



edtea

Department :

Economic Development, Tourism and
Environmental Affairs

PROVINCE OF KWAZULU-NATAL

*KwaZulu-Natal
Economic
Development,
Tourism and
Environmental
Affairs (DEDTEA)*

Draft Climate Change Action Plan

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Executive Summary

The overwhelming scientific consensus is that human-induced climate change is among the most pressing environmental and social problems facing this generation and those to come. Global climate varies naturally, but scientists agree that rising concentration of anthropogenic produced greenhouse gases (GHG's) in the atmosphere are leading to changes in the atmosphere. The effects of Climate Change have already been observed and scientific findings indicate that precautionary and prompt action is necessary.

While climate change is a global problem influenced by an array of interrelated factors, climate change is also a local problem with serious impacts foreseen for our country South Africa as well as this Province of KwaZulu-Natal. Acknowledging the overall vulnerability of South Africa to climate change impacts, it will thus be necessary to carry out mitigation and adaptation measures in this country including our Province of KwaZulu-Natal.

The National Climate Change Response White Paper, which was released in October 2011, presents the South African Government's vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society. South Africa's response to climate change has two objectives.

- 1) Effectively manage inevitable climate change impacts through interventions that build and sustain South Africa's social, economic and environmental resilience and emergency response capacity;
- 2) Make a fair contribution to the global effort to stabilize GHG concentrations in the atmosphere at a level that avoids dangerous anthropogenic interferences with the climate system within a timeframe that enables economic, social and environmental development to proceed in a sustainable manner.

The Department of Economic Development, Tourism and Environmental Affairs is committed to lead the response to climate change in partnership with other spheres of Government, research institutions, industry and the community of the Province of KwaZulu-Natal. The commitment entails minimizing or eliminating the risks to the impacts of climate change. This will be achieved by developing an action plan and hence ensuring its implementation. Both scientific and technological means shall be employed to define mitigation and adaptation measures. Capacity building and empowerment of all shareholders shall be undertaken as part of all climate change response activities.

1. Introduction

1.1 The science of climate change

The rate of human-induced change is unprecedented. There is now unequivocal evidence that human activities are affecting the Earth's system at the global scale. Increasingly strong evidence suggests that the functioning of this system is changing in response. Global change is more than climate change. Global change refers to any changes in the Earth system. The Earth system encompasses the climate system, and many changes in Earth system functioning directly involve changes in climate. The Earth system includes, however other components and processes, bio-physical and human, which are important for its functioning. Some Earth system changes (see Table below), natural or human-driven, can have significant consequences without involving any changes in climate.

Global change does not operate in isolation but rather interacts with an array of natural processes and human-driven effects in complex and multidimensional ways; at local, regional and global scales.

Climate change is “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (United Nations Framework Convention on Climate Change).

Global warming refers only to the overall warming of the planet, based on average increases in temperature over the entire land and ocean surface. It is important to note that climate change is more than simply an increase in global temperatures; it encompasses changes in regional climate characteristics, including temperature, humidity, rainfall, wind, and severe weather events, which have economic and social dimensions.

1.2 Impacts of climate change

Climate change is expected to negate decades of progress and undermine the hard-won development gains made in many regions of the world. According to the latest Intergovernmental Panel on Climate Change (IPCC) findings, the world is already facing an inevitable increase in average temperatures by 0.5°C to 1°C until approximately 2035, after which positive change will accelerate and approach a 2°C increase (relative to 1990 levels) by 2050.

Natural variability, namely that which occurs regardless of human activity, may act to dampen or amplify these projected changes. The consequent biophysical and socio-economic changes that are expected are varied and are, in part, contingent on the type, frequency, intensity, duration and distribution of climate-induced hazards that can be expected even under relatively modest scenarios of climate change. According to the recent Stern Review (Stern, 2006), a warming of 2°C is likely to result in the extinction of 15-40% of all species, a 3°C or 4°C change in temperature will result in millions of people being displaced due to flooding, while a warming of 4°C or more is likely to seriously affect global food production.

1.3 National climate change policy

The science of Climate Change remains an evolving one with more researches still being conducted and more agreements still being ratified at the annual international conferences which our country is part of. The National Climate Change response strategy already gazetted and highlights that in terms of climate change mitigation objectives and national development objectives; the main priority (for South Africa) is to shift from an energy intensive economy into a climate friendly. Four major areas with the largest mitigation potential have been identified and these are 1) energy efficiency, 2) electricity generation, 3) transport and 4) carbon capture. The National strategy further indicate, based on the country's climate change adaptation and national implementation strategies and action plans that; there is a need for the short-term prioritisation of adaptation interventions that address immediate threats in water, agriculture and health sector (the key sectors) as well as the other sectors identified to be more at risk.

Guided by these principles the province need to implement a plan that extensively address the impacts of climate change through scientific and technological means based on mitigation, adaptation and increased awareness to vulnerable sectors and communities.

Climate Change programmes are based on two major approaches:

- Adaptation to climate change effects
- Mitigation of climate change effects.

Adaptation is a response to climate change that seeks to reduce the vulnerability of natural and human systems to climate change effects hence the department has conducted the provincial vulnerability study. Clearly from this study the adaptive capacity of the KwaZulu-Natal society is closely linked to social and economic developments.

On the other hand, mitigation in the context of climate change (according to the United Nations), is a human intervention to reduce the sources or enhance the sinks of greenhouse gases. We can only set reduction targets and monitor progress once we know or have a picture of how much is emitted by which sector (baselines). As a result countries are expected to estimate greenhouse gas inventories and report to the UNFCCC. This then requires Provinces to also estimate their own greenhouse gas inventories and feed into the national reporting in order to give a complete picture of the country's emissions profile. In accordance with the UNFCCC reporting requirements the greenhouse gas emissions (GHG's) requires the collection of activity data from a variety of sectors and sources by the Climate Change component. These are the Energy sector, Industrial processes and product use (IPPU), Agriculture Forestry and Land use (AFOLU), Waste, and the Transportation sector. This is a comprehensive process that requires special skills, human capacity and enough budgets.

2. Current status quo

2.1 Defining mitigation baselines

2.1.1 Regulatory scope

The United Nations devised the Climate Change Convention whose objective is to ensure the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level would be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate

change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner” (United Nations, 1992).

The Convention recognised that climate change impacts and policy priorities differ for developed and developing countries and adopted a common but differentiated approach to responsibilities. It identifies Annex 1 countries (developed countries or those whose economies are in a state of transition) and non-Annex 1 countries (developing countries). The South African government ratified the UNFCCC in August 1997 as a non-Annex 1 country.

Article 3 of the Convention sets out principles upon which the common but differentiated approach is based and includes agreement that the Parties “take precautionary measures to anticipate, prevent or minimize the cause of climate change and mitigate its adverse effects. Where there are serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures, taking into account that policies and measures to deal with climate change should be cost effective so as to ensure global benefits at the lowest possible cost”. The principles include the following:

- Climate change is a global problem and must be approached globally but the developed countries must at present, accept the main responsibility for addressing the issue.
- Developed countries should provide financial assistance and technology to developing countries to help them respond to, mitigate and adapt to climate change.
- Sustainable development and poverty alleviation must not be impeded by climate change policy but environmental damage must be minimized.
- Developing countries must be involved in all international climate change negotiations.

Article 4 of the Convention is concerned with commitments. All countries that have ratified the Convention are required to: (listing the first 5 requirements)

- develop, update and publish national inventories of anthropogenic emissions by sources and removals by sinks of greenhouse gases - the greenhouse gases exclude those listed in the Montreal Protocol ;
- formulate, implement and update national and regional programmes containing measures to mitigate climate change;
- promote and co-operate in the development and transfer of technology that controls, reduces or prevents anthropogenic emissions of greenhouse gases;
- promote sustainable management, conservation and enhancement of sinks and reservoirs of greenhouse gases;
- co-operate in preparing for the adaptation to the impacts of climate change; ...

According to Decision 17/CP.8,3 each non-Annex I Party shall, as appropriate and to the extent possible, provide in its national inventory, on a gas-by-gas basis and in units of mass, estimates of anthropogenic emission of carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) by sources and removals by sinks.

2.1.2 Global emissions profile

The current concentration of CO₂ in the atmosphere stands at 400 ppmv, and is continuing to rise. In order to remain within the global 2°C temperature target, the greenhouse gas concentration will need to stabilise at approximately 450 ppm CO₂e. The stabilisation target

could be achieved by following alternate emission pathways. A recent assessment (UNEP, 2012) shows that scenarios that meet the 2°C limit have global emissions in 2050 roughly 40% below 1990 emission levels and roughly 60% below 2010 emission levels. The medium range (50–66%) of probability of staying below the 2°C limit requires global emissions to peak before 2020. One of the suggested pathways shows that emissions need to peak around 2020, and decline progressively to reach the target emissions reduction by 2050.

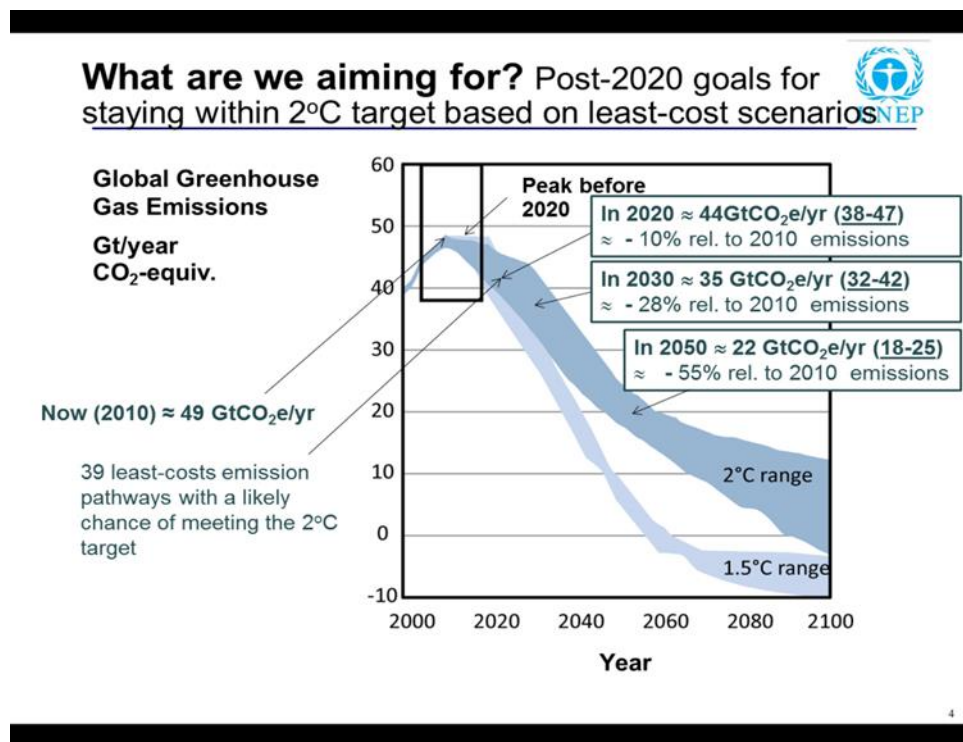


Fig.2.1.2.1 Greenhouse gas inventory for South Africa: 2000

2.1.3 Greenhouse gas (GHG) inventory for South Africa: 2000

Based on Article 4 of the Convention South Africa conducted a full national GHG inventory with base year 2000 on the major greenhouse gases in line with Decision 17/CP.8.3 focusing on six inventory sectors: Energy, Industrial Processes, Solvent and Other Product Use, Agriculture, Land-Use Change and Forestry and Waste as defined by the IPCC inventory guidance (IPCC 1997, 2000, 2003).

On the year 2000 GHG inventory baseline it emerged that South Africa is a carbon intensive economy which needed to shift to a carbon neutral one. Emissions in 2000 for the country were 461 million tonnes CO₂eq, the breakdown indicates that South Africa is an energy intensive economy; 78% - energy supply and consumption, 14% - industrial processes, 6% - agriculture, forestry and land use, 2% - waste

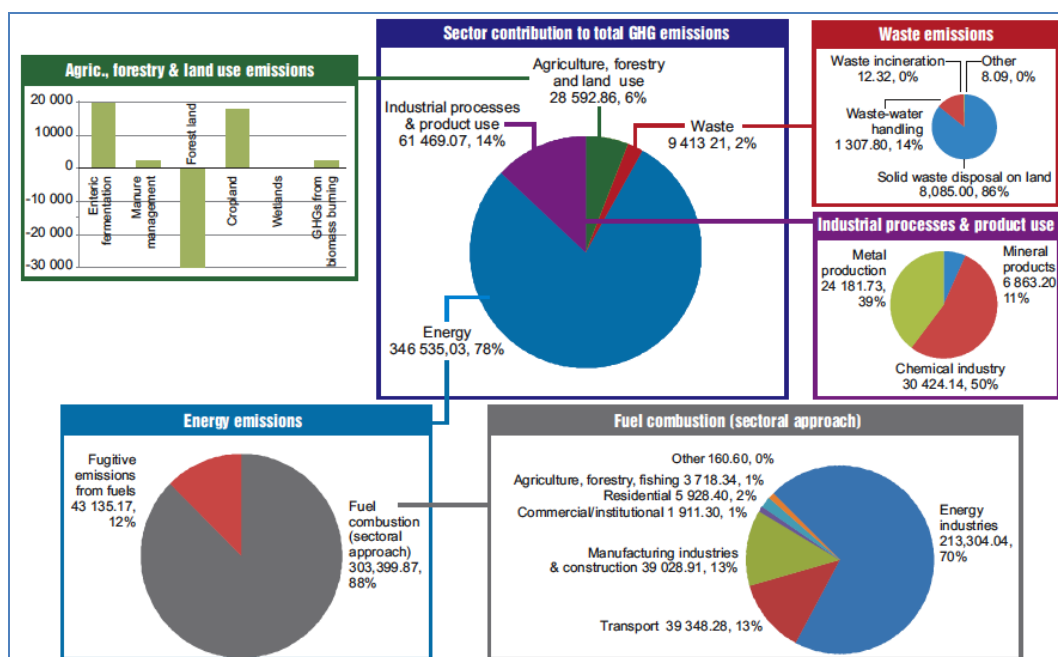


Fig. 2.1.3.1 South Africa's National GHG Emissions Inventory profile 2000

As a response South Africa committed itself to substantially reducing its GHG below its business as usual growth trajectory. The government's commitment to a low carbon economy was formally made at the Copenhagen Accord (2009) when it was stated that it would reduce its GHG emissions to 34% below its "business-as-usual" growth trajectory by 2020, and by 42% by 2025, subject to specified conditions.

South Africa's approach to mitigation should balance the country's contribution as a responsible global citizen to the international effort to curb global emissions with the economic and social opportunities presented by the transition to a lower carbon economy while successfully tackling its development challenges. This requires every sector (government and private) contributing to energy, industrial processes, agriculture-forestry & land use as well as waste emissions in the country to make commitments to contribute to the below business as usual Copenhagen Accord.

2.1.4 KwaZulu-Natal GHG emissions inventory

Preparations are underway for KwaZulu-Natal to undergo a baseline emissions inventory in order to determine the levels of greenhouse gas (GHG) emissions in the Province. This GHG emissions study will be prepared following the same guidelines and principles employed by the national department of environment affairs in compiling the third national estimation of GHG's for the country. This will be done as the Provinces contribution towards the UNFCCC requirement that all parties would have to develop, periodically update, publish and make available to the Conference of Parties, national inventories of anthropogenic emissions by sources.

The production and consumption of energy have been indicated to be responsible for a substantial share of the total emissions, globally and coincidentally nationally. This then necessitate a need to reduce these emissions through technological development and integrated solutions.

An inventory of greenhouse gas emissions requires the collection of information from a variety of sectors and sources. Based on the 2006 IPCC Guidelines the requirement is to

identify emission levels in the from a variety of sectors including Energy, Industrial processes and product use (IPPU), Agriculture Forestry and Land use (AFOLU), Waste, and the Transportation sector. The emphasis is on collecting emission levels of the main six greenhouse gases: CO₂, CH₄, and N₂O, all HFC's, all PFC's and SF₆, using the global warming potentials (GWP) in accordance with the UNFCCC reporting requirements for calculation of the CO₂-equivalent emissions and in-line with the IPCC Second Assessment Report (SAR).

Table 2.1.4.1: Six greenhouse gases as specified in the table together with their GWP based on the UNFCCC requirements (Sources: Greenhouse gas inventory for South Africa: 2000, p. 5)

Greenhouse gas	Chemical formula	1995 IPCC GWP
Carbon dioxide	CO ₂	1
Methane	CH ₄	21
Nitrous Oxide	N ₂ O	310
Hydrofluorocarbons (HFC's)		
HFC-23	CHF ₃	11 700
HFC-32	CH ₂ F ₂	650
HFC-41	CH ₂ F	150
HFC-43	C ₅ H ₂ F ₁₀	300
Perfluorocarbons (PFC's)		
Perflouromethane	CF ₄	6 500
Perflouroethane	C ₂ F ₆	9 200
Perflouropropane	C ₃ F ₈	7 000
Perflourobutane	C ₄ F ₁₀	7 000
Perflouroclobutane	c-C ₄ F ₈	8 700
Perflouropentane	C ₅ F ₁₂	7 500
Perflourohexane	C ₆ F ₁₄	7 400
Sulphur hexafluoride	SF ₆	23 900

In KwaZulu-Natal, GHG emissions inventory will be generated in order to obtain the status quo of GHG emissions in the Province, for the base year 2000. The information on the emissions will also play a major role in planning mitigation actions for the KZN Province. Stakeholders in the Province will be encouraged to provide greenhouse gas emission data voluntarily. Once completed, these inventories provide the basis for creating an emissions forecast and reduction target, and enable the quantification of emissions reductions associated with implemented and proposed measures. This is also done in order to improve the accuracy and reliability of data at the sectoral level. Annexure B attached, provides the project implementation plan for this purpose.

2.2 Defining adaptation baselines

2.2.1 Regulatory scope

Adaptation refers to the “adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial

opportunities” (IPCC 2007). According to the International Panel on Climate Change (IPCC) Fourth assessment report, adaptation strategies that are effective and/or suitable across sectors need to be prioritised; this is termed a Multi-Sectoral Approach.

It is therefore clear that a baseline vulnerability assessment for the country which identifies sectors at risk and their level of vulnerability should form a basis for adaptation. Vulnerability refers to the “degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC 2007). This has been achieved with the South African Risk and Vulnerability Atlas, mapping such multi-sectoral “hot spots” at a national level. The sectors that need immediate attention, as identified in the assessment are water, agriculture & forestry, health, biodiversity and human settlements. This process then needs to be taken further by concerned sector departments as identified by the assessment. In terms of adaptation, the Act then should be concerned with ensuring that sector departments develop sector plans aimed at ensuring prevention of any catastrophic incidents occurring in the sensitive areas already identified to be at risk, just because of a lack of proper safety nets and rehabilitation mechanisms in the “hot spot” areas.

2.2.2 KwaZulu-Natal vulnerability assessment study

A Status Quo Vulnerability Study of the Impacts of Climate Change in KZN Province was carried out by DAEARD in 2009. This study assessed the degree of vulnerability of sectors and affected geographical areas in KwaZulu-Natal. Observations indicated apparent increase in outbreak of fires during winter season and the extreme weather events such as floods and severe storms during the summer season. Climate projections for KwaZulu-Natal according to this study include continued warming, changes in precipitation patterns and a likelihood of an increase in extremes. Provincial modelling shows that an increase in temperature may lead the Midlands and the Drakensberg areas sensitive to change. We have recently observed the continuation of such events in some parts of the Province and more especially in the Midlands during the past winter season and in the current summer season. The study further indicated that the coastal belt may become more tropical and sub-tropical conditions may move inland. There have been measurable changes in sea level rise in KwaZulu-Natal and the effect of sea-level rise has already started to manifest itself through a number of storm events. Guided by these findings and other assessments done at an international and national level, our department has been and will be engaging in a number of interventions that seek action related to combating climate change impacts in the Province.

3. Management plan

3.1 Legislative tools/Regulatory instruments

SOUTH AFRICA’S CONSTITUTION

Section 24 of the Bill of Rights as contained in the Constitution of 1996

DEPARTMENT OF ENVIRONMENT AFFAIRS

The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

Section 29(1), read with section 57(1) have already been used by the current Minister of DEA to give notice of intention to declare the greenhouse gases as priority air pollutants and to

require a person falling within the specified category to prepare and submit for approval a pollution prevention plan.

***National Environmental Management Act of 1998
Chapter 3 of NEMA (EMPs)***

***National Environmental Management: Air Quality Act of 2004
Section 15 of NEMA: AQA (AQMPs)***

National Environmental Management: Waste Act, 2008.

***National Environmental Management: Integrated
Coastal Management act, 2008***

DEPARTMENT OF ENERGY

Electricity Regulation Act (2006): Establishes a broad level mandate for promoting EE measures and initiatives

Electricity Regulation Act – Compulsory Norms and Standards for Reticulation (2008): Calls for practises to support EE eg: lighting, smart metering & water heating

National Energy Act (2008): Provides legislative basis for number of EE related matters, including the introduction of EE regulation

National Energy Act – Regulations on the Mandatory Provision of Energy Data (2012): Intended to allow for the collection, collation and publishing of quality energy data and information by the DOE; and to provide for the type, manner and form of energy data and information that must be provided by a wide range of specified data providers.

National Energy Act – Allowances for Energy Savings (2011): Allows for a process for M&V to allow taxpayer to claim an allowance for EE from SARS, linked to Section 12L of the Income Tax Act, Act No 58 of 1962 (below).

Electricity Regulations on the Integrated Resource Plan (2011): Plan focuses on new generation capacity but calls for 3,430MW of energy savings by 2030

Draft Revision of Regulatory Rules for EE and DSM (2010): Outlines the regulatory framework for utility implementation of EEDSM & allocates this duty to Eskom.

Advanced Metering Infrastructure for Residential & Commercial Consumers (2008): Sets the standards for smart metering.

DTI – (SANS and NRCS)

SANS 10400XA (2011) Mandatory: National Building Regulations Part XA governing all new built buildings requiring them to comply with energy performance parameters

SANS 204 (2011) Voluntary: Sets construction standards for EE and energy use in the built environment, Reference document for National Building Regulations Part XA

SANS 50001 and 50010 Voluntary: 50001- Specifies requirements for an energy management system. 50010- Measurement and verification of energy savings - methodology for the determination of energy savings

3.2 Responsibilities/Regulatory authorities

PRESIDENCY

National Development Plan (2012):

Mitigation; Calls for a new path which is less carbon intensive making use of resources in a sustainable and strategic manner. States that transport infrastructure key to low-carbon economy. **Adaptation;** National Budget Review (2013) states that the NDP is to be a key guide for the funding and implementation of infrastructural projects.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS

Climate Change Response Policy White Paper (2011):

Adaptation; includes a risk-based process to identify and prioritise short- and medium-term adaptation interventions in sector plans. The sectors that need immediate attention are water, agriculture & forestry, health, biodiversity and human settlements.

Mitigation; EE is recognised as a primary short-term mitigation option available to the country and up scaling of EE as a primary medium-term mitigation option. Provides for EE and Energy Demand Management Flagship Programme.

DEPARTMENT OF TRANSPORT

Adaptation & mitigation; National Land Transport Act (2009): Promotion and prioritization of public transport and optimal use of available travel modes

National Land Transport Master Plan (2007): Promotes improved efficiencies in transportation

DTI and ECONOMIC DEVELOPMENT DEPARTMENT

Mitigation; Industrial Action Policy Plan (2012): Identifies significant opportunities to develop new green & energy efficient industries and related services in South Africa, and highlights that the country's manufacturing sector will need to improve its EE.

Mitigation; New Growth Path Framework (2011): Calls for 'comprehensive' support for EE Green Economy Accord: Commitment 4 of the accord focuses on EE and calls on private sector to effect EE pledges

3.3 Provincial structures

3.3.1 Provincial department of environmental affairs

a. Directorate: Environmental Planning & Coordination Services

Mission

We, in recognition of our stakeholders, will develop and maintain an environmental management strategy that supports sustainable livelihoods. In doing so, we as a team are committed to continual improvement, and by the demonstration of our expertise and professionalism, will render an efficient and effective service to our clients:

Be accountable

Promote equity in the context of local, national, regional and international obligations.

Vision

In pursuit of service excellence, we desire a holistic approach to sustainable environmental management practices and environmental stability for sustainable livelihoods.

b. The Sub-directorates

Environmental Planning, Governance & Information Management

Environmental Impact Assessment

Environmental Empowerment & Sustainable livelihoods

Coastal & Biodiversity Management

Pollution & Waste Management

Compliance, Monitoring and Enforcement

Air Quality & Climate Change

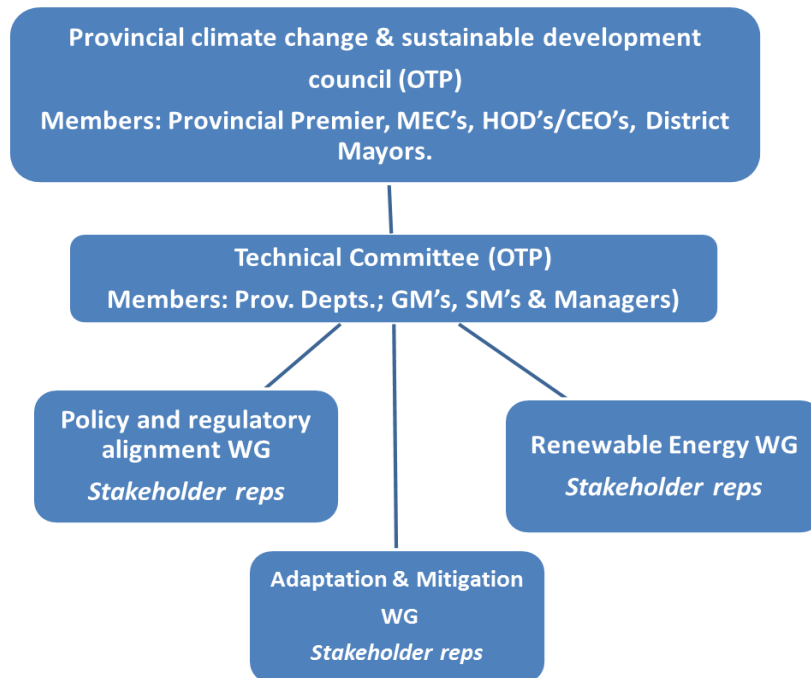
Invasive Alien Species Programme

c. Air Quality & Climate change

Climate change main key result areas

1. Monitor and evaluate the Provincial climate change response strategy implementation.
2. Provide Climate Change specialist inputs and scientific guidance, advice to clients, and stakeholders.
3. Oversee Climate change mitigation projects management and administration.
4. Promote co-operative governance amongst the various tiers of government, develop memorandum of understanding with other stakeholders on Climate Change.
5. Support Climate change education and awareness programmes.

3.3.2 KwaZulu-Natal Climate Change and Sustainable development council



During the KwaZulu-Natal Pre-COP 17 Climate Change Summit held on 26 – 27 September 2011, a resolution to establish and launch a Provincial Climate Change and Sustainable Development Council was adopted. This was in terms of responding to the effects/impacts of climate change in the Province, and also providing support to national government in meeting its emission reduction commitments.

The council was setup in order to provide administrative coordination that would ensure in the Provincial structures with respect to environmental resilience programmes and projects. In order to respond to the impacts of climate change urgently and without compromising socio-economic development in the Province the Council also coordinate activities that are geared towards effective and timeous management of climate change impacts as a priority.

4. Departmental interventions

4.1. Energy audit and its findings

Background

The department is seeking methods to reduce energy consumption by 10% at all offices and work stations it occupies. The core objective is to contribute to the energy conservation and to achieve best energy performance. The Department of Economic Development, Tourism & Environmental Affairs aims to rollout this project also to other government departments dependent on its success at its own office building and stocks.

The Report from the Energy Audit already conducted at the Cedara buildings on a site wide scale as well as on specific buildings, have determine mainly issues that affect consumption as well as sustainability. It further suggested the relevant recommendations to reduce consumption as well as to improve sustainability and retrofitting was one of these.

Prioritising / Phasing of Interventions

Three interventions were identified as critical to reducing energy consumption by the audit and needed to be implemented at once, these are:

- Re-energising the maintenance programme
- Sub metering
- Behavioural training programme

Together with the above three interventions, interventions with zero cost implications should be implemented immediately.

In the medium term a mix of initiatives can be carried out depending on available finances and the information that arises from more accurate time related metering information

Further Recommendations

1. Roll out of this energy audit process to other offices within the Department in KZN to understand and improve the Department's total energy consumption performance.
2. Further studies need to be undertaken once improved metering is installed to analyse the data collected and inform energy reduction initiatives.
3. Employ or contract someone to drive the energy reduction programmes at all provincial offices. Part of this responsibility needs to be lie with the FM team.
4. Develop a database for tracking asset performance. This will enable the department to take interventions where they will get the most for their money and the biggest improvements for the least effort.

4.2. Carbon Foot-print and its findings

A carbon audit (footprint) was conducted in accordance with ISO 14064-1. The overall footprint of Cedara, site of the KwaZulu-Natal Department of Agriculture and Environmental Affairs for the 2009 financial year is 8146 ton CO₂ equivalent.

Electricity consumption stands out as the primary contributor of GHG emissions at Cedara. It is responsible for 79% of the total carbon footprint. This is the case even with some gaps in the consumption data due to unavailable meter readings. This then means that electricity consumption could have accounted for more than 79%. It will be a good idea to therefore conduct an energy audit for Cedara as a way of taking the process forward and help identify factors that are main contributors to this high consumption and further recommend intervention measures. We further propose that the electricity meters be thoroughly checked and necessary calibrations made if needs be.

Business travel is the second contributor of GHG emissions at Cedara. It is responsible for 8% of the total carbon footprint. This only considered state owned and subsidized vehicle, the figure could have been higher than 8% with private on official vehicles as well as air travel included. These emissions can be reduced through a relook at the current Government travelling policy, e.g. promoting less individual travelling by employees instead travel in one vehicle as a group to and from a common destination. This reduces the number of vehicles travelling and hence significantly reduces the GHG emissions.

The DAEA could improve the GHG information management of Cedara by:

- Continuing to periodically update the carbon footprint;
- Periodic review of opportunities to improve the GHG information management process and identifying areas for reducing GHG emissions;
- Filling the existing data gaps in order to obtain a complete picture;

We believe that future carbon audits will complement the image of the DAEA and will provide a sound basis for reducing this footprint, as well as creating awareness around climate change.

4.3. Pilot renewable Energy Mix at Cedara

Background

The Department of Economic Development, Tourism and Environmental Affairs response strategy for Climate Change is guided amongst other things by the findings that the economic sectors responsible for over 80% of South Africa's GHG emissions include energy, industry and transport and that these sectors will be required to make a "significant contribution" towards mitigating climate change.

The Energy Efficiency Strategy for South Africa also sets a national target for energy efficiency improvement which embraces the energy conservation of 12% by 2015.

To achieve the goals set out in the Energy Efficiency Strategy, DEDTEA as a lead agent on Climate Change issues in the Province proposes energy reduction programmes to achieve Government's intended reduction of energy consumption by 10% at all offices and work stations used by Government institutions.

We believe the 10% reduction of energy will in the long term contribute to the conservation of the environment by reducing emissions. Renewable energy sources offer the potential for a clean, decentralized energy source that can significantly impact the countries greenhouse gas emissions.

Project objectives

The Renewable Energy Sources project was initiated in July 2009 at identified areas in Cedara, the main focus being at Environmental Management offices. This will serve as a demonstration platform on the feasibility and efficiency of alternative forms of energy. Among many alternative energy forms this project focused on; Solar Energy system, Wind Turbine System, and Heat Pump.

The first main objective of undertaking this project is to attain credible baseline information on such renewable energy technologies, this by implementing a small scale test project at identified areas in Cedara. Secondly is to create awareness on the possibility to utilize the natural resources (e.g. wind, solar or the sun) to generate energy to the Cedara community and those who come as visitors.



5. Response programmes

5.1 Adaptation actions

5.1.1 KwaZulu-Natal Climate Change Vulnerability Assessment Study

The erstwhile Department of Agriculture and Environmental Affairs commissioned a study to assess the province's vulnerability to the impacts of Climate Change in 2009. The vulnerability of major sectors was as follows:

Natural Systems

The extent to which natural systems would respond to a change in climatic conditions was examined as a primary study objective. The study has highlighted that KwaZulu-Natal's natural resource base is highly susceptible to change and there is reason to believe that ecosystem alterations may cause changes that will influence human-beings negatively. The study has highlighted that:

KwaZulu-Natal's natural resource base is already severely degraded. Human activities have reduced the variety of opportunities available and the continuing demand for land and resources to alleviate poverty and accelerate economic growth are lessening these opportunities. The extent to which the natural resource base would be able to maintain provincial productivity, even without climate change, is uncertain. The extent to which the natural resource base would respond to climate change is becoming clearer; the biggest risk is the uncertainty of thresholds.

Water Resources

The province's water resources are already under stress. Society's water requirements have already approached water availability limits. Changes in the province's rainfall patterns and water availability due to climate change are a severe threat to KwaZulu-Natal's future advances in poverty alleviation and economic growth. A further examination of these risks has shown that:

The stressed water situation in the Mvoti-Mzimkhulu Water Management Area makes it highly susceptible to adverse climate change impacts. This is exacerbated by the area's current susceptibility to flooding, land degradation and the high human vulnerability index;

The Uthukela Water Management Area is currently experiencing severe water poverty and the situation is expected to worsen. Natural variability in the climate has resulted in years of prolonged drought while regular flood events have been recorded in Ladysmith since the 1960's. There are water quality challenges and the irrigation sector demands more than 50% of the water in this area. A worsening situation is expected under conditions of climate change;

Local level risks within the Usuthu-Mhlathuze Water Management Area reflect the heterogeneity of its various catchments. The high degree of natural climate variability in the area makes it vulnerable under conditions of climate change. The severity of future impacts will probably depend to a great degree on extreme conditions but water shortages and poor water quality conditions may become worse; and

The high levels and densities of poverty in KwaZulu-Natal in combination with existing and projected threats of droughts and flood hazards is a high risk for the Province.

There are high levels of uncertainty associated with rainfall projections under conditions of climate change but the results of the most recent climate change scenarios include the following for KwaZulu-Natal:

- An increase in potential evaporation;
- The annual number of storm flow events will decrease;
- There would be an increase in recharge events;
- More variable stream flows are projected despite higher predicted flows overall;
- Stream flows will shift a month later in KwaZulu-Natal.;
- Sediment yields along the east coast will decrease; and
- There would be a higher relative irrigation water demand.

Biodiversity Resources

The future of KwaZulu-Natal's biodiversity resources is one of "disappearing climates" and "disappearing species" with severe changes in ecosystems and risks to society. A further examination of these risks has shown that:

Biodiversity extinction is already occurring. The rate is of concern. There is at least 700 species that we know about that are currently threatened;

Trends in the conservation status of vegetation types in KwaZulu-Natal are showing alarmingly rates of degradation, particularly along the coastal belt and inland from the south coast. This is expected to continue over the short term. Climate change will exacerbate the situation. Ecosystems that "absorb" the shocks of natural extremes such as floods may lose their resilience;

A shift in bio-climatic zones will cause ecosystem shifts and alterations;

Cold-adapted species in the Drakensberg will have to prepare themselves for warmer conditions. We are not sure whether they would be able to adapt;

Current land degradation in the midlands of KwaZulu-Natal is hindering conservation efforts to create migratory pathways for species that may not survive higher temperatures;

The potential increase in warm sub-tropical and tropical areas in the coastal areas of KwaZulu-Natal may improve land production potential. However, there is a risk of increase in human diseases as species will expand their ranges. Pathogens may find new hosts and ways to transmit diseases to humans;

The predicted distribution of forests under projected future climatic conditions include a decrease in forest habitats in the north-eastern parts of the Province and an increase in forests on the south coast of the Province. However, the current state of land degradation will not allow these forests to migrate;

Modelling to predict species responses to climate change shows that the species-richness "hotspot" that currently existing in KwaZulu-Natal would completely disappear in the future; and

There are few uncertainties as regards the vulnerability of natural ecosystems. We are however, unsure where the “tipping point” may be.

Fire Regimes

KwaZulu-Natal’s fire regime is expected to change under climate change conditions. A further examination of these risks has shown that:

KwaZulu-Natal’s ecosystems are dependent on fire but fire has turned into a provincial hazard because of incorrect use and an increase in uncontrolled burning practices. These practices have negative ecological effects; contribute to greenhouse gas emissions and causes significant socio-economic losses;

A shift in bio-climatic zones due to climate change will result in ecosystem changes which may in turn influence vegetation structure. This may change the behaviour of fire;

Potential warming and changes in frost patterns in the Drakensberg areas may influence the onset of the fire season;

Fire seasons may change in a future climate because of extreme rainfall events;

The frequency of “Bergwind” events could increase; and

The lack of adequate fire data urgently needs attention.

Marine and Coastal Zone

KwaZulu-Natal’s coastal zone is already under severe stress due to coastal erosion. A continuation of the existing situation and the added effects of potential climate change is a high risk for the province. A further examination of these risks has shown that:

Changes in sea level rise have already been observed. The sea level rise in Durban has been 2.7mm/year in 33 years;

Recent storm events on the coast have caused significant damage. The March 2007 storms alone caused property damage to the amount of approximately 250 million rand;

The increase in coastal storm events is believed to be a definitive indication that change has started. It is expected to continue;

The south coast is particularly vulnerable to coastal erosion. It is also the area with the highest flood hazard and the highest climate-human vulnerability risk in South Africa; and

Low-lying areas on the north coast will also be affected by climate change and sea-level rise.

Agricultural Sector

The extent to which climate change induced variations in the natural resource sectors would affect the agricultural sector demonstrates the interdependence of humans and the environment. A further examination of risks in agriculture has shown a sector that is highly susceptible to climatic changes:

Climate change will cause geographical shifts in specific climate zones. In KwaZulu-Natal this may mean a net loss of cold to moderate climatic zones and a potential increase in warm sub-tropical and tropical areas. The effects may be positive and/or negative;

Agricultural production will change in a future KwaZulu-Natal – production areas will shift and productivity will be altered. Agricultural opportunities will be gained in some areas while other areas will become the agricultural “losers”;

There may be a shift in the production areas and a net loss in production of basic “food security crops” such as cabbage and dryland maize;

Climate change may cause a net gain in potential growing areas for sweet potatoes (another basic “food security crop”);

Food insecurity in the Zululand, Umkhanyakude, Ugu and uMgungundlovu District Municipalities may be worsened by climate change impacts;

The decline in agricultural production potential in the south coast coincides with the high-risk areas in terms of water and biodiversity changes;

The results of the most recent climate change scenarios project a lowering of the water table. This will influence crop yields and increase irrigation demands; and

Ecosystem alterations may result in new pests and diseases – modeling shows that codling moth and spotted stem borers may increase their distribution ranges into KwaZulu-Natal under climate change conditions. The latter is a risk to provincial sugarcane production.

Health Sector

The extent to which climate change induced variations in the natural resource sectors would affect the health sector signifies a serious provincial risk. The study has highlighted how susceptible this sector is to changes in the climate, water and ecological systems:

KwaZulu-Natal has the highest human vulnerability to climatic events in South Africa. It is expected to worsen;

Extreme weather events over the last decade have impacted on communities negatively, causing damage to properties, displacements, injuries and event-related deaths. An increase in the frequency and intensity of extreme events is expected;

Food insecurity due to climate change will lead to decreased nutrition and an increase in disease;

Ecosystem alterations may cause species shifts – malaria and bilharzia ranges may expand due to suitable climatic conditions. Less well-known mosquito-borne viruses such as rift valley fever and dengue may become more prevalent if conditions are suitable (outbreaks after above average rainfall and warm weather); and

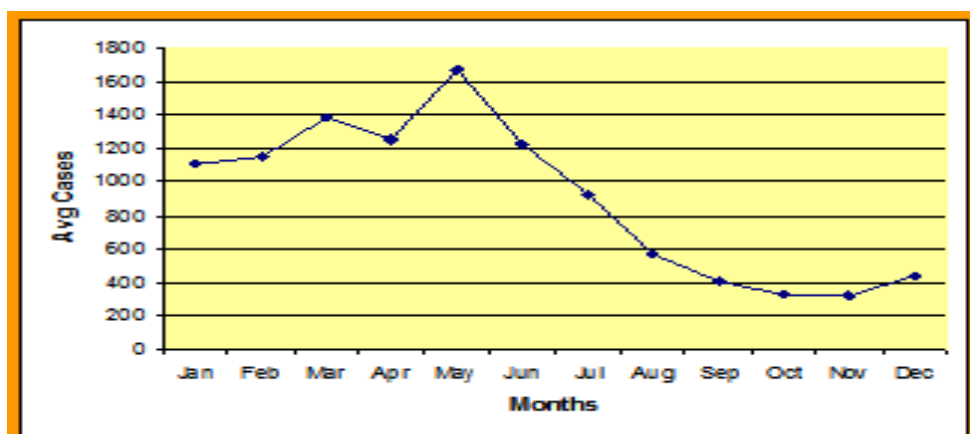


Fig.5.1: Average malaria cases per month in KwaZulu-Natal illustrating how climate may drive inter-seasonal variation in malaria incidence (Source: Department of Health, 2008)

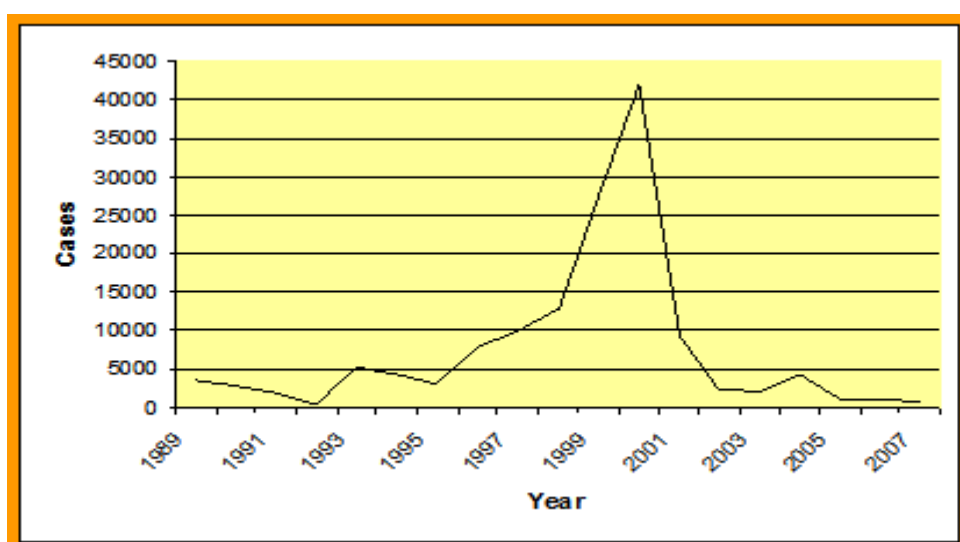


Fig.5.2: Total malaria cases in KwaZulu-Natal for the period 1998 to 2007 (Source: South African Department of Health, 2008)

- Ecosystem alterations may cause the emergence of new infectious diseases – zoonotic transmissions (e.g. avian influenza, rabies and mad cow disease) may increase when climate changes and biodiversity diminishes.
- Evidence is growing that climate change will influence cholera outbreaks.

5.1.2 Proposed adaptation measures by sector

Table 4.1.2.1: Proposed adaptation measures by sector

Sector and responsible entity	Adaptation option
Natural Systems EKZN, DEDTEA	<ul style="list-style-type: none"> • Climate change projections need to feed into sector long-term management plans. • Building partnerships to enable effective management of areas not under formal protection, and investment in the expansion of key protected areas. • Increasing awareness of the value of using biodiversity in assisting societal adaptation to the adverse impacts of climate change.

<p>Water resource</p> <p><i>DWA, Municipalities</i></p>	<ul style="list-style-type: none"> • Sector-specific strategic adaptation to longer term climate changes include enhanced water storage capacity and increased water supply for the water sector, as well as improved catchment management (e.g. removal of invasive alien species). • Expanded rainwater harvesting, water storage and conservation techniques, water reuse, desalination, water-use and irrigation efficiency. • Water conservation (WC) and water demand management (WDM) strategies are becoming a fundamental part of adaptation at the household level. • Improved understanding of South Africa's water balance, water demand management, as well as strengthening engineering and community based capacity to respond to new water supply challenges. • DWAF (2008) states that priority needs to be given to developing robust strategies to ensure that demand matches supply, even where water availability is reduced. • Institutions need to encourage appropriate technology that range from large-scale water provision for economic growth through to micro-level processes to provide water to rural development.
<p>Fire Regimes, Forestry</p> <p><i>DAFF, COGTA, Local authorities</i></p>	<ul style="list-style-type: none"> • Fire frequency and intensity is likely to increase due to the increase in dry spells and temperature. The commercial forestry industry may respond through the combination of pro-active fuel reduction and re-active fire fighting, but this will certainly increase production costs. • The mitigation potential of the forest-wood sector in South Africa is widely undeveloped, and can be increased by carbon sequestration in forests on previously not-afforested areas, carbon sequestration in wood products, an increased forest biomass use for energy production, and also by a further reduction of the carbon footprint of forest operations and timber transport. • A 'multiple benefits' approach must be considered. Such an approach should be able to provide an optimal portfolio of land-use forms in an area which could integrate production, environmental, climate change adaptive, sequestration and mitigation objectives and socio-economic aspects for sustainable landscape management. • Alternative forms of silviculture, such as mixed species forests, agroforestry, and the use of adapted indigenous tree species could yield more resilient forests in areas where site development uncertainty is high or water use restrictions prohibit use of fast growing plantation species.
<p>Agriculture</p> <p><i>DARD</i></p>	<ul style="list-style-type: none"> • Shifts in crop calendars and the switching of crops. • Soil, water and nutrient conservation practices. • Improved land management, such as erosion control. Switch to more resilient livestock production systems. • Switch to more resilient livestock production systems. <p>It is important to note that climate change impacts may make agriculture increasingly unfeasible as a livelihood strategy for the rural poor. This must be taken into account in developing policy and strategy for the emerging agriculture sector.</p>
<p>Health</p> <p><i>DOH</i></p>	<ul style="list-style-type: none"> • Adaptations are urgently needed that will guarantee adequate and reasonable healthcare delivery services – addressing all aspects of South Africa's complex health burden, not merely the impacts of climate change. • Improved housing and infrastructure in both rural and urban communities should particularly aim to reduce risk of water-borne disease, exposure to indoor pollution, and support of existing public health infrastructure initiatives. • Efficient and effective meteorological, water and air quality monitoring services are an essential component of an early-warning adaptive and disease mitigation strategy. • Primary health activities for disease prevention as well as the collection and dissemination of health information.
<p>Marine and coastal zone</p>	<ul style="list-style-type: none"> • Primary health activities for disease prevention as well as the collection and dissemination of health information.

Prov.-DEA, EKZN, Municipalities	<ul style="list-style-type: none"> • Conduct inventory and map coastal and near shore resources and processes (e.g. beaches, soils, bio-diversity), including baseline inventories against changes which can be monitored and coordinated, • Develop and implement integrated coastal integrated catchment and management adaptation measures to increase the resilience of coastal systems, foreshore protection measures including revegetation and establishment of set-back zones.
Municipality and Planning COGTA, Municipalities	<p>Although national and sectoral policies and plans guide and direct climate change responses, real, on the ground climate change mitigation and adaptation will be pioneered and driven by local municipalities.</p> <ul style="list-style-type: none"> • Describe and prioritise what adaptation interventions must be initiated, who should be driving these interventions and how implementation will be monitored. • Incorporate climate information into all municipal plans • Comply with obligations as per the Disaster Management Act, veld and forest fire management. • Avoid building in floodline areas; and investigate possible revisions to flood line estimations. • Investigate and prioritize existing and planned strategies and actions that indirectly support climate change adaptation. • Design and maintenance of stormwater infrastructure. • Demand-side water management • Municipal developments to include water and energy savings • Local Economic Development strategies that incorporate climate realities

5.2 Mitigation actions

5.2.1 Setting provincial GHG reduction targets for KwaZulu-Natal

Analysis of GHG emissions per capita indicated that South Africa ranked among the world's biggest GHG emitters per capita. Graphs portrayed a relationship where in the past few years, there was a steady increase of both South Africa's GDP per capita as well as their CO₂e emissions. From 2007-2009, GDP per capita and emissions were equal to one another. Some options for intervention included the use of legislative regulations that prescribed certain outcomes or the use of target outputs that limited entities to certain standards. Taking into consideration that Kwazulu-Natal contributes 16% towards the country's GDP per capita (Census 2011) we can safely ASSUME that KZN accounts for 16% of the national GHG emissions currently.

Since the Provincial GHG emissions baseline is yet to be developed through the GHG inventory, the targets set with the foundational programmes will be aligned to the national targets aimed towards deviation business as usual (BAU). KwaZulu-Natal will target to reduce about 16% of the national targets set.

5.2.2 Proposed mitigation measures and targets

Table 5.2.2.1: Proposed mitigation measures and targets for KwaZulu-Natal

Responsible entity & available regulatory tools	IPCC Guidelines Sector	Mitigation programme	Target requirements	2020 National Target	2020 Province Target
DoE, NERSA, Eskom	Energy	Lower CO ₂ ELECTRICITY SUPPLY	Expanded low-carbon electricity supply prog – regulation / incentives in electricity sector	5%	Not applicable
DoE, Eskom, NBI - Current DSM prog, EE Strategy, EE Accord, NEEA	Energy	INDUSTRIAL Energy efficiency	Full implementation of current EE strategy, plus additional accelerated progs	8.0%	Not applicable
DoE, Eskom, NBI, DPW, local authorities - current DSM prog, EE Strategy, EE Accord, NEEA	Energy	COMMERCIAL Energy efficiency	Full implementation of current EE strategy, plus additional accelerated progs	1%	Not applicable
DoE, local authorities - current DSM prog, EE Strategy, EE Accord, NEEA	Energy	RESIDENTIAL ENERGY efficiency (EE)	Full implementation of current EE strategy, plus other progs, eg sustainable housing facility	1%	2%
DoE, NERSA, Eskom – REFIT RE	Energy	Lower CO ₂ ELECTRICITY SUPPLY	Expanded low-carbon electricity supply prog – regulation	5%	1%

target			/ incentives in electricity sector		
DoT, local govt, DTI, Transnet – rollout of public transport, BRT	Transport	TRANSPORT options	Vehicle efficiency prog, expanded public transport, shift freight to rail, promote hybrids & electric vehicles, promote biofuels	9%	1%
DTI, NBI, others	Industrial Processes and Product Use	INDUSTRIAL PROCESS emissions	CCS, methane capture for existing synfuel plants, GHG mitigation for aluminium plants, coalmine methane	4%	1%
National, Provincial & local govt	Waste	WASTE minimisation	Progs to minimise waste, promote composting	1%	2%
DoA, NBI – no current regulatory tools available	Agriculture	Improved AGRICULTURE	Progs to reduce tillage, reduce enteric fermentation & increase manure management	2%	0.5%
DAFF, DEA, Land Affairs, Forestry – no current programmes	Land use and land use change (LULUC)	Emissions reduction /sinks in LAND USE/ FORESTRY	Enhanced fire control, savannah thickening, increased forest cover	2.0%	0.5%

5.2.3 Tentative Greenhouse gases reduction plan for the province of KwaZulu-Natal

5.2.3.1: Tentative GHG reduction plan for KwaZulu-Natal

Deviation below business as usual	2015 target	2020 target	2025 target	2030 target
National	26%	34%	42%	50%
Provincial	4%	5%	7%	8%

6. Conclusion

The development of Climate Change Action Plan calls for baseline GHG emission data which are not available presently in the country. DEDTEA shall embark on developing that inventory soon. The department shall also use its findings on Climate Vulnerability study, Energy Audit and Carbon Foot-print together with other data and information available within and outside the province to develop a proper Climate Change Plan for the province.

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