

# Changing development paths: From an energy-intensive to low-carbon economy in South Africa

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Climate change mitigation poses significant challenges for South Africa and its energy development, historically highly energy intensive. At the same time, the country faces a host of daunting development challenges, exacerbated by the legacy of apartheid. Examining both challenges, this paper considers how alternative conceptions of a development path can be achieved. In the short term, energy efficiency provides large potential for mitigation – and energy savings at the same time. Changing South Africa's fuel mix, dependent to three-quarters on coal, is at least a medium-term challenge. The minerals–energy complex is so central to the economy that it is likely to take decades to change dramatically. The most transformative change is to an alteration in economic structure, likely to take long to achieve. The article examines specific policy instruments that might be implemented to achieve such a transformation. A transition to a low-carbon economy will require a paradigm shift in industrial policy. It will require considered provision for sectors sensitive to changes in energy prices. Building up new, climate-friendly industries will be needed to sustain employment and investment. To enable a just transition, provision will have to be made for emissions-intensive sectors, if they are to be phased out over time. South African government has adopted a vision, strategic direction and framework for climate policy. Policymakers have begun to understand that the future will be carbon constrained and that South Africa's emission will have to stop growing, stabilize and decline before mid-century. The challenge of climate change is a long-term challenge, requiring immediate action. This article examines actions at near-, medium- and long-term timescales. Its focus is on the most transformative change, that of seeking to shift development paths.

Keywords: climate change mitigation; development; industrial policy; low-carbon economy; South Africa; sustainable development

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## 1. Introduction

Climate change mitigation poses significant challenges for South Africa and its energy development. Not only does South Africa have an extremely energy-intensive economy based primarily on coal leading to relatively high emissions, but it simultaneously faces a host of daunting development challenges, exacerbated by the legacy of apartheid. Challenges for development include a dramatic gap between rich and poor, a heritage of racial oppression and inequality, a lack of infrastructure, high levels of unemployment and urbanization, an economy adjusting to

globalization, and the new challenge of AIDS. Given the challenges of development to meet basic needs, mitigation policies and measures have to be integrated with development goals. While South Africa's traditional development path, based on energy- and capital-intensive mega-projects is unfavourable for mitigation strategies, it may be possible to incorporate sustainable development goals with mitigation.

This paper presents a case study of South Africa, how various measures can contribute – on different time and spatial scales – to changing development paths. Since it is concerned with development, it begins by outlining the key

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challenges that the country faces and the history of recent responses in development policy. Section 3 moves to climate change, in particular a brief profile of greenhouse gas (GHG) emissions. The largest share of emissions comes from the energy sector, which is profiled in section 4. Section 5 discusses the context and development of South African energy and climate change policy, and implications for climate change. This leads to the discussion in section 6 of meeting climate change goals in the context of development. Energy efficiency in the short term, changes in the fuel mix in the medium term and structural changes in the long term frame the major categories of mitigation actions.

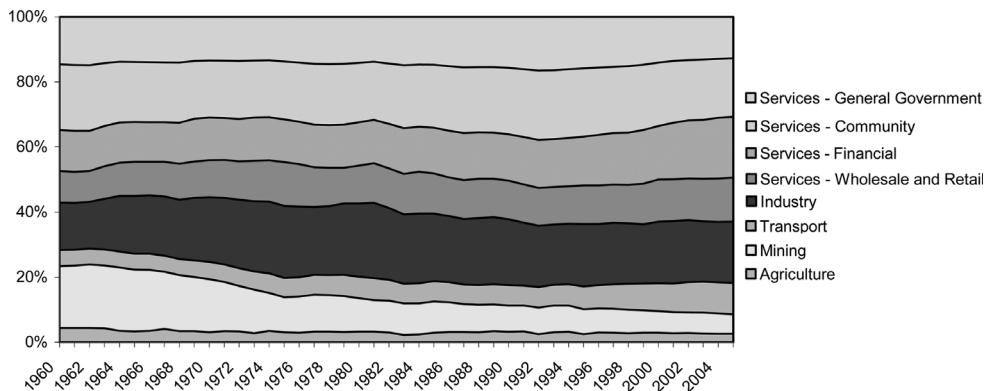
## 2. Overview of South African development challenges

### 2.1. The legacy of apartheid

South Africa has an estimated population of 47.9 million people (July 2007),<sup>1</sup> of which 57.5% live in urban areas. South Africa has historically followed a capital- and energy-intensive development path, driven by resource extraction and the development of an associated set of interrelated economic activities termed the 'minerals–energy complex' by Fine and Rustomjee (1996). This complex comprises mining, minerals processing,

the energy sector and associated industries linked to these sectors, based initially on mining and then on beneficiation, underpinned by some of the cheapest electricity in the world (Figure 1).

Although South Africa is a middle-income developing country, its economic and social development was highly uneven due to apartheid, finally abolished in 1994. This left a legacy of extreme inequality, leading commentators to speak of 'two economies', or 'two worlds'. In the most recent Human Development Report (UNDP, 2007), South Africa's Gini coefficient ranked the country 117th most economically unequal out of 126 countries for which data was available. Likewise, South Africa's ranking according to the Human Development Index is 121 out of 177 countries (most developed=1), whereas in GDP per capita (PPP) terms, South Africa is ranked 53rd (UNDP, 2007), indicating the significant disparity between economic wealth and development in South Africa. While the affluent sectors of South African society have access to infrastructure (including power, water and sanitation) and economic and social facilities comparable to most developed countries, poor communities suffer from lack of basic infrastructure, social and economic marginalization, unemployment and high levels of violence, and bear the main burden of diseases such as AIDS and tuberculosis. Moreover the population grew from around 40 million people in 1994 to nearly 48 million



**FIGURE 1** Sectoral contribution to economy, 1946–2005

Source: South African Reserve Bank Quarterly Bulletin.

people in 2007 (SSA, 2007b), and the number of households grew faster than the population, from 8.7 million in 1994 to 13.3 million in 2007 (SSA, 2007a), posing additional challenges for infrastructure development. In the same period, South Africa's HDI value declined from 0.745 in 1995 to 0.707 in 2000, and further to 0.674 in 2005 (UNDP, 2008).

## **2.2. Development policy frameworks**

The post-1994 government's broad policy framework has been based on two sets of principles: first, resolving the macroeconomic problems existing at the end of the apartheid era, and second, providing services and employment for the majority of the population. Contrary to popular expectations, the macroeconomic policy framework has been quite conservative, with a strong emphasis on macroeconomic stability. Central aims have been to resolve the financial crisis which the apartheid state found itself in at the beginning of the 1990s, and to promote a developmental agenda aimed at accelerating economic growth and meeting basic needs. One of the key areas to be addressed has been the apartheid-linked infrastructure backlog. These development aims are encapsulated in three successive policy frameworks: the 1994 Reconstruction and Development Programme (RDP), the 1996 Growth, Employment and Redistribution Strategy (GEAR), and the most recent 2006 Accelerated and Shared Growth Initiative AsgiSA (see ANC, 1994; DTI, 1996; AsgiSA, 2006).

Published in the year of transition, the RDP was primarily aimed at overcoming the economic and social marginalization of the majority of the South African population under apartheid and outlined a programme of job creation through public works, and meeting a range of basic needs, as key priorities. Quantified goals were set for delivery of several basic services in housing, water and electrification, and programmes were launched in specific sectors. Two years later, GEAR shifted the focus to macroeconomic stability and economic growth, and was based on a

policy of opening the economy and encouraging investment. It was thought at the time that many RDP goals, such as job creation and poverty alleviation, could be met through macroeconomic reforms. While relatively successful in addressing macroeconomic problems, the policies did not create employment or address poverty at the required rate, and the government acknowledged that the role of the market in addressing problems such as unemployment was more limited than had been assumed.

By the end of the 1990s, the government saw the state playing a much more significant role in development. Plans to privatize parastatals were shelved, and these came to be seen as vehicles for infrastructure development and service delivery. In 2006, the government announced a new development policy framework, AsgiSA, responding to the failures of earlier policies in these areas by proposing a 'national shared growth initiative', to counter the exclusion from the formal economy of the bottom third of the population. The initiative was proposed in response to a set of problems not adequately addressed by the earlier frameworks. These included threats to exports from a strong currency, backlogs and bottlenecks in national infrastructure development which undermined both basic service delivery and high-end economic growth, and a shortage of skills, lack of support for small businesses, and economic concentration in the economy, leading to barriers to entry into various markets in the economy, and the exclusion of a significant proportion of the population from the formal economy.

In response to these constraints, AsgiSA proposed a large-scale state-led infrastructure development programme, specific sectoral development plans (including business process outsourcing, tourism, biofuels and agro-processing), national skills development, an overhaul of regulation and policy-making, and measures to eliminate the 'second economy' (i.e. create opportunities to participate in the formal economy for those excluded from it). Growing and diversifying the economy, alleviating poverty and lowering unemployment remain key development goals. Clearly

the state seeks to diversify the economy away from the apartheid-era development path, based on the energy-intensive 'minerals–energy complex', yet these are currently attracting significant local and international investment. Reconciling sustainable development goals, such as mitigating GHGs, alleviating poverty and creating employment, with the current structure of the economy, is one of the main challenges which South African policy-makers face (DEAT, 2008). Thus, in South Africa, the focus of the tension between development objectives and climate change mitigation objectives is the energy system, as well as the point at which this tension can be resolved through innovative policies and measures.

### 3. Greenhouse gas emissions overview

The most comprehensive survey to date of South African GHG emissions was the inventory for 1990 and 1994 compiled as part of South Africa's Initial National Communication (INC) to the United Nations Framework Convention on Climate Change (UNFCCC) (RSA, 2004), for the three major GHGs: CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O (RSA, 2004, p. 14). Further work in terms of an inventory for the year 2000 is currently being compiled and includes a component of knowledge management to facilitate conducting future inventories. More

up-to-date estimates are available from the World Resources Institute's Climate Analysis Indicators Tool (WRI, 2003, 2005). The CAIT data provides a useful interface for international comparisons. Aggregate estimate of emissions for a 2003 base year<sup>2</sup> were compiled for South Africa's Long-Term Mitigation Scenarios, as well as baseline projections until 2050 (SBT, 2007; Winkler, 2007).

Internationally, South Africa's GHG emissions are relatively high – in 2000, South Africa ranked 57th (all six Kyoto gases plus land use, land-use change and forestry (LULUCF)), 43rd (all six Kyoto gases without LULUCF), or 37th (CO<sub>2</sub> only) in terms of per capita GHG emissions (WRI, 2005)<sup>3</sup>: South Africa's 2000 emissions with LULUCF were 10.1 t CO<sub>2</sub>-eq per person; by comparison, those of the EU (25 countries) were 10.5, those of the USA were 22.9, China's were 3.8 and India's were 1.5. Figure 2 plots the UNDP's Human Development Index against per capita emissions (CO<sub>2</sub> only) for 171 countries for which data was available; while there is an exponential trend towards an HDI value of 1, South Africa and a handful of other countries are clearly outliers.

The coal dependency of South Africa's energy system shapes the composition of its GHG emissions. Energy use accounts for the vast majority of emissions of CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O: in 2007, it is estimated that 78% of emissions resulted from

**FIGURE 2** Per capita emissions compared to Human Development Index

Source: UNDP (2008).

































