as on vehicles, and calibrating such taxes to progress against sectoral targets.
- The impact of a tax on sectors with limited flexibility in terms of emissions, such as the cement

industry and SASOL, and energy-intensive industries whose mitigation potential is constrained by the national energy mix, such as the mining and minerals sector.

- The extent to which the impact of a carbon tax will be passed directly on to consumers.
- The need for a conditional exemption of the carbon tax in the electricity sector that can be phased out over time, given the context of a regulated electricity price, effective Eskom monopoly and an IRP that mandates progressively lower carbon intensity in electricity generation.
- The cumulative economic impact of a carbon tax.

The creation of a properly regulated domestic market in carbon offsets will enable industry to identify least-cost approaches to emissions reductions and drive private-sector investment in renewable energy and mitigation.

Proposed interventions and policy imperatives:

- The Department of Energy and the Department of Public Enterprises are to provide leadership in the reform of the electricity sector, establishing an independent systems and market





operator, forming an initial step in promoting diversification within the sector.

- The National Treasury will implement a carbon-pricing strategy, in close consultation with stakeholders such as the Department of Trade and Industry, Department of Energy, Department of Mineral Resources and Department of Environmental Affairs, as well as National Economic Development and Labour Affairs Council, with possible conditional exemptions for specific sectors.
- The National Treasury and the Department of Environmental Affairs are to develop the regulatory framework for a domestic market in carbon offsets, together with the Johannesburg Stock Exchange.
- The National Treasury, the Department of Economic Development and the Department of Energy are to facilitate public- and catalyse private-sector investment in renewable energy, with a particular focus on developing manufacturing capacity across a range of technology options, by means of infrastructure grants to local government, public-private partnerships, and the Green Economy Fund.
- The National Treasury is to use fiscal instruments to subsidise research and development and the Department of Trade and Industry will invest in strengthening the ability of South Africa to support its innovators in the process of product development and marketing, with a particular focus on renewable energy and energy efficiency.
- The Department of Transport must support and incentivise improvements in vehicle efficiency and fuel standards, integrated transport planning and promote public and non-motorised transport.

Responding effectively to climate change: adaptation

Climate change is already having an impact on South Africa. Over the last 50 years, there are clear signs of warming and increased frequency of rainfall extremes. The number of hot days has increased in frequency, while days with cooler temperatures have decreased in frequency. The sea-level has risen around the South African coast.

In the short term, South Africa's capacity to respond to climate change is compromised by factors such as social vulnerability, and dispersed and poorly planned development, rather than inadequate climate-specific policy.

South Africa's primary approach to adapting to climate change is to strengthen the nation's economic and societal resilience. This includes ensuring that all sectors of society are more resilient to the future impacts of climate-change by:

- Decreasing poverty and inequality
- Creating employment
- Increasing levels of education and promoting skills development
- Improving health care
- Maintaining the integrity of ecosystems and the many services that they provide.

The best form of adaptation to climate change will come from strong policies, backed by sound technical understanding and operational capacity to deal with the general development challenges in each sector. Local, provincial and national governments will need to embrace climate adaptation by identifying and putting into effect appropriate policies and measures that are well coordinated and credibly motivated. Where climate is an important factor, as in agriculture, water and infrastructure development, sectoral development must be informed by the best

available climate predictions and coordinated responses promoted through an effective national planning system. South Africa should avoid development of climate-adaptation strategies that run parallel to broader national development strategies.

Further research is needed to inform climate resilient planning and implementation. This must seek to provide more detailed information about the potential impacts on different geographic regions. The high level of uncertainty about possible future climate scenarios over the medium and long term means that:

- Climate resilient development planning has to be flexible enough to respond to a wide range of possible climate futures.
- Investment in scientific research is needed to narrow the possible range of scenarios and guide resilient development planning and strategy.

South Africa's Second National Communication on Climate Change also highlights the many barriers to effective climate- and disaster-risk management and to climate-change adaptation responses. Accessible and reliable information is lacking, with too few social platforms to allow citizens to engage effectively on climate-change issues. Effective communication of the possible impacts and

potential responses is therefore a significant adaptation challenge.

Apart from the needs for improved disaster-risk reduction, South Africa's National Climate Change Response White Paper highlights a suite of sectors that need to consider climate change impacts in their planning, namely water, agriculture and commercial forestry, health, biodiversity and ecosystems, and human settlements (urban, coastal and rural).

Proposed intervention and policy imperatives:

- The National Research Foundation is to establish a national facility dedicated to funding research and developing human capacity in climate-change adaptation and climate modelling.
- The Agricultural Research Council should establish a research focus on climate change and food security.
- The Water Research Commission should continue its current programme to understand the potential impacts of climate change on the nation's water resources.
- The National Disaster Management Centre should include climate-change risks in the national disaster management plan and in its communication strategies.





Managing a just transition

The poor and vulnerable continue to be disproportionately affected by climate change. Human health-related risks due to climate change are exacerbated by widespread poverty that includes a unique disease burden, high population mobility, and informal settlement housing characterised by poor sanitation, risks of waterborne disease, fires, flooding and malnutrition. Without adequate adaptation strategies this existing disease burden could worsen through increased vector-borne and emergent diseases.

Similarly, a global failure to mitigate the most dangerous levels of climate change will have a disproportionate effect on the African continent and potentially devastating long-term consequences locally. This knowledge underpins South Africa's commitment to mitigating its own carbon emissions.

At the same time, millions of people are employed in energy-intensive industries, and the mining sector is a major contributor to South Africa's foreign-exchange earnings. An equitable transition must protect the poor and vulnerable from the transitional costs associated with mitigation, such as increased costs of energy, food and transport, job losses in carbon-intensive industries, and the demand for different skills. A growing body of evidence suggests that as income inequality increases within a society, so does its environmental footprint, along with social burdens such as crime and poor health, and that targeting income inequality is one of the most effective strategies for sustainable development.²

In managing the transition, South Africa needs to understand that the decisions it takes could lock it into and have long-term environmental and economic consequences. Factors to consider include:

- Public infrastructure investments that need to be recouped over an extended timeframe must take account of the risk of a significantly increased cost of carbon, which will increase the cost of fossil fuels.
- Committing to a particular technology can result in institutions and financial resources becoming committed to suboptimal investments when more efficient, less costly, more labour absorbing or cleaner alternatives become available.
- Any decision about infrastructure involves committing to its emissions profile over its lifespan, and consideration must be given to the ability to incorporate it into a changing energy mix to avoid situations in which infrastructure is prematurely decommissioned (thereby not realising its full economic value).

The Commission highlights some examples of decisions that could potentially lock South Africa into an unsustainable and carbon-intensive path, and trade-offs that are needed to move to a low-carbon future. These include:

- The building of two new coal-fired power stations, Medupi and Kusile, with a combined output of 9 600MW. Although these are more efficient than existing coal power stations, they lack flexibility in operation and they will commit the country into significant carbon-dioxide emissions over their projected lifespan. This will limit the available carbon space for the rest of the industry and the economy and society as a whole.
- South Africa has extensive coal resources that have not yet been developed, as well as shale gas resources in the Karoo that, while not fully explored, are believed to be substantial. The exploitation of these resources would contribute to environmental damage and the national carbon

footprint, but could potentially create jobs and be a source of foreign exchange and investment, providing a level of energy security. It could also provide a lower-carbon fuel source that allows the economy to make a transition from its dependence on coal.

The implications of Eskom's current build plans for Medupi and Kusile are not necessarily incompatible with the national GHG emissions trajectory, but will impose corresponding constraints on other industrial sectors, and may constrain future decisions about the extent and timing of decisions to exploit other renewable resources and transitional fossil-fuel resources such as the Karoo shale gas, off-shore gas and liquefied natural gas imports. These decisions will inevitably be informed by developments in global energy and carbon markets and the impacts of global agreements on South Africa's ability to competitively exploit its fossil-fuel resources. Trade-off decisions, based on a set of criteria and indicators that include environmental and socioeconomic factors, will need to be made.

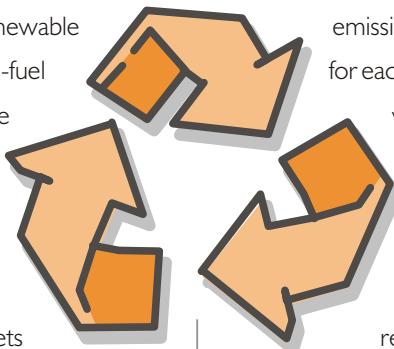
To manage a just transition to a low-carbon economy, it is essential that there is policy alignment at all levels of government in relation to priorities and considerations when investing in infrastructure that has long-term consequences for the environment and national mitigation targets. To this end:

- IRPs for the electricity sector and national mitigation trajectory will need to be aligned, forming part of an integrated energy plan for the country that charts the course to a low-carbon economy.
- The transition to an environmentally

sustainable, low-carbon economy will be a cross-cutting objective that will be integrated into the plans of government departments, integrated development plans and future iterations of the Medium Term Strategic Framework.

- Carbon emissions will form part of environmental assessment procedures for infrastructure investment decisions at all levels of government and in all government agencies and parastatals.

- In terms of the carbon budget, quantitative emissions objectives will be developed for each economic sector that are aligned with the mitigation trajectory for the country.



The short-term costs of building a just, low-carbon and resilient economy and society will be far lower than the long-term costs of an unplanned response. South Africa should initially focus on pursuing those mitigation options that are likely to have the least regrets options, particularly around energy efficiency, that improve the competitiveness of local industry, create jobs and represent a net saving rather than cost to the economy and gross domestic product.

Proposed initiatives and policy imperatives:

- Parastatals and the Department of Public Enterprises are to include environmental indicators in the criteria for evaluating investment in bulk infrastructure.
- The Commission is to regularly review the alignment of government policies and regulation with progress towards achieving a just transition to an environmentally sustainable, low-carbon economy.



- The Department of Performance Monitoring and Evaluation is to include carbon intensity and emissions reductions, the intensity of water use and critical land use parameters in the national indicators that it uses to monitor and assess government performance.

Enhancing governance systems and capacity

Government will lead the transition to a low-carbon economy. An aspect of this role is creating an enabling environment for the private sector and civil society to contribute to the transition by creating policy frameworks and economic signals that promote appropriate changes in business practice and behaviour.

Managing the transition to a low-carbon economy will require investment in governance systems and capacity. In relation to reducing the carbon intensity of the economy, the following institutional arrangements and actions will be important:

- Ensuring that climate change is effectively addressed and mainstreamed in every department, under the supervision of the Presidency and National Planning Commission, as an essential component of a broader national development strategy.
- Government should, in building capacity in this field, establish and support an independent research body as a repository of information and best practice in the fields of climate change mitigation and adaptation. The Centre should bring together differing perspectives, and provide guidance to government agencies in fulfilling their regulatory mandates, as well as providing a forum for business and civil society. It should also tap into practical knowledge and guidance about low carbon technologies and ways of responding to global climate imperatives.

- Strengthening the Department of Environmental Affairs' capacity to provide mechanisms and oversight for the monitoring, reporting and verification of sectoral carbon emissions.

- Strengthening and reforming regulation of the energy sector, in particular:

- Ensuring the nuclear regulator has sufficient capacity for proper regulation of the industry, commensurate with the risks involved.
- Establishing the independent systems and market operator (see chapter 4) for the electricity sector and establishing a policy framework under the National Energy Regulator of South Africa to promote diversification in the electricity sector.
- Aligning the national skills development strategy with the requirements of the green economy.

The government will undertake certain regulatory and legislative interventions to establish the policies and instruments required to effect the transition, including:

- Fiscal interventions and reform in relation to carbon pricing, incentives for the green economy, and promoting performance against environmental indicators by local government.

- Ensuring that environmental impacts of public-sector investment and spending are fully costed to promote the principle of full-cost accounting as a corporate governance standard.

- Establishing a framework for reporting on GHG emissions by industry.

PHASING

To ensure environmental sustainability and an equitable transition to a low-carbon economy requires strategic planning, a sound evidence base and substantial investment. While the aim is to make an immediate impact on emissions and provide support to those already affected by environmental impacts, the socioeconomic trade-offs of the transition will have to be carefully managed.

Attention to phasing and sequencing of investments is an important part of the planning process. The phasing required is outlined below.

By 2015 – planning, piloting and investing

South Africa creates the framework for implementing the transition to an environmentally sustainable, low-carbon economy as a core element of its strategy for sustainable development as proposed in the plan as a whole.

- The roles and institutional arrangements indicated by the Climate Change Response White Paper have been reviewed and implemented, as appropriate, and processes and systems have been developed to enable their mandate to be delivered.
- An independent Climate Change Centre, in partnership with academic institutions and other appropriate institutions, is established by government to support the actions of government, business and civil society.
- A regulatory framework for land use is in place, to assess the environmental and social costs of new developments and ensure the conservation and restoration of protected areas.
- There is a comprehensive, trusted and expanding evidence base in relation to South Africa's emissions profile to inform climate-change policy-making.

- South Africa's mitigation commitment is defined and actions are being taken to achieve it. A process to understand the implications of mitigation efforts by sectors within a limited carbon space has been established through the carbon-budget approach. This guides sectoral and company mitigation targets and infrastructure spending.



- Carbon-pricing mechanisms have been put in place (with appropriate exemptions). These are supported by a wider suite of mitigation policy instruments that target specific mitigation opportunities.
- Strategic environmental assessments are used to reduce regulatory obstacles in environmental impact assessments and provide incentives for green economic activities.
- In global negotiations, South Africa takes strong action to promote a just transition to a low-carbon economy and seeks to ensure that national and regional interests are not undermined by protectionist economic policies elsewhere.



- Significant investment and international assistance programmes are in place for climate-related research and development, and the roll-out of mitigation and adaptation projects, especially for key vulnerable sectors.
- There has been substantial development of technical skills and policy capacity to facilitate the transition to a low-carbon economy, and for adaptation research and implementation in particular.
- The national recycling strategy is delivering absolute reductions in the total volume of waste disposed to landfill each year.
- Environmental sustainability, climate-change issues and opportunities for regional responses are addressed at forums for regional cooperation.
- Two further integrated resource plans for electricity are complete and aligned with an integrated energy plan, including carbon constraints appropriate to South Africa's overall mitigation effort.
- Land, agriculture and water policies and strategies are reviewed at regular intervals to ensure that they continue to contribute to sustainable development approaches.

By 2020 – implementing programmes of sustainable development and targeting the emissions peak

As socioeconomic development begins to make significant inroads into reducing poverty and unemployment, emissions are in the process of peaking.

- Land, agriculture and water development strategies have provided the basis for programmes of environmentally sustainable rural regeneration.
- Public investment is being channelled into new agricultural technologies for commercial farming, as well as for the development of adaptation strategies and support services for small-scale and rural farmers.
- The development and marketing of niche products and services is encouraging the domestic manufacture of green technologies.
- The introduction of carbon pricing has been completed and assessed, and proposals have been finalised for its economy-wide extension.
- The carbon-budget approach has evolved, informing ongoing policy development and implementation, in support of South Africa's international commitments. State capacity for long-range adaptation and mitigation planning is at an advanced level.
- Medium-term adaptation strategies are being piloted and implemented, including for disaster preparedness, encouraging investment in adaptation technologies and research into the conservation and rehabilitation of ecosystems and biodiversity assets.
- Comprehensive reporting on carbon emissions and environmental performance by the government and business is under way, and annual data on emissions levels and climate impact feeds into policy and regulatory processes.
- Regional cooperation frameworks are in place to assist countries in becoming more resilient to climate change and to foster cooperation.
- A culture of energy efficiency in society is well established.

By 2030 – An environmentally sustainable society, expanded low-carbon economy and reducing emissions

South Africa has reduced poverty and unemployment to socially sustainable levels, as emissions reach a plateau. Thriving rural communities are providing an economic and social base for a significant number of people. Urban development is more compact and energy efficient. Growing public awareness of the consequences of climate change and unconstrained consumption of our natural resources leads to a refocusing of political priorities towards the protection and rehabilitation of the region's natural assets.

○ Investment in low-carbon and climate-resilient infrastructure has enabled South Africa to export and profit from its technologies and skills, and

benefit sectors that deliver enhanced energy, food and water security, new high-quality job opportunities, and improved quality of life.

- The state is well capacitated and comfortably manages its policy, regulatory and support functions.
- The transition has been aligned with South Africa's efforts to address poverty and inequality. The benefits of building resilience are evident in the strides towards a flourishing and prosperous nation.
- Various incentive frameworks and a suite of comprehensive carbon-pricing policies have catalysed high levels of private investment in mitigation and adaptation activities, and generated public resources for reducing emissions.

Notes

1. Draft National Greenhouse Gas Inventory for Republic of South Africa, Government Gazette Notice 1104 of 2009. Available at <http://www.info.gov.za/view/DownloadFileAction?id=106775> (accessed 05/06/2012).
2. Research on the relationship between inequality and various social and environmental indicators is extensive, however the pathways and mechanisms underlying these linkages are yet to be established. Inequality is shown to increase consumerism and can lead to greater environmental damage by undermining the collective action required for environmental protection. A full discussion may be viewed in the article *Unexpected connections: Income inequality and environmental degradation* by Haupt and Lawrence, available at <http://www.shapingtomorrowworld.org/hauptinequality.html>.