



**Climate Change and
Development**

**CLIMATE CHANGE, SUSTAINABLE
DEVELOPMENT AND ENERGY:
FUTURE PERSPECTIVES FOR SOUTH AFRICA**

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The ideas expressed in these case studies are those of the authors and do not necessarily represent views of the OECD or its Member countries

FOREWORD

In January 2001, the OECD held an expert seminar as part of a pilot project to investigate interactions between the long term agenda for climate change and sustainable development strategies. Experts from both OECD and developing countries attended. Participants identified issues and approaches, based on their regional perspectives, relevant to an evolving, equitable regime for addressing climate change, given various national circumstances, political interests, institutions and capacities to achieve sustainable development objectives. They stressed the importance of both climate mitigation and adaptation policy within a sustainable development framework.

Discussions and presentations centred around two broad themes:

- Synergies and trade-offs between sustainable development objectives and long-term strategies to limit climate change.
- How to build analytical and implementation capacity in developing countries to maximise synergies at local, regional and global levels of decision-making.

To support seminar discussions, the OECD commissioned several papers (including this one) from non-OECD country experts; authors were asked to comment on key interactions between climate change and sustainable development from their own regional or national perspectives. This paper is being released as an informal working paper in the hope that it will continue to stimulate interest and discussions on these topics in other fora.

The paper expresses the opinions of the author(s), and does not necessarily represent the views of either the OECD or its Member countries. Comments on the paper may be provided directly to the author(s): ogunlade@energetic.uct.ac.za

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ABBREVIATIONS AND ACRONYMS

Annex B	Annex of the Kyoto Protocol, listing initial national commitments
Annex I	Annex of the Convention (UNFCCC), listing industrialised countries making commitments under the FCCC and the Kyoto Protocol. Almost synonymous with Annex B. Non-Annex I countries are generally developing countries.
Baseline	Projection of emissions that would occur without mitigation or climate change policy. The baseline is needed to calculate credits earned by CDM projects.
DEAT	Department of Environment and Tourism
DME	Department of Minerals and Energy
CDM	Clean Development Mechanism, which allows project investments in developing countries (non-Annex I) that generate certified emissions reductions for Annex I countries
CO ₂	Carbon dioxide
GDP	Gross Domestic Product
GHG	Greenhouse gas. A 'basket' of 6 GHGs is considered by Kyoto Protocol, namely carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF ₆).
KP	Kyoto Protocol
IPCC	Intergovernmental Panel on Climate Change
OECD	Organisation for Economic Co-operation and Development
RDP	Reconstruction and Development Programme
SACS	South African Country Studies (programme on Climate Change)
UNFCCC	United Nations Framework Convention on Climate Change

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EXECUTIVE SUMMARY

1. The dual objectives of the United Nations Framework Convention on Climate Change (UNFCCC) are greenhouse gas (GHG) reduction and achievement of sustainable development. Developing countries are more concerned with the latter. This is because of their stage of overall economic development and the fact that they are presently minor contributors to rising GHG concentrations in the atmosphere. Due to the global nature of the climate change problem and the unpredictability of the likely impacts, the cooperation of all countries is required to successfully address it. The challenge, especially for developing countries, is to search for synergies between achieving sustainable development goals and GHG reduction strategies. This will ensure the participation of all countries to achieve the goals of the UNFCCC.

2. South Africa, as a developing country within the African region, is fully committed to meeting its sustainable development objectives, along with addressing the problems of its recent history. In South Africa, as in other developing countries, climate change is not a priority, hence the linkages between sustainable development and climate change issues are very weak. The major priorities of the South African government are equity among its different races, job creation and poverty reduction. These parameters will dominate the government's thinking for the immediate future. The challenge for South Africa is therefore to link these objectives with climate change priorities within a sustainable development framework.

3. Since 1992, South Africa has been one of the global partners promoting sustainable development. It is actively participating in the UN Commission on Sustainable Development and has been submitting national country reports on progress with the implementation of Agenda 21 to the Commission on Sustainable Development (e.g. in 1995, 1997, 1998, 1999 and 2000). At the policy level, South Africa is committed to sustainable development. Since 1994, the principles of sustainable development are considered in the development of new policies, legislation and regulations. While in principle both environmental and macro-economic policies are based on the sustainable development paradigm (which gives priority to the provision of basic needs, equity, employment creation and economic growth for all South Africans), practical results of such thinking in terms of integrated economic and environmental policies are still lacking. Economic policies do not yet reflect environmental concerns. Main barriers to integrating climate change into South Africa's vision of a sustainable development pathway include: lack of an adequate policy approach to consider energy and climate change objectives alongside each other, as well as a lack of institutional, human, legal and financial capabilities.

4. South Africa is the largest emitter of GHGs in Africa, primarily because of the overall size of its economy and the coal dependency of its energy economy. This paper focuses on the energy sector, which accounts for the lion's share of South Africa's GHG emissions. Also, South Africa is one of the most industrialised countries on the African continent. Thus energy provision and use is crucial to its overall development, especially at this time when the government wishes to attract foreign investment in the industrial sector. Energy demand in electricity is projected to rise at a rate of 2.8% per annum. An increase in the supply of energy as a whole and electricity in particular will be required, as in nearly all African countries, though the need is lesser in South Africa than others. If the increase in electricity is based on coal-fired systems, as has been the case historically in South Africa, GHG emissions will continue to increase at a fairly rapid pace.

5. South Africa's energy sector was developed with several objectives in mind. These vary from energy security, which led to maximum use of endogenous resources such as coal, to increasing access for the vast majority of people. Climate change issues were not a concern. Most energy policies are developed by the Department of Minerals and Energy (DME) and are part of broader (non-climate change specific) strategies. Nevertheless these policies include aspects that may have a dampening impact on GHG emissions, such as the introduction of energy efficiency programmes, the use of renewable energy, promotion of demand side management (DSM), and household fuel switching. Measures such as integrated resource planning (IRP), DSM and energy efficiency investments can lower growth in demand, but these measures can only be fully realised when major barriers to their implementation are overcome across the country. For example, the utilities do not have proper incentives to promote demand-side planning and –management, and clean energy supply.

6. For a country like South Africa, Climate change can provide opportunities for sustainable growth. It can help provide access to additional financial resources so as to encourage a shift towards a more environmentally sustainable pathway in energy sector expansion. South Africa is one of the countries in the world with very high GHG emissions intensity, and as such is an attractive candidate to host Clean Development Mechanism (CDM) projects under the Kyoto Protocol, which could lower the emissions intensity of the energy system in the future.

7. Some on-going initiatives by the government and other bodies within South Africa provide the opportunity to achieve synergies between climate change and sustainable development. Within the present restructuring of the electrical distribution industry, the DME and the National Energy Regulator (NER) have developed policies to promote the development of independent power producers, which in turn could advance sustainable energy projects. In addition, new policies will introduce natural gas into the energy sector for new plants and call for the replacement of coal by natural gas in certain operations for licensing the construction, operation and trading for transmission, distribution and storage of piped natural gas. Finally, the government's recent Energy Policy on renewable energy call for targets for the introduction of renewable energy in the energy economy. These national initiatives, if properly managed and implemented, could extend energy service provision and promote sustainable development simultaneously.

8. The DME acknowledges that the issues addressed by the Kyoto Protocol could threaten as well as provide opportunities to the South African energy economy. As a result, the DME has commissioned a study on "threats and opportunities" of the implementation of global environmental issues with regard to South Africa's energy economy. This should complement a number of other climate change studies undertaken by South Africa that are related to sustainable development, especially those related to the development of the institutional and project level of the CDM and different modeling exercises.

1. Introduction

9. The threat of global climate instability and its likely impacts on countries world-wide that led to the signing and subsequent ratification two years later of the United Nations Convention on Climate Change (UNFCCC) was a clear indication of political will by governments world-wide to combat climate change. Unfortunately, the period that followed these political commitments did not continue as many countries are finding it difficult to abide by their commitments and obligations as required by the Convention for a variety of reasons. The differentiation in obligations among nations responsible for most of the historical emissions of anthropogenic greenhouse gases (GHG) and the different national circumstances are some of the factors that have affected the early commitment. Despite these differences, the Kyoto Protocol (KP) to the Convention was adopted in Japan in 1997, which also demonstrates commitment among Parties to the Convention to search for a solution to the climate problem.

10. Since the signing of the Protocol, different economic and political issues have emerged which might make the ratification of the Protocol difficult, and the GHG reduction target of 5.2% below 1990 levels by Annex 1 parties that was agreed upon may not be achieved. This is a major dilemma because all current signs indicate that the predicted climate change may occur and even the limits stipulated by the Protocol may not be enough to make the necessary progress towards achieving the objectives of the UNFCCC.

11. Coping with this dilemma raises new short and long-term issues such as the search for strategies to get KP ratified, and co-operative mechanisms to increase the participation of Parties of the Convention with commitments beyond the first commitment period (2008-2012). The latter may require the participation of some developing countries, especially those that are relatively higher emitters of GHG. However, as clearly expressed in the UNFCCC, these countries are more concerned with achieving their sustainable development goals than with reducing GHG emissions. The challenge, therefore, is to search for synergies between sustainable development goals and GHG reduction strategies to ensure the participation of these developing countries.

12. Exploring synergies between sustainable development and climate change in a country such as South Africa, the largest GHG emitter in Africa, is the main focus of this short paper. The paper will discuss the climate change and sustainable development objectives of South Africa and the search for viable synergies. Due to the dominance of the energy sector (77%) in GHG emissions in South Africa, as shown in Fig.1, most of discussions will focus on the energy sector. The paper discusses the existing energy situation and sustainable development policies along with the climate change situation as a background to the possible future debate in the search for synergies on climate change and sustainable development.

13. This paper will explore from South Africa's perspectives how an equitable international climate change regime might emerge. Issues that are highlighted are:

the importance of the existing energy situation;

The policy debate on climate change including the participation and position of South Africa in the UNFCCC and the Kyoto Protocol;

Climate change and sustainable development objectives;

Barriers to integrate climate change into sustainable development;

Key issues for South Africa after the Kyoto commitment period;

An outline of the prospects for developing synergies between sustainable development and climate change.

14. The analysis in this paper is limited because the phase of this work is exploratory and the time allocated for the work was limited. Hence, for the analysis, existing published literature; as well as telephone and electronic interviews of relevant authorities form the basis of data utilised.

2. The South Africa energy sector

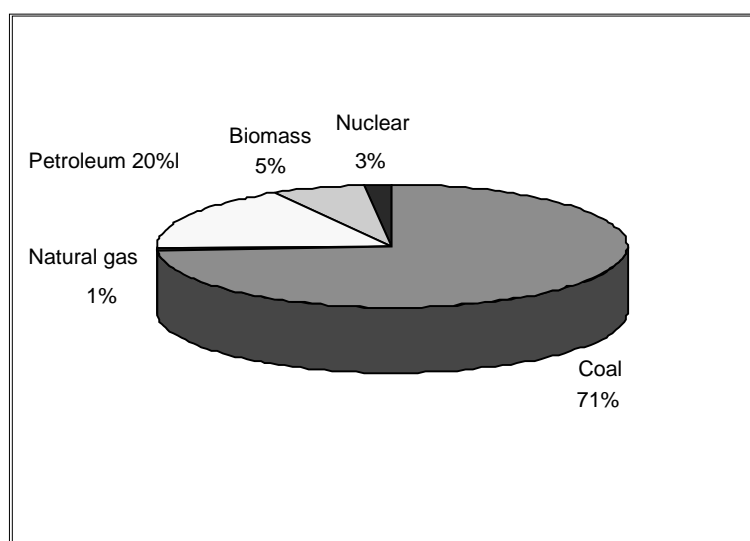
15. The energy sector is the largest single source of greenhouse gas emissions in South Africa, accounting for about 89% of the total (Howells, 2000; see also Figure 1). It also provides an essential and significant infrastructure for the country for attracting foreign investment (DME 1998). The energy sector

of South Africa will be discussed below in terms of the supply and demand perspectives. Energy supply is dominated by coal, with the other supply sources being electricity, nuclear energy, liquid fuels, gas and renewable energy. The section on the demand side will concentrate on the economic sub-sectors: households, industries, commerce, mining, transport and agriculture.

2.1 Energy supply sources

16. Primary energy supply and consumption in South Africa is dominated by coal, accounting for 71%. This source also dominates electricity generation, with a share of 92%. Imported crude oil amounts to 20% of primary energy used, mainly by the transport sector. In addition, synthetic fuel oil produced from coal is used in the energy sector. Other energy sources utilised are nuclear, natural gas, and renewable energy including biomass (DME 2000). Figure 1 provides a percentage breakdown of the various energy sources.

Figure 1. South Africa's primary energy source by source, 2000



Source: DME 2000.

17. Generation and supply of electricity is mainly by the public sector through Eskom, the parastatal electric utility which accounts for 91% of all electricity produced in the country. With Eskom being a significant user of coal, and with coal being a major contributor to GHG emissions, Eskom is vulnerable to impacts of response measures that would be taken by developed countries to reduce or eliminate GHG emissions (Van Seventer 2000).

18. Electricity is largely generated from coal-fired power stations close to the main coal resources as well as the major demand centres. As of 1999, there were 38 power stations, with the 23 coal-fired power stations accounting for 87 per cent of the total installed capacity of 42,994 MW. The only non-coal stations of significance are the Koeberg nuclear power plant, 5% of total installed capacity, and three pump storage facilities 4% of total capacity (NER 1999; Eskom 1999). Table 1 presents the breakdown of capacity and electricity production by fuel source.

Table 1. Capacity and gross electricity production by fuel type

	Capacity [MW]	(1998)	Electricity production (1998) [GWh]	
Coal	32 724	87,4%	170 750	90,4%
Nuclear	1 840	4,9%	13 601	7,2%
Pumped storage	1 580	4,2%	2 626	1,4%
Hydro	668	1,8%	1 852	1,0%
Gas	606	1,6%	23	0,0%
Bagasse	29	0,1%	86	0,0%
Total	37 447	100%	188 938	100%

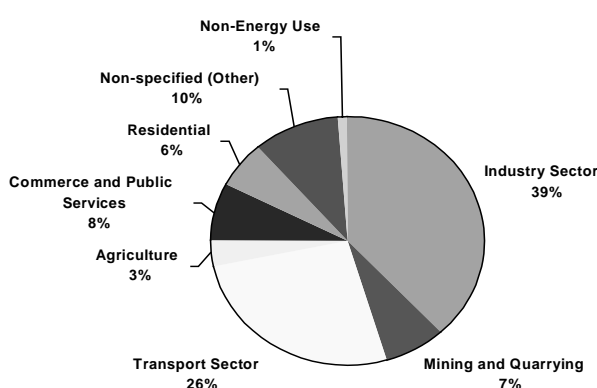
Source: SANEA 1998

19. The large coal-fired power stations have the capacity to burn low-grade coal and generate electricity cheaply. As a result, South Africa is among the world's low-cost producers of electricity (NER1998). In 1997, its industrial electricity tariffs was 2 US cents/kWh, the lowest worldwide, followed by New Zealand at 2,5 US cents/kWh (SANEA 1998 Mavhungu 2000). Admittedly, however, a more precise comparison of electricity tariffs would have to take differences in income into account.

2.2 Energy consumption

20. South Africa is a middle-income country and one of the most industrialised countries in Africa. The energy sector contributes approximately 15% of South Africa's gross domestic product, including energy related taxes, and provides around 250,000 jobs. South Africa's economy is heavily dependent on energy – Figure 2 provides a sectoral breakdown of energy consumption.

Figure 2. South Africa's energy consumption by demand sector



Source: DME 2000

21. Electricity is used for industrial, commercial and household purposes. Table 2 shows the use of electricity in different sectors.

Table 2. Consumption of electricity in different sectors

Sector	% Electricity consumption
Industry	63%
Transport	3%
Residential	15%
Commercial and Public service	9%
Energy sector own use	10%

Source: SANEA 1998.

22. In 1991, Eskom embarked on an accelerated electrification programme which planned then to connect 700 000 new households by 1997. By 1993 Eskom's target was increased to one million new connections (Eberhard and van Horen 1995). Between 1994 and 1999, about 2.8 million households were connected to the national electricity grid. The number of households electrified by the year 2025 is expected to increase to 82 percent, which is equivalent to 11.4 million households (de Villiers 2000). With the increased electrification of households, electricity demand is expected to rise.

2.3 Energy sector policies

23. Prior to 1994, South African energy policy was dominated by the need to secure energy supplies in the face of international boycotts, including the oil embargo. Energy security was the driving force behind the establishment of Sasol and Mossgas (both of which are synthetic fuel producers) and the presence of extensive oil storage facilities (Davis and Wamukonya 1999). Since 1994, energy security has been replaced by the imperatives of striving for social equity and economic efficiency within the context of sustainable development.

24. In 1998, the Government released a White Paper on Energy Policy (DME 1998) – the culmination of an extensive period of public consultation and policy development. The White Paper covers all aspects of the energy sector, and outlines the Government's approach to a large number of issues. In many cases, policies remain in a formative stage, with expectations that strategies will be developed to attain the stated policy objectives.

25. South African energy policy strives to preserve an appropriate balance between energy demand and supply; short-term, medium term and long-term priorities; the efficient utilisation of natural resources and environmental considerations. Five key policy objectives are identified in the White Paper:

Increasing access to affordable energy services;

Improving energy sector governance;

Stimulating economic development;

Managing energy-related environmental impacts;

Securing supply through diversity.

2.4 Future perspectives in the energy sector

26. It is not yet clear how energy development will evolve in South Africa. Several projections have been made, but so far only in the electricity and liquid fuels industries. No projections have been made regarding the potential contribution and cost of renewable energy sources available in South Africa except for the recent statement by DME that they intend to achieve 5% renewable energy share of electricity production by 2010. Only the potential of imported cleaner energy sources (gas and hydro) has been considered.

27. According to projections, electricity supply will increase at a rate of 2.8% per annum (de Villiers et al 2000). Table 3 below shows a projection of energy supply and the associated emissions from 2001 to 2025 under a business-as-usual' scenario.

Table 3. Projected electricity supply

Year	2001	2005	2010	2015	2020	2025
Energy to be supplied (GWh)	196 379	223 927	254 749	285 874	319 780	354 147
System Load Factor (%)	73.3%	71.9%	70.6%	71.1%	69.9%	70.1%
Operating Plant (%)						
Coal fired (%)	82.35	79.33	78.91	76.50	77.56	78.40
Pump storage (%)	3.63	3.50	3.94	6.87	6.20	5.65
Nuclear (%)	4.77	4.60	4.18	3.72	3.36	3.06
Hydro (%)	4.34	5.10	4.63	4.12	3.72	3.39
Gas (%)	0.89	0.86	0.78	0.69	0.62	0.57
Demand side management (DSM in %)	4.02	6.62	7.56	8.10	8.55	8.93
Total (%)	100.00	100.00	100.00	100.00	100.00	100.00
Emissions						
CO2 Emissions (Gt/year)	166 000	183 000	207 000	225 000	256 000	286 000

Note: System load factor is the utilisation of generating facility in percentage of energy produced compared to energy it could have produced if operated at maximum power. Demand-side-management (DSM) is the expected savings from practising energy efficiency measures and so is available power that can be used.

Source: de Villiers et al (2000).

28. Since South Africa has limited cleaner energy resource capacity, imported energy from surrounding countries in the region is actively being considered and a natural gas project has started with Mozambique. Attractive options include natural gas and hydroelectricity. Estimates of the potential of these sources are listed in Table 4 below.

Table 4. Potential sources for imported energy

Resource	Reserves
<i>Natural Gas</i>	
Pande, Mozambique	2 500 PJ
Temane, Mozambique	2 500 PJ
Kudu, Namibia	7 700 PJ
Cabinda, Angola	20 000 PJ
<i>Hydro¹</i>	
Zambezi Basin	190 PJ/a
Inga, Congo	1 140 – 3 150 PJ/a
Others	900 PJ/a

Source: Southern African Development Community (1995).

29. The rise in the projection of residential electricity demand is due to the success of the national electrification programme in meeting its targets. If the national electrification programme proceeds without any serious energy efficiency measures, there would be a major rise in electricity demand that would have serious implications for generation planning (Afrene-Okese 1998). An introduction of energy efficiency measures alone into the electrification programme could reduce the electricity consumption and demand growth (Afrene-Okese 1998, Tyani 2000). The result would be a decrease in power generation costs and environmental costs. Thus South Africa would have to take action to curb growth in electricity demand in all sectors. South Africa is considering use of the Integrated Resource Planning (IRP), which includes the use of a cost effective and more efficient mix of energy supply technologies and demand side management (DSM) with energy efficiency (de Villiers et al 2000). Whilst these measures could reduce electricity consumption and defer the need for investment in production of electricity, there is no regulatory capacity in South Africa to ensure that utilities implement IRP, invest in DSM and energy efficiency. At the same time utilities themselves have no interest and no capacity to implement and invest in these measures (Tyani 2000).

30. To this end South Africa's energy sector is more vulnerable to climate change, whilst at the same time climate change would provide opportunities (especially financial resources) to possibly implement IRP, DSM and energy efficiency. However this would require South Africa to develop and implement policy measures to deal with climate change.

3. The policy debate on climate change

3.1 Climate change related activities

31. South Africa demonstrated commitment to global concerns in August 1997 when it ratified the UNFCCC. Policies relating to meeting its obligations of the UNFCCC are being developed within the context of national priorities. The leading department on climate change is the Department of Environment and Tourism (DEAT). This department, which is the national focal point, has suggested that Parliament approve a memorandum for the establishment of climate change focal points in all departments. DEAT also released the White Paper on Environmental Policy for South Africa in 1998. This policy is an overarching framework that sets out the government's objectives in relation to environmental management,

intended methods to achieve its objectives, and to guide government agencies, and the relevant institutions to execute the objectives stated. DEAT also published the National Environment Management Act (NEMA) (Act no 107, 1998). This act aims to improve environmental management, while facilitating sustainable development to ensure that significant impacts on the environment are avoided, minimised or mitigated.

32. DEAT established a National Climate Change Coordinating Committee (NCCC) as an advisory body to the Department. NCCC is instrumental in getting South Africa to ratify the Kyoto Protocol. The NCCC is the main driver of South Africa's climate change policy discussion document. The climate change policy discussion document of DEAT is a reference for its climate change-related activities. The strategies identified in the climate change discussion document for South Africa to satisfy its obligations under the Convention are as follows:

Improve the understanding of the likely future climate changes in South Africa, their effects, and how the country can adapt to these changes;

Implement the institutional arrangements and regulations identified as necessary by the policy process;

Conduct an ongoing process of public information and education on climate change issues;

Identify mitigation opportunities, and implement those which are "no regrets" options as soon as possible.

33. The important issue is whether the above strategies are strong and relevant enough to enable South Africa to deal with climate change and take advantage of opportunities arising from climate change. South Africa should be prepared to deal with climate change so that it can shoulder its obligations under the Convention and can exploit any opportunities available from the debate (Thorne 2001). At the moment, however, climate change is not yet reflected in most government policies and strategies, since climate change is generally a low priority of public policy in the country.

34. Policies governing the energy sector developed by the Department of Minerals and Energy were not necessarily developed to deal with climate change. For example climate change is clearly not a major driver for the programmes on energy efficiency, renewable energy, and demand side management or household fuel switching strategies (Bouille and Metz 1998). These programmes were largely driven by the rural electrification initiative, and economic and environmental concerns. Since the energy sector is responsible for a bigger percentage of emissions in South Africa, it would be expected that the DME should deal with energy sectors that have an impact on greenhouse gas emissions.

3.2 *South Africa's participation in the UNFCCC*

35. South Africa signed the UNFCCC in 1993 and ratified it in August 1997. It is therefore bound to fulfil the obligations stated in the Convention as a full member of the Convention process. South Africa has not yet ratified the Kyoto Protocol and its position on the Kyoto Protocol is aligned to those of African countries and G77.

36. In South Africa, activities relevant to the UNFCCC fall within the responsibility of many different government departments at all levels of government. To avoid fragmented administration of the Convention and to ensure that government attends to the provisions of the UNFCCC effectively, the Department of Environmental Affairs and Tourism (DEA&T) has been designated by the government to be

the lead department responsible for the co-ordination and the implementation of South Africa's commitments of the UNFCCC.

37. As a member of the UNFCCC, South Africa has to comply with certain obligations outlined in the articles in the UNFCCC. South Africa launched a Country Study Programme (SACS) in 1997, which commissioned research to enable South Africa meet its obligations under the UNFCCC. The country study consisted of four components: greenhouse gas emissions inventory; vulnerability and adaptation assessment; mitigation options; and the initial communications study.

38. The reports on GHG emissions inventory and the mitigation options were prepared to fulfil Article 4.1 (a) and 4.1(b) of the Convention, using the methodology produced by the Intergovernmental Panel on Climate Change (IPCC). These studies are completed but not yet published (Luboyera 2001).

39. A vulnerability and adaptation (V&A) research effort was also initiated. It is a result of the South African government's recognition of the potential negative impacts of global climate change on the southern African region. The V&A study concentrated on the following areas: climate scenarios, water resources, agriculture, human health (Malaria and Schistosomiasis), commercial forestry, rangelands, and biodiversity (plant, animal and marine).

40. According to the V&A study, South Africa has significant sensitivity and vulnerability to climate change effects, but also has significant adaptive resources to address their potential harmful effects (Kiker 2000). An important facet of the country's vulnerability is expected impacts on human health, especially through the main vector-borne diseases of malaria and schistosomiasis (Kiker 2000). Other key issue emanating from the V&A are adverse effects on ecosystems and welfare (de Wit 2000).

41. The Initial National Communication on Climate Change has been prepared in accordance with Article 12 of the Convention, but it is yet to be released by the government.

3.3 *South Africa's position on the Kyoto Protocol*

42. South Africa has not yet ratified the Kyoto Protocol. South Africa's participation in the UNFCCC and the Kyoto Protocol as a developing country, combined with a relatively high level of industrialisation and per capita emissions, make it an ideal candidate for investment through the Clean Development Mechanism (CDM). South Africa has the opportunity to access additional foreign investments through the CDM that will not only reduce greenhouse gas emissions, but will also contribute towards sustainable development (Rukarto et al 2000).

43. South Africa supports the African position on the CDM and, like other Parties to the Convention, will continue to update its position till such time as CDM negotiations are completed. South Africa supports a CDM system that is based on objective criteria to ensure that both the economic and the environmental benefits of the CDM are realised. From South Africa's perspective, the principle of equitable regional and sub-regional access to CDM projects should be ensured, as well as the provision of assistance to developing countries, particularly the least developed countries, to set up national systems that will facilitate meaningful participation by all Parties to the Protocol. South Africa also supports the position that part of the proceeds to host developing countries should help the host country in the realisation of its sustainable development objectives. Methodological and operational issues that are of importance to South Africa include: that project validation and registration should be transparent and independent; that the roles of national governments and other operational entities should be clarified; and that accountability for approval and registration of projects should rest with Parties. In addition, CDM projects must be aligned to the developing host country's sustainable developmental objectives (Rukarto et al 2000).

44. Clearly South Africa's participation and position on climate change is driven by the focus of government policies to achieve sustainable development. Government is concerned about delivery of services to improve the lives of the majority of South Africans. This makes it difficult for South Africa to develop a strong policy approach that makes climate change a priority for action. In other words, it is politically important that policies on climate change are linked to more visible short-term development objectives.

4. Climate change and sustainable development objectives of South Africa

4.1 South Africa's participation in sustainable development arena

45. South Africa is one of the global partners in sustainable development. It participated officially in the meetings of the UN Commission on Sustainable Development (UNCSD) in April 1995 and submitted national country reports on progress with the implementation of agenda 21 to the UNCSD in 1997, 1998, 1999 and 2000. The focus areas covered in the reports are on educational, training and awareness programmes for sustainable development; on the implementation initiatives by all levels of government and major groups identified by Agenda 21; and on the programmes that were put in place by the different sectors to achieve sustainable development.

46. At the policy level, South Africa is committed to sustainable development and this is reflected through the development of new policies, legislation and regulations. The principles of sustainable development became part of the development of all new policies since 1994. In addition, South Africa has ratified the following international conventions since establishment of UNCED in 1992:

The Basel convention on Control of Trans-boundary Movements of Hazardous Wastes and their disposal, 1994, Chapter 19 of Agenda 21

The law of the Sea Convention, 1994, Chapter 17 of agenda 21

The Convention on Biological Diversity, 1995, Chapter 15 of Agenda 21

The Convention on Combating Desertification, 1997, chapter 12 of Agenda 21

The Framework Convention on Climate Change, 1997, Chapter 9 of Agenda 21

47. In addition, South Africa is an active participant in the testing programme of UNCSD indicators of sustainable development and participated in this programme since its inception in 1996.

48. South Africa completed its report on the testing of the indicators for sustainable development and submitted it to the UNCSD. Results of the testing programme show that:

Out of the 134 indicators, 74 were suitable for South Africa

Out of the 55 environmental indicators only 19 were found appropriate for South Africa

48 new indicators were proposed for all indicator groups

49. South Africa is using the opportunity to test the list of indicators by UNCSD for sustainable development to start a process of awareness regarding sustainable development indicators and their potential use. Although some progress has been made, there is still a lack of awareness at most levels of

government. Much work is still needed to convince institutions of the importance and use of these indicators.

50. There are initiatives to implement Agenda 21 on the local level that focus on awareness raising, development of tools and networking. Projects that are in place include:

CITIES State of the Environment Report

Sustainable Development Training.

51. Also, the National Environmental Management Act 107 of 1998 makes provision for the Minister of Environmental Affairs and Tourism to initiate an annual performance report on sustainable development to meet the government's commitment to agenda 21. The Annual Performance Report must cover all relevant activities of all national departments and spheres of government. This will evaluate the progress that national governments have made to provide the framework for sustainable development through policies, and legislation based on the principles of sustainable development.

52. Since South Africa is the official host of Earth Summit in 2002, the Department of Environmental Affairs and Tourism (DEAT) has started a national dialogue on sustainable development with all relevant stakeholders. The government acknowledges that capacity building is critical at all government departments. As a result, a dedicated environmental education and capacity-building unit has been established. The DEAT has already started a preparatory processes required for the United Nations Commission (UNCSD) April 2002, including a national and regional review of Agenda 21 to of Agenda 21.

53. The Earth Summit will provide South Africa with an opportunity to influence the global and regional priorities and problem areas and assist in identifying priority areas for further implementation of sustainable development objectives. Also, this can help South Africa to show leadership in the developing world in efforts to reform the global system on the environment in favour of poorer countries. South Africa wants to address poverty through Agenda 21 because poverty remains vital in its progression to economic growth and restoration of human dignity. Within this context, sustainable development is seen as a way of addressing environmental concerns while maintaining basic services to the poor. One aspect of poverty in South Africa is energy poverty, which is partly caused by historical measures in the energy development in the country .

4.2 *The environment-economy debate*

54. Most of the current policies and objectives are based on the new Constitution of the Republic of South Africa, which was released after installation of the first democratic government in 1994. The sustainable development priorities stated in the constitution, which are also echoed in the Reconstruction and Development Programme (RDP) white paper policy document, are: alleviation of poverty; provision of basic needs for all South Africans; equity; employment creation and; economic growth (RDP 1994). These priorities are reflected in all the new policies developed by the new democratic government.

55. The Environmental Management Policy, which was released in July 1997, is conceptualised within a paradigm of sustainable development. Amongst other things its aim is to address the following:

Improve people's quality of life

The integration of economic development, social justice and environmental sustainability

More efficient use of energy resources

56. In particular, the policy emphasises that the integrated and sustainable management of the environment, now and in the future, is the essential basis for sustainable development in all areas of human activity. The policy focuses on win-win solutions to promote economic and environmental gains, particularly for the previously disadvantaged communities. Thus development policies, plans, programmes and activities in all sectors should address environmental concerns (DEA&T 1997).

57. Since 1994 the South African Government and Reserve Bank have pursued economic policies with an emphasis on macro-economic stability and reduction of the fiscal deficit. Nevertheless, the commitments to redistribution and social equity remain high on the Government's agenda. In 1996, the Government announced a macroeconomic strategy entitled 'Growth, Employment and Redistribution' (GEAR). The strategy is essentially a fiscal policy designed to reduce the deficit, thereby creating conditions for lower inflation and interest rates. Government projections anticipate an increased rate of investment, economic growth and job creation as a result. While growth has occurred, it has been slower than expected.

Table 5. A selection of GEAR projections of macro-economic variables

	1996/ 1997	1997/ 1998	1998/ 1999	1999/ 2000	2000/ 2001	Actual 1998
Fiscal deficit	5.1%	4.0%	3.5%	3.0%	3.0%	3.7% ^a
GDP growth	3.5%	2.9%	3.8%	4.9%	6.1%	-0.1%
New jobs ('000s)	126	252	246	320	409	-130
Current a/c deficit	2.2%	2.0%	2.2%	2.5%	3.1%	2.0%
Inflation (CPI)	8.0%	9.7%	8.1%	7.7%	7.6%	7.6% ^b

Source: Davis and Wamukonya (1999).

58. The governments' GEAR macro-economic strategy places a higher emphasis on economic growth (6% per year) and employment creation (400 000 jobs per year) by the year 2000 (SANEA 1998). It is clear that the economy has failed in 1998 to meet the expected growth of 6%, however in recent years the growth rate has been around 2% which is higher but still below what was anticipated.

59. General improvements in the macroeconomic performance seem to be the driving force behind the South African government's economic activities. At present, integrating environmental concerns into this drive for strong macroeconomic performance is difficult because of the following factors:

There appears to be little appreciation among the policy community for the theoretical basis concerning linkages between environmental and economic performance. Although the Department of Environmental Affairs and Tourism published a series of discussion papers and research reports on the added value of environmental and resource economics to policy, there has so far been no tangible support from macroeconomic policy makers. Macroeconomic policy makers, such as the Department of Finance and the South African Reserve Bank, have not yet perceived the linkages between economics and the environment

as a priority concern. Socio-economic issues such as education, unemployment and price stability are given a higher priority.

Scientific research on environmental indicators is still continuing, and early results do not always recognise the broader context of economy-environment-social development relationships;

The integration of economic activities and their impact on the environment has been institutionalised through some supporting activities such as environmental assessments. The general constraint is the lack of institutional capacity to process applications and monitor policies. In addition to this capacity constraint there is a lack of awareness among macroeconomic policy makers to sustainable development issues.

Nevertheless the government is prepared to take the challenge to move towards macro-economic policy reform, which involves discouraging environmentally unsustainable practices. The new policies with sustainable development implications that are being suggested include:

Full cost accounting (e.g. by removing distortions from the economy such as energy subsidisation);

Taxing pollution and waste generation;

Managing interest rates so that harmful land-use practices are discouraged;

Providing alternatives to informal sector activities which use resources in an unsustainable manner;

Promoting economic practices to include environmental resources as capital in the national accounts, so as to raise awareness to their real value, and promote their sustainable use.

4.3 *How sustainable is the energy sector in South Africa*

4.3.1 *Sustainable energy indicators*

60. Ensuring the provision of adequate, affordable, efficient and reliable high quality energy services with minimum effects on the environment is pivotal for economic growth in Africa and as well as to meet energy demands of communities (Davidson 1999). South Africa's Constitution provides for the establishment of a national energy policy, which will ensure that the national energy resources are adequately and efficiently utilised and developed to cater for the needs of the nation (RSA 1996).

61. South African civil society requires climate and energy to be put as an item on the agenda in the World Sustainable Development Summit, to be held in South Africa in 2002. They asked that the energy sector should be sustainable and that the government should ensure universal access to energy and eradicate energy poverty, establish targets for renewable energy and provide funds for rapid diffusion of renewable energy technologies, phase out nuclear power, and reduce GHG emissions (Tyani 2000). Progress towards energy sustainability can be measured using some indicators such as: per capita carbon emissions; particulate concentrations; cleaner energy investment; energy trade exports; energy intensity; renewable energy (Helio 2000). South Africa's performance on these indicators varies but most indicate that the country's energy sector is not sustainable (Spalding-Fecher 2001).

62. South Africa has relatively high indicators for carbon emissions per capita and energy intensity. The reasons for the energy intensity of the economy include heavy reliance on energy intensive industries for domestic production and export, high dependence on coal for primary energy, higher energy intensity of synthetic transport fuel made from coal, low energy prices and the poor energy efficiency of individual sectors. Continued high energy intensity is potentially a competitive disadvantage for the South African economy, because it can increase the cost of production (Spalding-Fecher 2001).

63. On particulate concentrations South Africa's performance is not good. There are high levels of particulate concentrations due to energy production and consumption in South Africa. This results in serious environmental and health problems because air quality, land, water and forest resources are severely degraded. Most critical problems occur at the household level due to use of coal, wood, paraffin and candles for cooking, heating and lighting. This pattern of energy use exposes households to hazardous levels of indoor air pollution which is a potential cause of illness and even death (van Horen 1995). The incidents of poor air quality are found in historically black residential and rural areas. Pollution monitoring undertaken in several historically black residential areas by the CSIR and MRC has found that people's exposure to indoor air pollution, especially particulate matter, exceed WHO standards (van Horen 1995). The household hazards of energy extend even beyond pollutants, to include the high risk of fires, burns and even poisoning from paraffin stove use and candle burning in informal dwellings (Van Horen 1996b; Mehlwana 1999a, 1999b).

64. South Africa performs well on households with access to electricity due to the target driven mass electrification programme. The South African mass electrification programme initiated by Eskom in 1991 has until December 1999 brought electricity to more than 3.3 million homes (NER 1999).

65. The share of population having access to electricity in South Africa stood at 66% at the end of 1999, with 80% of urban and 46% of rural households having access (NER 1999). South Africa performs well in this indicator when compared to most Southern African countries where less than 15% of the population have access to electricity. However, average use among newly electrified South African customers five years after electrification is less than 140 kWh (NER 1996). It is increasingly apparent that the existing system of electrification financing and implementation, whilst successful in meeting RDP targets, is not sustainable. The challenge facing government is how to further extend access in the face of rising costs and declining average consumption as this might slow down their future electrification targets. So far the new government has proposed off-grid electrification in rural areas, and the change in electrification financing (Davis and Wamukonya 1999).

66. The status quo on investment in cleaner energy indicates that South Africa's energy sector needs are high, though there are positive signs of both public and private sector commitment to increase investment in cleaner energy options. The challenge is to maintain these goals through innovative means, particularly the electricity industry.

67. Another area that needs attention is the energy pricing policy in South Africa, in particular electricity prices. South Africa has been able to generate electricity from coal at very low cost since coal reserves are closer to earth's surface and also electricity prices do not account for environmental externalities. This factor has been presented as an important comparative advantage for the country, and has been used as an incentive to international investors seeking sites for energy-intensive industries (Van Horen 1995). However, a very small percentage of products produced by most of the energy-intensive industries operating in South Africa are consumed by South Africans. Thus in a way the relatively low energy prices provides a subsidy to foreign markets.

68. Whilst it is clear that South Africa should develop strategies to make the energy sector more sustainable, the situation presents South Africa with opportunities and threats that would arise from the climate change debate.

4.3.2 Opportunities and threats presented by climate change to the South African energy sector

69. In the context of the Convention and KP, South Africa as a developing country would be able to meet its obligations under the Convention and mitigate climate change through assistance from developed country Parties.

70. The high emissions intensity makes South Africa an attractive candidate for CDM international projects, which could help to move the energy sector into lower emissions intensity. For example, it has been estimated that, through efficiency improvements, energy savings of between 20% and 50% are achievable in many industries at relatively low cost (Visser et al 2000). Apart from the CDM, the UNFCCC provide for the transfer of financial and technological resources to non-annex I Parties by Annex I Parties in its Article 4.5 and capacity building (Davidson 2001) Thus South Africa can access climate-friendly environmentally sound technologies and funding for capacity building. However it is important that South Africa is prepared to seize the opportunities arising from climate change.

71. South Africa's contribution to emissions of GHGs is small on a global scale, accounting for less than 2% of total emissions. However, because of South Africa's fossil fuel-intensive economy, the country has a very high emissions intensity and emissions per capita (Winkler 2001, Spalding-Fecher 2001, IEA 2000). Most of the emissions are from the manufacturing and mining industries since these consume 63% of total electricity consumption whilst residential customers' consumption of electricity accounts for only about 15% of total electricity consumption (IEA 1998). Thus, in this context South Africa may be pressurised to accept future commitments to reduce emissions and possibly be required to take on a bigger burden on emissions if its per capita emission levels are used to determine its share of emissions burden (Winkler et al 2001).

72. This would put a strain on South African economic development and would further impoverish the majority of South Africans. Currently the new democratic government is faced with enormous challenges in dealing with the poverty and inequality, which are products of past apartheid policies in South Africa.¹ Among others there is inequality in energy service provision and income distribution. In 1993 almost two-thirds of the South African population had no access to electricity in their homes (Van Horen et al 1993), with the result that they used wood, coal, paraffin, gas and candles to meet their energy needs. Approximately a million households, including even some of those who already have access to the electricity grid, still use coal to meet at least three of their energy service requirements: cooking, space heating and water heating. Research has shown that serious environmental and health problems result from this pattern of energy use (Van Horen. 1995).

73. South Africa is one of the leading coal exporters in the world- the fourth largest producer and third largest exporter of coal in the world (van Seventer 2000). According to the Chamber of Mines Report coal exports (35% of total production) totalled R9.3 billion in 1999. This is a significant 6.2% of total

1. In 1993 the Gini coefficient (a measure for income inequality) Index for South Africa was the fourth worst of 105 countries in a World Bank survey (World Bank 2000). In 1994 more than 10% of South Africans lived on less than \$1 per day, while 35% lived on less than \$2 per day. There are also enormous disparities between racial and ethnic groups. For example, a 1996 census showed that 65% of white men earned more than R3500 per month (\$810 at 1996 exchange rates), while 48% of African men earned less than R500 (\$115).

(seasonally adjusted and annualised) merchandise exports for 1999 (de Wit 2000). It is expected that international climate change mitigation measures are likely to cause a decline in the global demand for coal (Wamukonya and Spalding-Fecher 1999, van Seventer 2000). There is significant concern in the country about how the implementation of the Kyoto Protocol will affect the coal industry, and the 61 000 workers that it employs. Since South Africa exports 68% of its coal to OECD countries where most trading partners such as European countries and countries in the Pacific Rim such as Japan have quantified their emissions reductions under the Kyoto Protocol, investment, trade and aid patterns are expected to change (EIA 2000; UNFCCC 1997b). A report from the International Energy Agency suggests that South Africa may be very vulnerable to fossil fuel exports by the impacts of the Kyoto Protocol. Equally, a recent report by the South African National Economic Development and Labour Council argues that obligations of Annex I parties to meet their obligations under the protocol are likely to lead to reduced demand for fossil fuels by Annex 1 Parties, which will negatively affect coal exports (Kotze et al. 2001). Therefore a proactive analysis of the impacts of international climate change response measures on the South African economy, and possible technological and policy measures to reduce this impact, would form the basis for requesting assistance to deal with potential negative impacts (Wamukonya and Spalding-Fecher 1999).

74. The challenge facing South Africa is to adopt policies and strategies to make its energy sector sustainable that would at the same time address climate change. However the country is faced with difficulties regarding integration of climate change and sustainable development. These problems are discussed in the following section.

5. Barriers to integrate climate change in sustainable development

75. The main barriers to integrating climate change in South Africa's sustainable development pathway include: the policy approach to energy and climate change, lack of institutional capabilities and lack of human capacity, legal and financial capabilities.

5.1. The current policy approach to energy and climate change

76. Since the energy sector is responsible for a bigger percentage of emissions in South Africa, it would be expected that the DME would deal with energy sectors, which have an impact on GHG emissions. Despite this, climate change is clearly not yet a driver for the energy efficiency programmes, renewable energy, and demand side management or household fuel switching strategies that are mentioned in the Energy Policy White Paper. Secondly, although the Energy Policy White Paper document proposes a specific agency to promote energy efficiency, the opinion of different stakeholders is that renewable energies and actions related with increasing efficiency will play a marginal role in the actual energy policy.

77. In addition, the Department of Environment and Tourism has no mandate to tell DME to adopt emission reduction policies. DEAT has developed a discussion document on climate change that treats different aspects and dimensions of the climate change problem. However it has the following shortcomings that would affect the integration of climate change and sustainable development:

Although the relevant dimensions are covered, the link between climate change and water shortages and desertification is not strong enough and does not strongly link climate change to current high priority issues.

Whilst the discussion document on climate change covers the links with different sector policies, the role of some key sectors such as Housing and Science and Technology are insufficiently covered. The Housing policy needs to be included with its potential for energy efficiency gains, fuel switching and changes in behaviour and its important contribution to the

mitigation of GHG emissions. The housing programme could have a significant contribution to the climate mitigation, especially since the housing infrastructure has a very long lifetime. The document does not mention allocation of funds to the R&D priorities of the Science and Technology policy to address climate change objectives.

The framework given by the Reconstruction and Development and the strategy 'Growth, Employment and Redistribution' is not linked to Climate change Policy. Certain issues were not addressed such as job creation and GHG emissions, energy efficiency and competitiveness, and productive capacity and environmentally sound technologies.

5.2 *Lack of institutional capabilities*

78. Parliament has approved the memorandum for the establishment of climate change focal points in departments critical to the management of climate change. These are Environment and Tourism, Trade and Industry, Foreign Affairs, Minerals and Energy, Water and Forestry, Transport, Science and Technology, Housing, and Agriculture.

79. The Department of Environment and Tourism has been appointed as lead department and has now given climate change priority at the top management level. Government officials in other departments do not see climate change as a priority because the awareness is still low among government authorities, and as a result there are concerns about its impact on national development. Their concern is that South Africa has huge backlog of service delivery where performance of each department is measured by how effective and efficient each department is on service delivery. Thus it becomes difficult to allocate time and resources to analyse and provide input on climate change issues. For climate change to be taken seriously by government officials it needs to be interpreted such that it can have relevance on how it can help them achieve or meet their service delivery objectives.

80. The Department of Trade and Industry (DTI) does not consider climate change in its programme. Instead, it has a holistic strategy to deal with environment and regards all environmental issues as equally important. In addition, DTI considers environmental factors as being of crucial importance in decisions on sustained economic growth and global trade. Consequently, the DTI is involved in initiatives to enhance the environmental performance of South African industry. Professionals in the department provide inputs guided by the economic development needs of South Africa to the country's negotiators at a variety of international forums. The motive of DTI is to open markets for South African products. DTI also faces the following constraints: though there are environmental laws and schemes to assist industry, there is currently no consistency on the enforcement of environmental laws by government, as well as serious technology and financial barriers to use new technologies. .

5.3 *Lack of human capacity, legal and financial capabilities*

81. Climate change policy cannot successfully be implemented in isolation from the main socio-economic and development policies of the South African government. However there is no adequate information, knowledge and capacity on climate change and its relations with sector policies in departments. Furthermore there is no commitment to integrate climate change policy into sectoral policies, and no capacity to co-ordinate actions with DEAT and other departments. This situation is further exacerbated by a lack of general institutional or legal provisions to check consistency between sector policies and the climate change policy objectives. The lack of financial resources is reflected under the current economic circumstances of the South African budget and general financial constraints, which make it difficult to implement policies that are appropriate for South Africa given its international obligations and objectives of government to pursue sustainable development. This further makes it difficult for the

government to provide the institutional and management capacity for dealing with climate change policy at the required levels in the short term.

82. Overcoming these barriers is a challenge which requires putting in place suitable policies so that South Africa is able to access opportunities offered by climate change. However identifying barriers and the extent to which they hinder convergence between sustainable development and climate change is one of the key issues for South Africa towards realisation of an equitable climate change regime. Some of these issues are raised in the following section.

6. Key issues for South Africa after the Kyoto commitment period and beyond

83. The two important issues for South Africa in the climate change debate are:

Ensuring that South Africa is prepared to take opportunities by actively attracting climate change related projects;

Ensuring convergence between sustainable development and climate change;

6.1 Preparing South Africa to attract opportunities from climate change

84. South Africa is not ready to deal with climate change and attract opportunities in comparison with some of the key developing countries. At the moment South Africa will benefit from the CDM. Involvement in the CDM imposes a number of management and policy requirements on South Africa. These requirements include institutional, human and financial resource capacities, which will need to be addressed for successful engagement with the CDM. However the problem is that key people and government departments such as DTI are yet to internalise CDM as an investment and trade issue. Moreover, potential project developers are not equipped sufficiently to develop projects (Rukato et al 2000). Also, DEAT is yet to develop a domestic regime for CDM. . In general, South Africa has not fully seen the CDM as a business opportunity. Therefore South Africa needs to prepare itself at least in three areas viz; developing an institutional framework to deal with climate change/ CDM; capacity building; and policy development.

6.1.1 Developing an institutional framework

85. Maximising the opportunities of the CDM for South Africa depends on the existence of appropriate regulatory frameworks and public institutions. To this end South Africa should consider the following

Establish a CDM office, which should be located within the Department of Environmental Affairs and Tourism (DEAT). This office should assist project developers who can then provide the institutional momentum required to develop an environment that is conducive to CDM project investment;

Strengthen the existing National Committee on Climate Change (NCCC). Given the complexity of the climate change debate and the need to involve stakeholders, the existing NCCC should be expanded and strengthened.

Stronger commitments from other relevant departments, including the Department of Minerals and Energy, the Department of Trade and Industry and the Department of Finance towards climate change.

6.1.2 Capacity building

86. The adverse effects of climate change on South Africa, as well as the opportunities which are presented under mechanisms such as CDM, would require adequate capacity to respond to these issues in a strategic manner (de Wit 2000). Government departments as well as project developers require capacity in awareness raising, providing technical support and guidance to CDM pilot projects, assisting project developers with project identification, design and implementation. In addition to problems with the conceptual approach, there are low staffing levels and high workloads within the DEAT, which make it difficult to devote sufficient attention to the CDM concerns (Rukato et al 2000).

6.1.3 Policy development

87. One of the effects of the political isolation of South Africa up to 1994 has been that few resources were directed towards the issue of climate change. As a result, the country's policy makers have had to catch up on much lost ground both in political processes surrounding the issue of global change and the substantive implications of such change for the country in general and the energy sector specifically.

88. Since South Africa has ratified the UNFCCC, the country has obligations and is presented with opportunities under the FCCC and the Kyoto Protocol². To meet these obligations and capitalise on opportunities the right supportive policies should be in place.

89. Presently, South Africa needs a policy and a strategy to deal with its energy-intensive economy and a strategy to ensure fair distribution of credits and other benefits from CDM projects.

6.2 Ensuring convergence between sustainable development and climate change

90. The CDM falls under the UNFCCC, which is aimed at the reduction of human-induced climate change within the broad goal of sustainable development. Therefore although in many respects the CDM can be seen as an investment-based mechanism, South Africa's policy and institutional response to the CDM should not only be located within the context of investment promotion but also within the context of the country's sustainable development policies. This latter point is especially relevant to Article 12 of the Kyoto Protocol, which states that the purpose of the CDM shall be to assist non-Annex I parties in achieving sustainable development and in contributing to the ultimate objectives of the Convention. This implies that the use of the CDM should fit in within sustainable development objectives of South Africa as well as within the country's climate change abatement policies.

2. Obligations are most notably: under the FCCC, Articles 4.1 (all but (g)), 5(a) and (b) and 12, and under the Kyoto Protocol, Articles 10(b) and 18. Opportunities are most notably: under the FCCC, Articles 4.3, 4.4, 4.5, 4.7, 4.8, 4.10, 5(c), 11.2, 11.5, 12.4, and 12.7, and under the Kyoto Protocol, Articles 3.14, 10(c), 10(d), 10(g), 11(b), and 12.

7. Prospects of developing synergies

91. There are some on-going initiatives by the government that offer some possibility for achieving synergies between climate change and sustainable development. The DME and the National Energy Regulator have developed policies with a specific emphasis on sustainable energy projects for implementation when the restructuring of the electrical distribution industry is completed and independent power producers have been established.

92. Several initiatives are ongoing to introduce natural gas into South Africa. Pre-feasibility studies are in progress to evaluate the use of gas from the Kudu gas field off the coast of Namibia to power a combined cycle gas turbine power station to be located in the Western Cape, as well as to establish new industries along the pipeline. Furthermore, agreements have been signed between the Mozambican government and the chemicals group, Sasol, to pipe natural gas from the Pande and Temane gas fields to Sasol Secunda plant by 2004. Sasol is likely to use the gas in three ways: as a supplementary feedstock to coal at an expanded Sasol Synthetic Fuels plant in Secunda; to replace coal as a feedstock at the Sasol Chemical Industries plant in Sasolburg, if a feasibility study proves positive; and to expand its existing pipeline gas market (Sasol, 2000).

93. A draft Gas Bill has been developed, which outlines the conditions for licensing the construction, operation and trading for transmission, distribution and storage of piped natural gas.

94. With regards to renewable energy, the White Paper on Energy Policy specifically supports renewable energy initiatives. It states that the government will encourage competition within energy markets, will provide focused support for the development, demonstration and implementation of renewable energy sources for both small and large-scale application, and will support renewable energy technologies for application in specific markets on the basis of researched priorities. The DME has recently issued a renewable energy strategy, which appears a good starting point despite the difficulties ahead.

95. The DME acknowledges that the issues addressed by the Kyoto Protocol could threaten as well as provide opportunities to the South African energy economy. As a result the DME has commissioned a study on “threats and opportunities of the implementation of global environmental issues with regard to South Africa’s energy economy”. With this project, DME intends to achieve the following:

Identify and quantify threats to South Africa’s energy exports and imports;

Identify and quantify other threats to minerals and energy, for example controls on non-carbon dioxide gases, in particular cooling systems in the mining industry and insulating gases in the electricity sector;

Identify and establish the procedures for utilising environmental funding including the Clean Development Mechanism;

Further develop the policy stated in the Energy White paper as pertains to the global environment.

8. Conclusions

96. Whilst it is unlikely that binding commitments will be applied to developing countries, it is possible that intermediate emission reduction or stabilization goals will be negotiated in the future for middle-income and more carbon-intensive developing countries such as South Africa.

97. This paper has outlined some of the steps South African government has taken to link sustainable development with climate change issues. However, there are major priorities of the government such as equity among races and job creation. These factors will dominate the government's position for the immediate future. The challenge is how to link these objectives with climate change and sustainable development objectives. This could be achieved by further work on these areas:

Helping South Africa identify and overcome barriers to integrate sustainable development and climate change;

A study on "How much sustainable development can be expected from the CDM?" in South Africa;

Work on developing sustainable development criteria for South Africa, for use in approving CDM projects;

Quantifying the "co-benefits" of CDM projects -- job creation, improved health, reduced local air pollution;

Create an energy-economy-environment model;

Analysis of renewable energy potential and achievable targets;

Policies and strategies to help South Africa move to a low carbon intensive economy;

Analysis of impacts of climate change international policies on the economy.

REFERENCES

Afrene-Okese Y.1998. Scenario developing for domestic energy demand projections. Energy and Development Research Centre: University of Cape Town.

Bouille D & Metz B. 1998. Assessment of South African Climate change Policy Programme. United Nations Development Programme.

The Constitution of the Republic of South Africa (Act 108 of 1996)

Davidson O R.1999. Energy initiatives in Africa for cleaner development. UNDP, New York.

Davidson O R. 2000. Energy security in Africa: Opportunities from the climate change debate. Globe Publication "Energy Security in Africa.

Demana T. (Director for standards and environment DTI). 2001. Personal interview.

Department of Environment and Tourism. 2000. Climate Change: South Africa's Initial National Communication under the United Nations Framework Convention on Climate Change.

- Department of Environmental Affairs and Tourism. 1998. Discussion Document on Climate Change. Department of Environmental Affairs and Tourism.
- Department of Environmental Affairs and Tourism. National environmental Management Act (Act No 107, 1998), Pretoria.
- Department of Arts, Culture Science and Technology. 1999. Energy: The National Research and Technology Foresight Project; Department of Arts, Culture, Science and Technology.
- Department of Minerals and Energy. 1998. White paper on Energy policy for Republic of South Africa. Department of Minerals and Energy.
- Department of Environment and Tourism. 1997. White Paper on Environmental Management. Pretoria.
- Department of Minerals and Energy 2000. Call for proposals on threats and opportunities of the implementation of global environmental issues with regard to South Africa's energy economy.
- Department of Minerals and Energy. 1996. Energy in South Africa. Pretoria
- De Villiers M G, Howells M I & Kenny A R. 2000. Sustainable energy for South Africa. Energy Scenarios from 1995 to 2025. Energy Research Institute, University of Cape Town.
- Eskom 1997. Integrated Electricity planning 6. Sandton: Eskom
- Forum for economics and the environment. <http://www.env.econ.com>
- Howells M. 2000. SA Country studies: Baselines and Greenhouse Gas Mitigation Options for Bulk Energy Supply. Energy Research Institute, University of Cape Town.
- International Energy Agency (IEA): Key World Energy Statistics, 1999.
- Luboyera F (Assistant Director at DEAT 2000). Personal interview.
- <http://www.environment.gov.za/earthsummit2002/background.htm>. Earth Summit 2002
- Helio International 2000. Guidelines for observer-reporters. November 28. [Http://www.heliointernational.org/anglais/reports2000html](http://www.heliointernational.org/anglais/reports2000html)
- Kotze, P.E.; R Coetzee, J.H.Hall and associates (2001): How will the responses of the developed countries to the United Nations' Framework Convention on Climate Change affect South Africa? The National Economic Development and Labour Council (NEDLAC), Johannesburg.
- Mavhungu J. N. 2000. Poverty tariffs. Masters thesis. Energy and development Research Centre: University Of Cape Town.
- Rukato H, Wamukonya N & Spalding_Fecher R. 2000. Clean development Mechanism Capacity Building Project for South Africa and Southern Africa 2000-2002. Project Proposal submitted to Shell Foundation.
- SASOL Press release, November 2000
- SSA (Statistics South Africa) 1996. The people of South Africa: population Census. Pretoria.

- Tyani L. 2000. Energy efficiency in a restructuring electricity distribution industry in South Africa: Analysis and policy strategies. Masters theses. Energy and Development research Centre. University of Cape Town.
- Tyani L. 2001. NGO workshop reports on Earth Summit III. Energy and Development Research, university of Cape town
- Van Horen C. 1995. Energy-environment research in southern Africa: problems and priorities. Energy and Development Research Centre, University of Cape Town.
- Van der Merwe M R & Scholes R J. 1998. South African Greenhouse Gas Emissions Inventory for the year 1990. South African Country Studies on climate change.
- Van Seventer D E N. 2000. The potential impact of international protocols and agreements regarding climate change on South African coal export and hence on Eskom. Consulting economist Johannesburg.
- Wamukonya N & Spalding-Fecher R. 1999. The Convention on Climate Change, Kyoto Protocol and South Africa: Obligations and opportunities. Energy and Development Research Centre, University of Cape Town.
- Wamukonya N & Tyani L. 2000. Positioning South Africa on the globe. Energy and development Research Centre; University of Cape Town.
- World Bank 2000. World development report 2000/2001. Oxford, Oxford University Press.
- World Energy Council (WEC). 1998. South African Energy Profile 1998. SANEA Sandton: South Africa.