Final Draft

WHITE PAPER ON SUSTAINABLE ENERGY FOR THE WESTERN CAPE PROVINCE

Department of Environmental Affairs and Development Planning: Western Cape

October 2008

Table of Contents

Abbreviations

ASGISA	Accelerated and Shared Growth Initiative for South Africa
CCRS	Climate Change Response Strategy
D:EA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DME	National Department for Minerals and Energy
DTI	Department of Trade and Industry
EE	Energy Efficiency
ESCO	Energy service company
GDP	Gross domestic product
GDS	Growth and Development Strategy
HCDS	Human Capital Development Strategy
IAEA	International Atomic Energy Agency
IDP	Integrated Development Plan
IEA	International Energy Agency
IGRF Act	Intergovernmental Relations Framework Act 13 of 2005
iKapa	Western Cape
ILRP	Integrated Law Reform Project
IPP	Independent Power Producer
Isidima	Sustainable Human Settlements Strategy
LED	local economic development
MDGs	Millennium Development Goals
MEDS	Micro-economic Development Strategy
MTSF	Medium-term Strategic Framework
NERSA	National Energy Regulator of South Africa
NFLED	National Framework for Local Economic Development
NFSD	National Framework for Sustainable Development
NGO	Non-governmental organisation
NIPF	National Industrial Policy Framework
NSDP	National Spatial Development Perspective
OECD	Organisation for Economic Co-operation and Development
PGDS	Provincial Growth and Development Strategy
PGWC	Provincial Government of the Western Cape
PRS	Poverty Reduction Strategy
PSDF	Provincial Spatial Development Framework
R&D	Research and development
RDP	Reconstruction and Development Programme of the Government of South Africa

RE	Renewable energy
SANERI	South African National Energy Research Institute
SAWEP	South African Wind Energy Programme
SCFS	Social Capital Formation Strategy
SDIP	Sustainable Development Implementation Plan, Western Cape
SIP	Strategic Infrastructure Plan
SOE	State-Owned Enterprise
SPV	Special-Purpose Vehicle
SWH	Solar Water Heater
UN	United Nations
WC	Western Cape

Glossary of Terms:

Energy units

kWh = kilowatt-hour

GWh = gigawatt-hour (1,000,000 kWh = 1 GWh)

1 GWh = 3600 Gigajoules (GJ)

1 kg coal = 1.89 kWh

I kwh = 0.963 kg CO_2

1 kwh = 1.26 Litres of water used

A kilowatt-hour (kWh) is one unit of electricity; one 60 Watt light bulb burned for one hour will use 0.06 kWh (60 Watts) x (1 kilowatt/1000 Watts) x 1 hour) = 0.06 kWh

Biodiesel	Refers to a diesel-equivalent, processed fuel derived from biological sources, such as, vegetable-oils which can be used in *unmodified* diesel-engine vehicles.
Biomass Energy	Energy from the burning of agricultural, forestry, and other organic material (including landfill gas, digester gas, and municipal solid waste).

Carbon Footprint	A representation of the effect human activities have on the climate in terms of the total amount of greenhouse gases produced (measured in units of carbon dioxide).
Carbon Tax	A tax on energy sources which emit carbon dioxide into the atmosphere. It is an example of a pollution tax.
CFL	Compact Fluorescent Lamp – relatively efficient light bulbs, using about 25% of the power of incandescent light bulbs, for the same light output. It typically screws into a standard light socket.
Coal Thermal Power Plant/Station	A power station that generates electricity through the burning of coal.
Co-generation	The simultaneous production by means of a single source of useful energy (usually electricity) and heat (e.g. process steam) than can then be recovered for use as additional energy.
Climate change	A statistically significant difference noted either in the mean state of the climate or in its variability persisting for an extended period of time. Presently, climate change is thought to be caused by human activity, the most prominent being the generation of energy.
Electricity Grid	The electricity supply line system.
Energy	A measure of the ability to do work. E.g. energy is required to lift a bucket of water 10 metres, and a certain amount of energy is required to keep a light bulb alight for 1 hour. Basic unit of measurement is the Joule (J).
Energy Audit	A process whereby the energy use profile of an entity is determined i.e. amounts of energy used, types of energy used etc.
Energy Efficiency	Using less energy to achieve the same objective, e.g. an energy efficient air conditioner uses less energy to achieve the same cooling.
Energy Conservation	Measures to avoid the use of energy services.
ESCO	Energy Services Company. A company that specializes in energy efficiency measures under a contractual arrangement in which the company shares the value of energy savings with the customer.
Fossil Fuel	A fuel such as coal, oil, natural gas, produced from the decomposition of ancient plants and animals.
Fossil Fuel Power Station/Plant	A power station that generates electricity through the burning any fossil fuel.
Global Warming	An overall rise in the global temperature presently thought to be faster than the natural rate, due to human activity (see Climate Change).
Gigajoules	A gigajoule (GJ) is 1,000,000,000 joules. It is a unit of energy.
Natural Gas	A mixture of hydrocarbon compounds and small quantities of various non-hydrocarbons, widely used as a fuel throughout the industrialized world; it exists in the gaseous phase or in solution with crude oil in natural underground reservoirs.
Hydropower	Energy derived at a variety of scales from water pressure, especially

	the force or pressure of falling water used to power a water wheel, turbine, and so on.
Nuclear Energy	Energy released by radioactive decay, through a nuclear reaction, or in the course of fission or fusion of atomic nuclei.
Renewable Energy	Energy which can be replenished at the same rate it is used.
Solar Radiation	All the constituents that make up the total electromagnetic radiation emitted by the sun.
Sustainability	An attempt to provide the best social, environmental and economic outcomes for the human and natural environments both now and into the indefinite future.
Solar Water Heater	Water heated by the sun for use in home or other. It can be backed up by electricity so as to heat the water when days are cloudy
Wave Power	Energy generated by the oceans' wave currents, especially wind-generated waves.
Wind Energy	The energy contained in the movement of air masses; in human energy use traditionally captured by means of the sails of a ship or the vanes of a windmill, and currently by mechanical blades similar to airplane propellers.

Introduction

This document is the **Draft White Paper: Western Cape Sustainable Energy** and incorporates the relevant aspects of the Provincial Growth and Development Strategy and the Sustainable Development Implementation Plan and the internal document the Sustainable Energy Strategy for the Western Cape Province. The document is also a reflection of key stakeholder contributions and it includes a brief description of the contextual aspects which led to its development.

On receipt of comments, the Final White Paper on Sustainable Energy for the Western Cape Province will be prepared and submitted for approval. The document will then form the formal Western Cape policy document on which the Western Cape Sustainable Energy Facilitation Bill will be based.

Executive Summary

This document is the Western Cape White Paper on Sustainable Energy. The Document has been prepared by the Provincial Department of Environmental Affairs and Development Planning (D:EA&DP) of the Western Cape and its partners.

The Western Cape's share of total national energy demand is roughly 10% of South Africa's total energy demand. In 2004, approximately 250 million GJ of energy was consumed in the Province. By 2020, if the economy continues to grow as expected, it is predicted that the demand will grow to 375 million GJ, unless energy consumption patterns change drastically.

The Western Cape is fully dependant on fossil fuels for its energy needs. This is in line with the National demand. The reliance of fossil fuels leaves a significant negative footprint on the environment. The White Paper on Sustainable Energy is an essential first step to move the Western Cape Province on to a more sustainable path of energy production and use.

The White Paper on Sustainable Energy is rooted in an integrated set of high-level documents initiated by the PGWC, in particular, the Western Cape Provincial Growth and Development Strategy (PG&DS) and the Sustainable Development Implementation Plan (SDIP). Also the Climate Change Response Strategy and Action Plan prepared in 2008 forms a background for this White Paper.

The 2014 Sustainable Energy Vision for the Western Cape is presented as following:

The Western Cape has a secure supply of quality, reliable, clean and safe energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and the eradication of energy poverty.

To achieve this 2014 vision, the potential for technological, institutional, economic and social change will have to be harmonised in order to create a sustainable energy system, aided by determined energy demand management programmes and support for a mix of renewable and clean energy technologies.

Achieving a sustainable energy system across the Province will require understanding of the present situation and good knowledge of the options and technologies available to bring about the desired changes. Changes are required in both our energy production system and sources of supply and in energy consumption patterns. To bring these changes into effect, it will need to be supported by appropriate legislation and cost structures as well as incentive systems such as standards, information, education, financial incentives and technology availability. Additionally, institutional capacity to support the new system needs to be built.

The strategy is built around the sustainable development goals explicitly expressed for social, environmental and economic development in the Province.

The target for electricity from renewable sources in the Province reads: "*15% of the electricity consumed in the Western Cape will come from renewable energy sources in 2014, measured against the 2006 provincial electricity consumption".*

The White Paper target for energy efficiency is also derived from the SDIP. The energy efficiency target is: "*A final energy demand reduction of 15% by 2014".*

Poverty alleviation is an integrated part of all policies in the Western Cape. Social sustainability is an integrated part of sustainable energy development and needs special attention so that the poverty challenges of people can be addressed.

Therefore, a special target has been developed to address energy poverty. This target reads: "*People living in informal settlements and RDP houses have a 30% reduced energy poverty measured as access to and costs of energy services by 2014".*

The last target relates to carbon emissions: **"***The carbon emissions are reduced by 10% by 2014 measured against the 2000 emission levels ".*

The implementation of the White Paper is the responsibility of the Provincial Government. However, municipalities will play a vital part in achieving the actual successes. It is the role of the municipal sector to ensure availability of energy and therefore also the role of the local government to ensure that such provision is sustainable. The Provincial Government will facilitate an environment conducive to smooth implementation through interactive liaisons with the municipalities.

The White Paper objectives promote the implementation of renewable energy and energy efficiency through technology and behaviour change. There will be a special focus on some technologies in order to gain critical mass of installation sufficient to drive prices down and support permanent employment. This can include both wind and solar energy but also other sources of renewable energy. The focus on some technologies does not mean that other technologies are excluded. It means that some technologies will have additional special attention during this first phase until 2014.

The focus on energy efficiency in the Western Cape is to optimise security of supply for all, minimise the collective carbon footprint and improve the economy. Using less energy for the same production output leads to relative lower energy bills. The implementation of energy efficiency follows the national strategy and initiatives and the PGWC will ensure that programmes and facilities are brought to the Province so that they support the achievement of set targets.

It is well recognised that poverty eradication is a cross cutting issue and the mandate for poverty eradication lies with a number of departments and stakeholders. It is the intention of the PGWC to participate actively in already established fora as well as initiate the establishment of a cross cutting reference and implementation group that can drive a consolidated effort towards energy poverty eradication.

The successful implementation of this White Paper also hinges on effective and supportive cooperation with and by all municipalities in the Province. The PGWC will support the development of local energy plans that collectively can contribute to the achievement of the targets set out in the White Paper.

The PGWC will put in place a system for monitoring and continuous updating and registration of progress on energy efficiency and electrical renewable energy generation. A special monitoring system will also be developed to track the efforts and achieve the goals for energy poverty reduction. This White Paper will have a mid-term review in 2011.

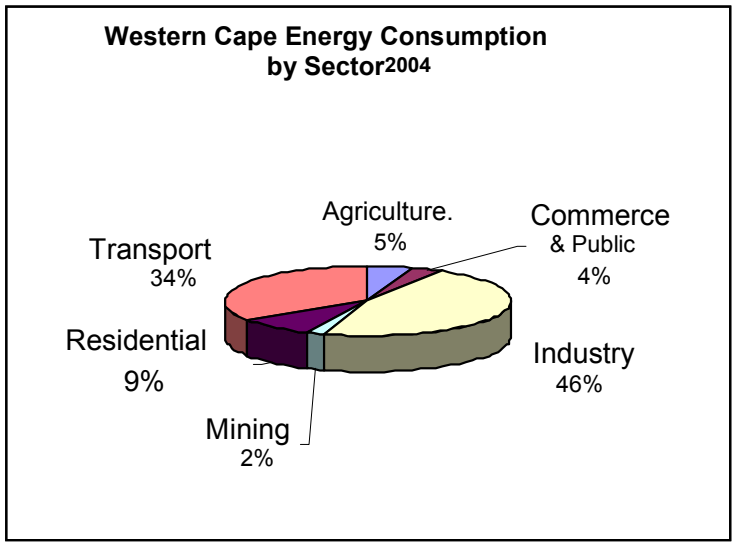
1. Sustainable Energy Challenges

The Brundtland Report[1] defines "sustainable development" as: *"development that meets the needs of the present without compromising the ability of future generations to meet their needs."* Sustainable development covers social, environmental as well as economic indicators.

The production and use of energy does not take place in isolation. The Provincial Government of the Western Cape (PGWC) acknowledges the Province's current over-reliance on fossil fuels and high energy consumption per GDP output. This mirrors the National reliance on fossil fuels. The Western Cape has already demonstrated its vulnerability in the energy sector, and the dramatic increase in the price of fossil fuels and the increased global scarcity for resources has pushed and continues to push prices up and undermines the PGWC's development efforts.

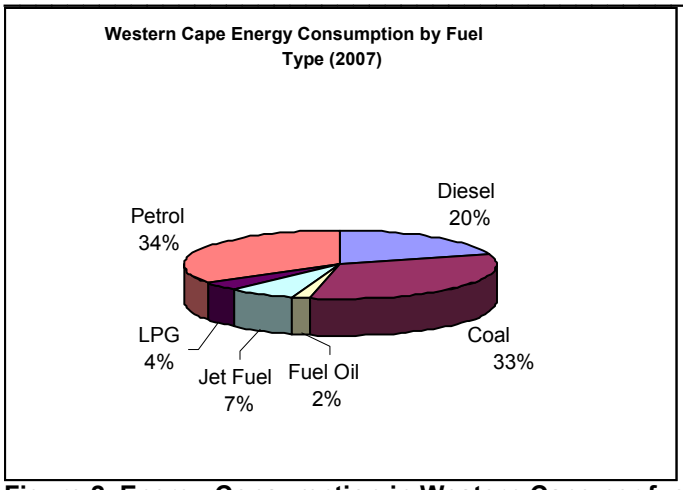
The Western Cape's share of total national energy demand is roughly 10% at 247,752 TJ. In 2004, approximately 250 million GJ of energy was consumed in the Province. By 2020, if the economy continues to grow as expected, it is predicted that the demand will grow to 375 million GJ, unless energy consumption patterns change drastically. Western Cape energy data in this White Paper is based on the feeder documents to the internal Sustainable Energy Strategy and the Climate Change Response Strategy of the Province.

Figure 1: Western Cape Energy Consumption.



As can be seen from figure 1 the Industry uses 46% of all energy in the province followed by the transport sector that uses 34%. The residential sector only uses 9% of the energy and the commerce and public buildings use as little as 4% of the total consumption.

[1] "Brundtland Report" 1987 from the Brundtland Commission on Sustainable Development.

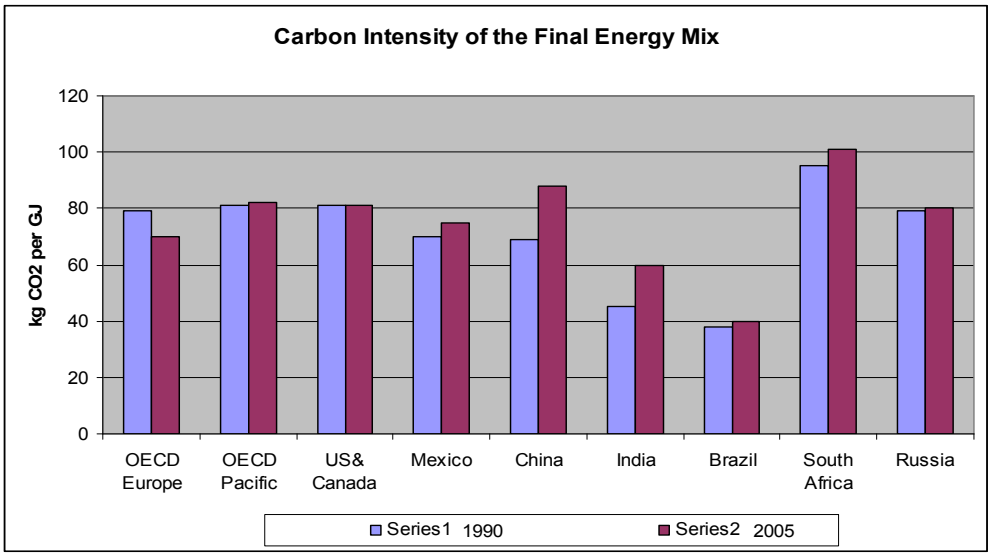


As can be seen from figure two, the Western Cape is fully dependant on fossil fuels for its energy needs. At 54% the greatest final energy demand is for liquid fuels due mainly to its use in the transport sector, but also in industry, commerce, agriculture, mining and the residential sector. The next major final energy source is coal for electricity and direct use. There is an insignificant use of wood.

Figure 2: **Energy Consumption in Western Cape per fuel source**.

Consequently, the carbon footprint in the Western Cape is large. Figure 3 shows that South Africa has a high carbon intensity (ie carbon emission by energy and economic unit) Although South Africa does not face emission reduction targets yet, it is clear from these figures that mitigation and adaptation strategies are necessary and need to be implemented as soon as possible.

Figure 3: International Carbon Intensities.



Globally, participation on sustainable energy matters occurs through forums such as the United Nations where South Africa is a signatory to the Kyoto Protocol, whilst nationally the PGWC participates in alliances and strategic partnerships. At the Provincial and Municipal level the PGWC also participates in partnerships in order to achieve the goals of the Sustainable Energy White Paper.

1.1. The Need for a White Paper on Sustainable Energy

Given South Africa's status as an energy intensive economy, the development of a sustainable energy programme for the country is critical and any provincial response strategy and action plan must take cognisance of this. The PGWC accepts a shared responsibility to reduce negative impacts from the current patterns of energy use. The Province's insufficient level of energy security coupled with its abundance of renewable energy resources points to the feasibility of developing a sustainable energy programme which can deal with existing energy vulnerability and also address mitigation responses to climate change in the Province, and thereby contribute to sustainable national and 'local' development.

The international energy crisis affects South Africa and the Western Cape as much as the rest of the world. The sharp increase in oil prices as well as the price on coal has an immediate negative impact on the production process unless stringent measures are followed to improve efficiency.

The White Paper on Sustainable Energy is an essential first step to move the Western Cape Province on to a more sustainable path of energy production and use.

2. Western Cape Sustainable Energy Goals

2.1. The Provincial Policy context

The White Paper on Sustainable Energy is firmly rooted in an integrated set of high-level documents[2] initiated by the PGWC, in particular, the Western Cape Provincial Growth and Development Strategy (PGDS) of 2007 and the Sustainable Development Implementation Plan (SDIP). These studies have been followed by the drafting of the internal Sustainable Energy Strategy in 2007 and the Climate Change Response Strategy and Action Plan in 2008. These high level documents provide the overarching framework for this White Paper on Sustainable Energy.

The Provincial Growth and Development Strategy's focus is on:

1. Growth of the economy and shared benefits thereof through key interventions - *inter alia* priority sector development, tourism, oil and gas industry expansion, renewable energy promotion, waste recycling, creative industries, and sustainable agriculture. The goal includes poverty reduction and second economy initiatives.

2. The evolution of a more equal and caring society through integrated human settlements, skills development and social transformation.

3. Ecologically sustainable development that includes an appropriate climate change response strategy with special reference to renewable energy and energy efficiency.

4. Greater spatial and transport integration.

5. Effective governance and institutional strengthening through good governance practices.

[2] Appendix 1 provides an overview of the various documents and how they relate to each other.

The SDIP aims to provide a clear and sufficiently challenging action plan for sustainable development that focuses on those issues on which the Provincial Government can lead and take action. The primary emphasis of the SDIP is on identifying priority actions that integrate economic, social, and environmental concerns relating to the activities of the Province. A particular focus is on identifying and responding to gaps in existing or emerging Provincial strategies.

The SDIP's primary focus is on:

- Sustainable human settlements;
- Energy provision and climate change mitigation;
- Sustainable water use and management;
- Sustainable waste management;
- Biodiversity management; and
- Sustainable transport provision.

One of the means to ensure implementation of the SDIP has been the drafting of the Climate Change Response Strategy and Action Plan. The Climate Change Response Strategy and Action Plan goals aim to strengthen the Province's resilience and its adaptive capacity to climate change. The Response Strategy and Action Plan is built on the following prioritised programmes:

- An integrated water supply and infrastructure management programme that integrates climate impacts and risks.
- Establishing clear links between land stewardship, livelihoods and the economy.
- Establishing a focused climate change research and weather information programme.
- Reducing the Province's carbon footprint – energy efficiency, development of renewable and alternative sustainable energy resources, effective waste management strategies and cleaner fuel programmes.

This document translates the identified PGWC priority areas on energy into strategic measurable goals. It also forms the basis for establishing legislation and specific regulations that can enhance implementation and achievement of the strategic vision and goals. Hence the White Paper is a document that is more specific than the SDIP and the Climate Change Response Strategy and Action Plan, but is not detailed at a micro level of implementation.

Individual implementation plans to 'operationalise' the White Paper on Sustainable Energy will be presented in targeted plans that can be adapted to suit changing opportunities.

The White Paper uses a time horizon of five years: 2010 - 2014. Hence the White Paper serves as a sub-document of the SDIP which also expires in 2014.

The Western Cape's vision for sustainable development is the following:

Sustainable development will be achieved through implementing integrated governance systems that promote economic growth in a manner that contributes to greater social equity and that maintains the ongoing capacity of the natural environment to provide the ecological goods and services upon which socio-economic development depends.

To achieve this vision, the following principles are essential for sustainable energy provision:

- Development must link and enhance synergies between social justice, secure livelihoods, economic prosperity, community well-being and environmental integrity;
- Environmental justice and equitable access to resources should be promoted;
- An appropriate regulatory and policy framework should ensure that environmental and social costs are fully accounted for;
- Economic growth and development must stay within the ecological limits of the Province's natural resource base; and
- The participation of all interested and affected parties in governance should be promoted.

The implementation of these principles needs to include the following cross-cutting behavioural fundamentals:

- Sustainability considerations should be mainstreamed into all policy, planning and decision-making processes;
- Appropriate institutional arrangements, should be in place to ensure effective co-ordination and integration of sustainability considerations within all levels of government and other relevant organisations;
- Reliable and transparent reporting, monitoring and evaluation systems should be implemented and co-operative governance should be facilitated; and
- Good understanding, commitment and governance amongst all stakeholders should be promoted based on the principles of transparency, access to information, accountability, shared responsibility and empowered participation.

The implementation will need to be based on:

- Leadership through action;
- Building effective partnerships;
- Stimulating the market for renewable energy and energy efficiency;
- Implementing effective financial mechanisms; and
- Supporting local government.

In summary it is essential to apply a holistic view in order to ensure that the decisions of today will also be judged as meaningful and relevant decisions in the future.

2.2. Vision and Goals

As outlined above, the sustainable energy vision for the Western Cape takes its impetus from the goals of the lead provincial strategies of the iKapa Elihlumayo, the PGDS and the SDIP.

2014 Sustainable Energy Vision for the Western Cape:

The Western Cape has a secure supply of quality, reliable, clean and safe energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and the eradication of energy poverty.

To achieve this 2014 vision, the potential for technological, institutional, economic and social change will have to be harmonised in order to create a sustainable energy system, aided by determined energy demand management programmes and support for a mix of renewable and clean energy technologies.

Sustainable Energy Goals for the Western Cape:

The Western Cape has six goals for sustainable energy – the goals are grouped under economic, environmental and social areas and are outlined below.

Social Sustainability

Goal 1 Alleviate energy poverty

The links between energy poverty and under-development clearly exist. While the poor might be electrified, households either have no or few electrical appliances. If they do these are typically very inefficient appliances for example old refrigerators or hot plates for heating and cooking. Many of the informal settlements are regularly the scenes of large scale fires caused by the use of paraffin stoves in unsafe conditions. The cost of preparing meals or heating a room is typically higher for the poor than for people who can afford efficient and appropriate technologies. Time spent to access energy also disadvantages the poor.

Goal 2 Improve the health of the nation

Energy efficiency and increased use of renewable energy reduces the atmospheric emission of harmful substances such as smoke, oxides of Sulphur and oxides of Nitrogen. Such substances are known to have an adverse effect on health and are frequently a primary cause of common respiratory ailments. The health of the nation includes improving the health of the individual through improved indoor climate as well as the outdoor climate.

Environmental sustainability

Goal 3 Reduce harmful emissions
Improved energy efficiency and increased use of renewable energy are cost effective methods to reduce Greenhouse Gas emissions, thereby combating Climate Change. Addressing Climate Change opens the door to utilising additional finance mechanisms such as the CDM to reduce CO_2 emissions.

Goal 4 Reduce negative footprints in our environment
The use of fossil fuels has a documented negative impact on the regional and local environment. The negative impact includes but is not limited to individual health, ground water pollution and air pollution. Any reduction in the use of fossil fuels through switching to clean(er) energy sources and more efficient energy uses is a success.

Economic sustainability

Goal 5 Enhance Energy Security
The massive South African black-outs that started first in the Western Cape in early 2006 alerted the Province to its energy vulnerability. It is essential that the Western Cape increases its resilience against external energy supply disruptions and the massive price fluctuations caused by national or international decisions.

Goal 6 Improve economic competitiveness
It has been demonstrated internationally that one of the ways to improve economic competitiveness is by improving industrial and commercial energy efficiency. Support of industrial best practice energy management as a tool to stay competitive and improve the economy is important.

3. Sustainable Energy Targets for Western Cape

Achieving a sustainable energy system across the Province will require understanding of the present situation and good knowledge of the options and technologies available to bring about the desired changes. Changes are required in both our energy production system and sources of supply and in energy consumption patterns. To bring these changes into effect, it will need to be supported by appropriate legislation and cost structures as well as incentive systems such as standards, information, education, financial incentives and technology availability. Additionally, institutional capacity to support the new system needs to be built.

3.1. The Western Cape Provincial Governments Mandate

The South African Constitution sets out the competencies of the national, provincial and local spheres of government. Schedule 4 sets out areas of concurrent competence while Schedule 5 of the Constitution sets out the areas that are the exclusive responsibility of the provincial and local sphere. Electricity reticulation is a functional competence of Local Government in terms of Schedule 4 (Part B) of the Constitution. It is also the mandate of Local Government to ensure supply of electricity (and other basic services).

It is the mandate of the Provincial Government to support the Local Governments to fulfil their responsibilities also with regard to energy provision. It is well within the PGWC's mandate to promote renewable energy and energy efficiency.

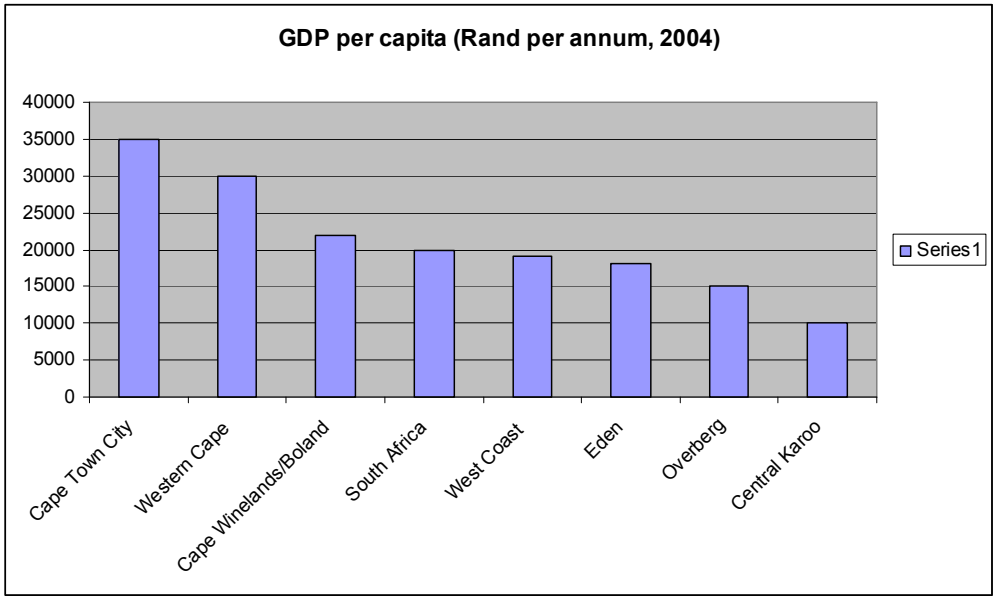
In addition, the Provincial Government's mandate to develop a Sustainable Energy Policy stems from its mandate concerning economic development, housing, provision of public transport and environmental impact mitigation.

The PGWC will take a leadership role in supporting, coordinating and facilitating the efforts of Local Government through Provincial legislation setting minimum standards and regulating the use of sustainable energy and pollution levels. Coordination and interaction is essential to achieve the vision and goals set forward in this White Paper.

3.2. Baseline Statistics

Western Cape Province includes some of the more affluent parts of South African – such as the City of Cape Town, as well as some of the poorest areas – such as the Central Karoo. The energy behaviour is equally different and the approach and abilities to achieve sustainable

Figure 4: Western Cape GDP per Capita.

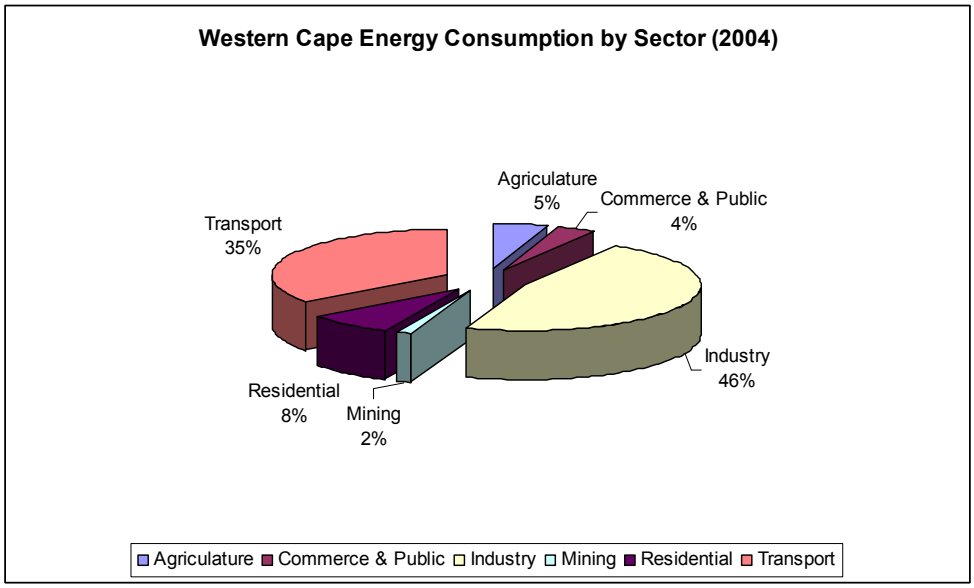


energy targets will vary. The areas that are most vulnerable are those that are also most dependent on agriculture, forestry and fishing. This is noteworthy because these regions will

also be the areas most affected by climate changes. Thus, while the poorer regions may not have the most significant energy consumption, they will be those most significantly affected by negative consequences of non-sustainable energy consumption.

An analysis of the energy consumption by sector reveals that industry and transport are currently the largest energy consumers in the Western Cape.

Figure 5: Western Cape Energy Consumption by Sector.



Industry uses 46% of the total energy in the Province, and industry and transport combined account for 80% of the total energy use. Industry is the largest consumer of electricity and the second largest consumer of other fuels after transport. This is due largely to the petrochemical refineries: Caltex and PetroSA, the iron and steel industry, and other industries using high temperature thermal operations: chemical industry, non ferrous metals, non metallic minerals, wood and wood products, food and tobacco as well as textiles and construction.

The transport sector is heavily dependent on petroleum, while the industrial sector is the largest electricity consumer, and the second largest petroleum consumer.

The residential sector accounts for only 8% of the total energy consumption, and it is estimated that 56% of this 8% is consumed by the urban medium to high income households. Although, the poor do not consume much in relative terms, their consumption is typically far more expensive (paraffin versus electricity) and far more unhealthy (burning of wood and fuels indoors versus use of electricity).

Industry and transport are collectively responsible for 69.9% of the carbon emissions, the residential sector is responsible for 15.5% of the carbon footprint.

3.3. Barriers

In general, the technologies and options for delivering on this White Paper already exist, and numerous reports have argued the rationale behind the White Paper. However, the systematic change towards more sustainable energy supply and use has not yet happened.

The Western Cape Province can start to overcome the barriers that prevent individuals, business and stakeholders from changing behaviour only when the nature of the barriers is understood, including both the self-evident and real barriers as well as the perceived or 'convenience' barriers. The purpose of the White Paper is to enable the PGWC to create an environment in which these technologies and initiatives may flourish in support of achieving the Western Cape's Sustainable Energy Vision.

The PGWC will assist in removing a number of the barriers currently preventing the adoption and commercialisation of clean energy technologies and initiatives.

The barriers discussed here are not necessarily a complete list of all barriers. Existing barriers may change and new barriers will emerge. It is essential to focus capacity efforts also on addressing new barriers. On-going capacity assessment will judge how well this is achieved.

3.3.1. Energy Pricing

Current cheap conventional energy prices that excludes the costs of externalities such as health and environmental costs are a perceived barrier to fuel switching or a change to renewable energy sources. With recent price increases in fossil fuels and electricity, this misconception is starting to change and renewable energy is if measured in immediate energy costs becoming more competitive.

Many also argue that energy efficiency is not cost effective. That is a misperception. It is also a misperception that energy is cheap. The cost per kWh of electricity might still be low compared to other countries, but the bills tend to be higher than they need be simply because there is an over-consumption of energy in all sectors in the economy.

There have already been significant hikes in electricity prices for 2007/2008 and Eskom has announced further price increases for many years to come. The cost for fuels, especially diesel but also petrol and paraffin, has also increased dramatically over the past 24 months. While fluctuations can be expected in global markets, the upward trend is likely to persist due to supply/demand factors.

Energy efficiency makes good economic sense under both the current and even more so under future high energy pricing scenarios. Payback on investment is frequently less than three years for both industrial sites and commercial sites. The importance is to approach energy management correctly and education and awareness programmes are some of the first and key activities to be promoted by the PGWC.

3.3.2. Legal Barriers

There is no specific legal or regulatory framework for the production of renewable electricity at the local or regional level. Additionally, a national legal and regulatory framework to ensure access to the national transmission grid is also still lacking. There is, however, no legal obstacle

preventing a municipality from purchasing renewable energy that is produced by independent power producers (IPP) or by itself within its boundaries or within the boundaries of a neighbour. There is also no legal barrier preventing municipalities from selling some of the electricity generated to a neighbouring municipality. This means that there are no real legal barriers preventing the production and sale of renewable electricity within the reticulation areas of municipalities.

The PGWC will support access to power from renewable energy within the jurisdiction of the PGWC and the municipalities within its jurisdiction, within the context of national legislation.

Legal barriers related to energy efficiency exist. Such barriers relate to building standards and equipment standards. For example, it would be easy to improve motor efficiency by prohibiting the sale and/or use of energy inefficient motors.

The PGWC works in close collaboration with National Government to pilot and support appropriate legislation that can enhance increased energy efficiency without hampering economic development.

3.3.3. Low Investment Confidence

Given the present investment climate in South Africa, the Western Cape can not isolate itself from issues such as increasing interest rates; post-poned decision-making regarding the future of the energy sector in South Africa; crime; a large un-skilled and semi-skilled labour force and the effectiveness of ports and transport. South Africa is also perceived to be the gateway to the rest of Africa, and the 2010 Soccer World Cup is also a huge attraction and opens a multitude of investment opportunities. The White Paper is presented within the context of these factors.

The PGWC will pay attention to barriers related to investment confidence as and when it becomes relevant.

3.3.4. Insufficient Knowledge and Understanding of Technologies

Decision makers in the private and public sector and the general public are often not aware of the latest technologies that could save money and energy. In industrial plants for example, the complexity of energy options requires highly skilled energy auditors who are not always available. Also often perceptions of renewable energy are linked to an image of inferior or defective solar home systems in townships. The importance of using properly qualified staff and having the right management information is essential in order to overcome the barrier of a lack of knowledge. Campaigns, news bulletins and other communication media are therefore essential.

The PGWC will design its capacity building efforts so as to reduce barriers around this gap of limited access to information, skill and knowledge.

3.3.5. Institutional Barriers and Individual Resistance

Institutional barriers and individual resistance often stem from lack of information or ignorance. Often there is a misconception that renewable energy is not modern energy. Or that energy efficiency will disrupt industrial processes and lead to productivity losses and that residences will end up in darkness. This indicates a lack of information and awareness.

It is essential to lead by example and the PGWC will ensure that systematic information and education is developed and implemented to overcome this barrier.

3.4. Sustainable Energy Targets

Most industrialised countries have established measurable targets for the generation of renewable energy, energy efficiency and carbon emission reduction. South Africa has a target of 10,000 GWh of electricity or equivalent to be produced from renewable energy by 2014 and a national energy efficiency improvement target of 12% by 2015.

As part of the SDIP, the PGWC agreed to targets for electricity from renewable sources and for energy efficiency to be achieved by 2014. The implementation of the White Paper will divide these targets into yearly activities to be implemented. There will also be instruments to ensure appropriate interventions are initiated to achieve the targets. The targets for the White Paper are coupled to timelines to ensure implementation.

Target for electricity from renewable sources in the Western Cape:

15% of the electricity consumed in the Western Cape will come from renewable energy sources in 2014, measured against the 2006 provincial electricity consumption

By expressing the target as a percentage of electricity consumed by the Province it becomes relatively easy to track progress and initiate support instruments to ensure that the target can be met. The target is expressed as electricity from renewable energy sources consumed but the target measure methodology includes an equivalent factor that allows for use of renewable energy without having to convert to electricity.[3]

The target is compulsory in that purchasers of electricity will have to take the sustainable energy target into consideration. However, the Provincial Government cannot prohibit the purchase of electricity from fossil fuel sources should there be no renewable electricity to be purchased. The job at hand is to ensure that the environment to establish and generate renewable energy is such that a minimum of 15% of the electricity can be produced, and must be consumed, from renewable sources.

The target was arrived at after years of intense studies of international experience and the potential for renewable energy availability in the Western Cape Province. Reference can in particular also be made to the D:EA&DP study 'Renewable Energy Resource Assessment', 2007. The emphasis is on setting targets to be achieved. The implementation of the target will be discussed in Chapter Four of this White Paper.

The White Paper target for energy efficiency is also derived from the SDIP. The energy efficiency target is:

[4] Methodology from PGWC for renewable energy monitoring to be developed as part of the implementation of this White Paper

A final energy demand reduction of 15% by 2014.

The energy efficiency target[4] has been broken into sub-targets for the different sectors, namely that:

- Industrial energy efficiency has improved by 20% by 2014;
- Residential energy efficiency has improved by 10% by 2014;
- Commercial and public buildings have improved energy efficiency in 2014 by 11%; and
- Transport energy efficiency has improved by 12% by 2014.

This target relates to the national energy efficiency target in terms of priorities, measurements and monitoring. The Western Cape Provincial Government's target is slightly more ambitious towards the possible savings in the industrial sector. The additional ambition is a reflection of better knowledge gained over the last years from show cases and preliminary energy audits. It is also a reflection of the need to save – the recent power outages have been serious and without fast implementation of radical savings the Province might face new rounds of power cuts. It is therefore in everyone's and particular in the industry's best interest to work towards achievement of the 20% target. Several support initiatives will be introduced including a national industrial energy management support facility.

The residential targets support the domestic users of Western Cape to save energy. Energy saved is money saved and the 10% target is a win-win situation for individual households as well as society. The energy savings campaign aimed at the commercial sector and public building has already begun largely through nationally and local driven initiatives.

Whilst the transport sector is covered by this White Paper as it is an essential part of the sustainable energy use in the Province, a separate implementation plan for transport will be prepared. The transport efficiency can not improve without massive infrastructure investments. While industrial, commercial and residential energy efficiency can be achieved largely through moderate investments, any shift in the transport sector will require massive and long term planning and finance. Hence the transport sector has been set apart for special attention and debate.

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[4] The target is expressed as a percentage reduction against the projected provincial energy usage in 2014. The forecast is derived from the Long range Energy Alternatives Planning tool (LEAP) utilised for developing the National Integrated Energy Plan for South Africa, The National Energy Efficiency target and used by the PGWC for the Sustainable Energy Strategy. The following assumptions are made:

- Population growth: 1,3% per annum)
- GDP growth: 2.8% average per annum growth over the period
- Economic growth: 2.8% over the period
- Fuel switching limited apart from general increase in electricity consumption in residential sector.

People living in informal settlements and RDP houses have a 30% reduced energy poverty measured as access to and costs of energy services by 2014.

Poverty alleviation is an integrated part of all policies in the Western Cape. While the social sustainability is an integrated part of this sustainable energy development it is a reality that without special attention poverty problems of people might not be addressed.

Renewable energy has typically high capital investment costs and low running costs compared to fossil fuels and therefore, pure financial calculation will show it to be a burden for poorer households. Several studies[5] have shown that solar hot water is not financially viable for systems much below 200 litre geysers, but poor households typically have 60 litre geysers.

As noted above, achieving the energy efficiency target will focus on the main users of energy, which is the industry, large commercial buildings and residence who make use of modern electrical appliances and heaters. Again, the poor will not be targeted although their costs for the same services are typically much higher per energy output than the costs experienced by the targeted residence.

This target has been developed for the purpose of ensuring that through implementation of this White Paper on Sustainable Energy the PGWC will proactively address the sustainable energy issues facing the poor.

The last target relates to carbon emissions:

The carbon emissions are reduced by 10% by 2014 measured against the 2000 emission levels

This target was agreed in the SDIP and has been calculated based on scenarios for increased production of energy from renewable sources and improved energy efficiencies. This target can not be achieved if the renewable energy target or the energy efficiency targets are not also achieved.

3.5. Outcomes

This White Paper has six overall goals. Outcomes are reliant on goals realised. The goals are high level expressions of the PGWC's commitment on a number of social, economic and environmental goals that collectively express the vision for sustainable energy development. It is essential to support the Vision with something tangible and measurable. For this first five year period up until 2014 the outcomes of achieving the targets can be expressed as follows:

Table 1: Projected Outcomes

[5] Western Cape Renewable Energy Scenarios – draft 2007 and DME paper "Solar Water Heating – a response to the Western Cape Energy Crisis" 2006.

Projected Outcomes by 2014	
White Paper Goal	**Outcomes**
Goal 1: Alleviate energy poverty	1. Access to affordable energy services improved by promoting low energy alternatives in the market place. 2. Optimise energy costs to cater for the poor, the rich, the residential and the industry sectors, the agriculture and the mines, the green and the willing buyer through differentiated tariffs and security of supply.
Goal 2: Improve the health of the nation	3. Health benefits realised through reduced atmospheric pollution and improved living conditions, in particular a reduction in respiratory-related illnesses.
Goal 3: Reduce harmful emissions	4. Atmospheric pollutant levels reduced by a reduction in fossil fuel combustion in industry, commerce and in homes. 5. Transport-related atmospheric pollutant levels reduced by a reduction of simple waste; increased focus on public transport and support for low energy individual transport system.
Goal 4: Reduce negative footprints on our environment	6. Western Cape CO_2 emissions reduced by increasing share of renewable energy use and improving energy efficiency across all economic sectors.
Goal 5: Enhance Energy Security	7. Increased resilience against electricity supply disruptions by improving the energy efficiency thus reducing the load placed upon power distributions systems. 8. Increased resilience against national supply disruptions by improving the provincial supply through supply of sustainable energy from IPPs and implementation of energy efficiency measures and use of Solar Water Heaters (SWH) within the boundaries of the WC. 9. Increased individual resilience against electricity and oil price fluctuations by increasing use of renewable energies and reducing the reliance on private transport.
Goal 6: Improve economic competitiveness	10. Improved industrial and commercial profitability by controlling and minimising energy losses from waste of energy, inefficiencies and prices. 11. Improved international acceptability of WC products (agricultural, industrial and manufacturing) by minimising the environmental impact of their manufacture and compliance with agreed standards for energy use.

By achieving these goals there will be a positive contribution to broader cross-cutting issues such as job creation and possible business development. Also, with a wider perspective, it must be assumed that electrification will facilitate learning simply by having lights in the homes. Additional advantages will be addressed in the monitoring system but they do not constitute

goals on their own. Rather, increased provision of sustainable energy will result in a number of positive impacts on other development goals in the Province.

4. Implementation plans and instruments

The implementation of the White Paper is the responsibility of the Provincial Government. However, municipalities will play a vital part in achieving the actual successes. It is the role of the municipal sector to ensure availability of energy and therefore also the role of the local government to ensure that such provision is sustainable. The Provincial Government will facilitate an environment conducive to smooth implementation through interactive liaisons with the municipalities. This will be elaborated on below.

The White Paper on Sustainable Energy proposes a range of implementing instruments, which are applied to overcome barriers and to meet specific needs in each sector or sub-sector. The barriers and level of maturity in the market place in combination with cost effectiveness of activities will determine which instrument will be used where, when and how. Some instruments are national instruments and PGWC will monitor the applicability and efficiency in order to determine if additional interventions are needed. For example, in the case of renewable energy policy such additions are believed to be necessary and through the mandate of this White Paper implementation instruments will be introduced that can support implementation without compromising national efforts. In other cases where national targets or initiatives are not in place this White Paper will be based on provincial or local prerogatives.

National and provincial legislation determines mandates and where appropriate specific additional legislation and regulations will be prepared.

4.1. Activities and Interventions

4.1.1. Renewable Energy

Future options for energy generation in the Western Cape include a range of renewable energy sources. The Western Cape is endowed with the best wind regime in the entire country. The theoretical potential for use of wind energy exceeds the current electricity consumption in Western Cape Province[6]. Also solar for hot water as well as power generation is readily available and represents commercial options in the Western Cape.

Hydro energy is not particularly relevant for the WC as the known potential is too little for commercial exploitation. Tidal and wave generation options may be available, however, this resource has not been quantified in terms of theoretical and commercial potential MW output. The technologies have been developed but are not yet necessarily commercially attractive in South Africa. Other renewable energy options include the use of landfill gas and biomass.

The implementation of the White Paper will use a combination of generation options. There will be a special focus on some technologies in order to gain critical mass of installation sufficient to drive prices down and support permanent employment. This can include both wind and solar energy but also other sources of renewable energy. The focus on some technologies does not

[6] "Renewable Energy Resource Assessment" Western Cape 2007 by Restio Energy Pty and Nano Energy Pty incorporated into the internal document Sustainable Energy Strategy for the Western Cape

mean that other technologies are excluded. It means that some technologies will have additional special attention during this first phase until 2014.

The implementation will be facilitated within the legal mandate of the Western Cape and where such a mandate is insufficient specific legislation will be prepared. The implementation will also be supported with necessary financial instruments. Such financial instruments will be discussed separately and can include feed in schemes, grant subsidies, green trading and any combination thereof.

Implementation of renewable energy also faces other capacity constraints. These will be identified through capacity assessments and addressed accordingly. This includes support to establish local manufacturing capacity.

4.1.2. Energy Efficiency

Different agendas can drive energy efficiency. It is essential that we have energy security to sustain growth and that we use energy efficiently to leave as little footprint as possible and facilitate reduced expenses for energy.

A power utility might approach energy efficiency from a Demand Side angle, namely attempting to level the load and balance the system over the 24 hour cycle.

Seen from the industries' or consumers' point of view there are also two main agendas that drive the motivation for energy efficiency, namely energy security and energy affordability.

The focus on energy efficiency in the Western Cape is to optimise security of supply for all, minimise the collective carbon footprint and improve the economy. Using less energy for the same production output leads to relative lower energy bills. The implementation of energy efficiency follows the national strategy and initiatives and the PGWC will ensure that programmes and facilities are brought to the Province to support the achievement of set targets.

Energy efficiency implementation includes a combination of 'carrot and stick' approach interventions. These include:

Management:	Energy must be treated as an expense that can be managed and optimised. Special focus will be given to support and promote industrial energy management but also management of energy in buildings. International studies[7] show average industrial savings between 16% and 26% through management only.
Audits:	Energy audits are used across all sectors to identify efficiency measures that can be implemented in a cost-effective manner. The DME has initiated this process through audits of public buildings. Other initiatives such as the upcoming UNIDO industrial management programme focuses on industrial audits. The PGWC will support the auditing of industries and buildings in the Province by certified auditors as a first step to manage and measure the potential savings.

[7] IEA: Energy Efficiency World Data, 2008

Norms, Standards and Labelling:	Promotion of norms, standards and labelling of energy use in particular in motors, systems, appliances, processes and designs. These activities are largely driven from the national level and no special standards, norms or labels are envisaged. A special attention will be given to new building regulation and the option to ensure inclusion of use of solar as and where appropriate. PGWC will also support green labelling.
Certification and Accreditation:	Compliance monitoring is essential to ensure quality and optimal use. The DME in collaboration with SABS drives these activities and the PGWC will promote optimal support and use of certified and accredited professionals.
Communication, Education, and Awareness:	The PGWC will supplement appropriate national initiatives with special campaigns and awareness programmes. The importance of long term systematic awareness to support sustainable development is recognised and coordinated efforts will be ensured.

The implementation of energy efficiency includes a number of action plans that will be specified for each sub-sector. The PGWC will initiate establishment of forums where necessary to promote and support implementation of energy efficiency in the different sub-sectors.

4.1.3. Reduction of Energy Poverty

The PGWC will in a consultative process with all relevant line departments as well as the local municipalities address the unique sustainable energy issues facing the poor. This includes:

- Development of a baseline from where to define and measure the energy poverty among the poor both in terms of access as well as in terms of price per energy output.
- Develop a methodology for monitoring improvement regarding energy poverty
- Oversee and facilitate implementation of the monitoring system
- Develop a catalogue of interventions that can address the energy poverty
- Facilitate barrier removals to relieve energy poverty. This can include improved building standards for RDP houses or improved tender processes to ensure that construction of houses optimise zero to low energy solutions. It can also include facilitation of finance mechanisms to support installation of solar water heaters despite these not necessarily being financially viable in traditional banking terms.
- Facilitate information activities and capacity building initiatives that enhances achievement of the energy poverty reduction goals.

It is well recognised that poverty eradication is a cross cutting issue and the mandate for poverty eradication lies with a number of departments and stakeholders including the poor. It is the intention of the PGWC to participate actively in already established fora as well as initiate the establishment of a cross cutting reference and implementation group that can drive a consolidated effort towards energy poverty eradication.

4.1.4. Optimisation of Transport System

Transport is one of the fastest growing sectors of energy use, with road transport being the major sub-sector. As an example, transport accounts for 54% of total Cape Town energy consumption. The Provincial Energy Scenarios found that the bulk of energy use across the Province can be attributed to electricity consumption and that transport is the second largest energy consumer. The importance of a sustainable transport system in the future scenario for Western Cape is essential and a separate detailed implementation plan will be prepared during the 2008 – 2010 period. The 2010 Soccer World Cup has already placed special emphasis on transport and the long term implementation will greatly benefit from the capital investments acquired.

Transport energy can be reduced through an emphasis on modal shift from private to public transport, non motorised transport alternatives and more energy efficient vehicle standards.

4.2. Legal Support Mechanisms

Legislation is an essential tool to support the implementation of this White Paper. Legislation is relevant both as a “stick” used, for example, by setting technical standards that specify energy performance and technology choices and as a “carrot” to allow the PGWC to encourage specific behaviour. The PGWC will make use of both to ensure achievement of Sustainable Energy targets as set out in the White Paper.

The PGWC has a constitutional mandate to promote the socio-economic wellbeing of its citizens, and this includes the adoption of a White Paper on Sustainable Energy. Furthermore, municipalities have a constitutional obligation to supply electricity and other services to its residents, thereby emphasising the close link between the Provincial sustainable energy mandate and municipal electricity reticulation obligation.

4.3. Financial Support Mechanisms

Financial support mechanisms are essential to drive changes in power generation. Renewable Energy is typically supported through feed-in tariffs or top-up feed in tariffs for grid connected solutions. Other support systems include once-off grant systems for typically smaller installations such as Solar Water Heating. It is essential to recognise the need for financial support mechanisms but also accept that it might not be prudent for the Western Cape to establish a system that is delinked from national financial support structures.

As part of the implementation of this White Paper on Sustainable Energy the PGWC will ensure that sufficient financial support is established within the legal framework of the province and the municipalities and in close collaboration with National initiatives.

The details of the financial support mechanism will vary over the period 2008 – 2014 and will be communicated to all stakeholders.

4.4. Stakeholder Interaction

This White Paper on Sustainable Energy will be implemented in close collaboration with partners and stakeholders locally, nationally and internationally. The PGWC will play a leadership role by ensuring appropriate policies, legislation and regulations for the effective application of renewable energy and improvement of energy efficiency. It is the role of the PGWC to ensure

that its policies are within the framework of the National Constitution and the mandate of the local governments within the PGWC's jurisdiction.

4.4.1. Internal Provincial Government

The D:EA&DP is responsible for the formulation and implementation of the White Paper. The Department will ensure that – in line with the guidelines on policy implementation in the Western Cape - all relevant Provincial Departments are involved as partners, reference points or stakeholders. This includes in particular the Provincial Treasury, Economic Development, the Department of Local Government and Housing, the Department of Transport and Public Works and of course the Department of Environmental Affairs and Development Planning.

4.4.2. National Government

While the implementation of this White Paper is a matter of Provincial and local jurisdiction, it is nevertheless essential to engage the national stakeholders such as National Treasury, the Department of Minerals & Energy (DME), the Department of Trade & Industry (DTI), the Department of Environmental Affairs and Tourism (DEAT), the National Energy Regulator (NERSA) and the power utility to ensure financial, legal and technical support. It is also essential that the Provincial activities can function as integral parts of possible national activities.

The PGWC is responsible for ensuring that all activities are effectively coordinated and optimised in relation to national initiatives, legislation and finance.

4.4.3. Local Government

The successful implementation of this White Paper also hinges on effective and supportive cooperation with and by all local governments in the Province. The PGWC will support the development of local energy plans that collectively can contribute to the achievement of the targets sets out in the White Paper.

The mandate for reticulation and sale of electricity rests with the local municipalities. Hence it is the role of the local governments to support the renewable energy target through generation and purchase of renewable electricity. The PGWC will facilitate removal of legal and financial barriers currently preventing the uptake of renewable energy. Through effective communication and liaison with local governments the PGWC will support the development of necessary local capacity to engage in the renewable energy market. This includes training of local labour and development of appropriate monitoring systems.

In support of energy efficiency targets, the PGWC will support the development of industrial, commercial and residential energy efficiency plans and their implementation.

The energy poverty eradication efforts will be closely coordinated both within the responsible Provincial Department/s as well as with the relevant local governments. This includes:

- Local mapping of energy poverty against the agreed provincial baseline methodology;
- Local mapping of appropriate interventions (such mapping can be supported through facilitated input from the PGWC as appropriate);
- Monitoring of energy poverty;
- Focussed implementation of activities which could include, for example, restrictions on construction by allowing only energy efficient housing designed for the WC's different micro climates; support of solar hot water roll-out; or support of programmes to promote

improved cooking facilities that reduce energy consumption and improve the indoor climate.

- Many other detailed options have been researched in the WC[8]. To support effective implementation, options will be categorised and a catalogue will be made available to interested parties in the Province.

4.4.4. Other Stakeholders

Public communication will be facilitated to address the awareness and education on the use of renewable energy, energy efficiency and eradication of energy poverty.

The Industrial and Commercial sector is essential to ensure adequate supply of the appropriate quality of both renewable energy generation including solar water heaters as well as energy efficient appliances and systems. The Industrial and Commercial sector covers thus the hardware producers, hardware suppliers, installers as well as the consulting firms who can support optimisation of processes and use of energy.

The NGO sector is an essential part of the stakeholders' engagement in the implementation of the White Paper. The NGO sector plays an important role as implementer, trainer, communicator, agitator and watchdog.

4.5. Research

The research facilities in the Province, nationally and internationally are essential to support the use of appropriate technologies and optimisations of systems. Hence the research entities will be encouraged to support the implementation through focused research and development.

Various facilities already exist in the Province and elsewhere in the country for undertaking vital research activities. A number of key research entities are briefly described below:

- SANERI is a state-funded research company that focuses energy R&D on a number of energy subjects including renewable energy, energy efficiency, energy policy and the impact of energy on the environment

- SAWEP focuses on barrier removal for wind energy use. The programme is largely funded by international donors.

- The Darling Wind farm in the Western Cape hosts research facilities for public use.

- Universities in the Western Cape in particular the Energy Research Centre at the University of Cape Town, the Centre for Sustainable and Renewable Energy Studies at the University of Stellenbosch and the Cape Peninsula University of Technology perform essential and recognised research in the field of sustainable development and sustainable energy.

[8] For example wide-ranging research was conducted in connection with the Sustainable Energy Strategy where activities such as ceilings and CFLs also feature.

- A number of trusts, NGOs such as Sustainable Energy Africa and South South North and consulting companies also play a key role in sustainable energy research.

Funding for sustainable energy research is also available through bilateral and multilateral donor programmes. This White Paper on Sustainable Energy does not require separate or additional research funding as it is expected that existing and forthcoming resources will be sufficient and more sustainable to support longer term research activities.

5. Monitoring and Evaluation

The SDIP stipulates that an annual provincial sustainability review will be prepared and published by the D:EA&DP. This annual review is to include dedicated reporting on all of the priority actions and targets indentified in the SDIP. This means that key performance areas linked to sustainable energy will be monitored on an annual basis.

The PGWC must also be able to measure the effectiveness and efficiency of programmes and actions implemented and it must be able to sustain this capacity.

The PGWC will put in place a system for continuous updating and registration of statistics related to energy efficiency and electrical renewable energy generation. A special monitoring system will also be developed to track the efforts and achieve the goals for energy poverty reduction. Indicators for a sustainable transport system will also be developed although this might only happen in a number of years as sustainable energy implementation moves forward.

A formalised system for collecting and managing data, calculating indicators and reporting will be established. This will inform on progress being made and guide implementation and necessary adjustments in order for the Province to successfully achieve the targets for sustainable energy.

The PGWC has embarked upon a process to develop detailed methodologies for the monitoring and tracking of sectoral targets. Where regulation is necessary to collect data, the PGWC will prepare the necessary legislation and regulations mandating the PGWC to prescribe to institutions, enterprises and individuals to keep and supply the necessary data.

The PGWC will also undertake institutional capacity assessments as part of monitoring. By understanding the institutional capacity and the barriers, PGWC will be enabled to address the gaps.

Independent external parties may be used to verify or provide independent views and findings related to the methodologies and results monitored and reported by the PGWC.

6. Appendices

Appendix 1: PGDS and the Western Cape Sustainable Energy White Paper

1.1 Provincial Growth and Development Strategy (PGDS)

The PGDS provides a clear strategic framework for accelerated and shared economic growth through thorough developmental intervention in the WC in favour of all its residents, particularly the poor, while restoring the ecosystems and resources essential to the sustaining of shared economic growth within a coherent spatial development framework.

1.2 Background and objectives

The purpose of the PGDS is:

- To contextualise national imperatives (according to the National Spatial Development Perspective [NSDP], Vision 2014, the Millennium Development Goals [MDGs], the Medium-term Strategic Framework [MTSF], the Accelerated and Shared Growth Initiative for South Africa [ASGISA], the National Industrial Policy Framework [NIPF], the National Framework for Local Economic Development [NFLED], the National Framework for Sustainable Development [NFSD] and the anti-poverty strategy) and ground them within the realities and specifics of the WC;
- To guide municipal (district, local and metropolitan) Integrated Development Plans (IDPs), local economic development (LED) strategies and district and metropolitan Growth and Development Strategies (GDSs);
- To guide intergovernmental engagements as prescribed by the Intergovernmental Relations Framework Act 13 of 2005 (IGRF Act);
- To inform the strategic plans and investment priorities of the Provincial departments, national departments and state-owned enterprises (SOEs) operating in the WC;
- To inform non-government stakeholders (the business sector, special-purpose vehicles [SPVs], civil society, labour and the higher-education sector) operating in the WC;
- To provide social partners with clear signals about desired growth and development objectives, priorities and outcomes; and to redress the spatial and socio-economic legacy of apartheid.

The policy framework of the PGDS is nested within a complex interplay of national, Provincial and local policy-making processes. The foundations for national development policy are provided by the Constitution, the MDGs, the Government's Vision 2014, the ASGISA and the NSDP.

The PGDS builds on the 12 iKapa strategies. These are the sectoral strategies developed by the PGWC's line departments. The iKapa strategies that have emerged since 2005 are as follows:

- *Provincial Spatial Development Framework (PSDF):* Strongly informed by the NSDP, this framework identifies the areas of growth in the Province and the areas where, in terms of the sustainable-development paradigm, growth should be emphasised in the future. It also addresses the form that this growth or development should take and further emphasises the restructuring of urban settlements to facilitate their sustainability.
- *Strategic Infrastructure Plan (SIP):* In terms of the PSDF, this plan indicates the infrastructure needed and where and how this can be built over time as budgets allow. It includes the buying of public land for settlements and the improvement of bulk infrastructure (water, sanitation and energy), information and communication technology (ICT), and roads.
- *Sustainable Human Settlements Strategy (Isidima):* Within the PSDF, this strategy sets out options to solve the housing backlog, including the upgrading of informal settlements, the creation of more affordable housing choices and the assurance of sustainable construction methods making communities safer and more comfortable and bringing down the cost of energy. It also sets out the importance of residential accommodation close to public transport, shops, work opportunities and places of relaxation.
- *Micro-economic Development Strategy (MEDS):* Based on an analysis of the strengths and weaknesses of the WC economy, this strategy recommends a range of public-sector interventions to stimulate specific high-potential sectors, including tourism, business process outsourcing and the servicing of the oil and gas industry. It indicates the requirements for economic development, empowerment, an increase in employment and the skills needed.
- *Poverty Reduction Strategy (PRS):* This strategy aims to reduce poverty through interventions such as job creation, the provision to needy people of access to grants and health-and-education benefits and programmes to address the greater vulnerability of all poor people, especially women, and those suffering from TB and HIV/Aids.
- *Human Capital Development Strategy (HCDS):* This strategy emphasises the retention of scarce skills and promotion of quality education to expand the skills base and increase job creation. It promotes early-childhood development, adult basic education and further education and training.
- *Scarce Skills Strategy (SSS):* This strategy focuses on the development of skills and greater economic participation, especially of young people, in the growing sectors of the WC economy.
- *Social Capital Formation Strategy (SCFS):* This strategy examines issues such as migration patterns and indicates the manner in which the Province's population is changing. It addresses the challenges of violence and crime in communities and the requirements to build social cohesion within and across communities to make the WC 'A Home for All'.
- *Burden of Disease and Health Care 2010 (BOD, HC2010):* These two policy documents underline and underpin the important role of all Provincial departments in the delivering of a healthy and capable population and responsive medical service prioritising primary health care.
- *Integrated Law Reform Project (ILRP):* This project aims to bring together the different laws that govern planning, together with environmental and heritage

impact assessments, to streamline the sustainable development of land or setting up of businesses.

- *Sustainable Development Implementation Plan (SDIP):* This plan includes programmes to encourage biodiversity, effective open-space management and the better management of settlements by ensuring the sustainability of services in respect of water, waste, energy and land.
- *Climate Change Response Strategy (CCRS):* The saving of energy and use of public transport are the most effective ways of helping to slow down climate change. Businesses and electricity producers increasingly have to focus on clean production to reduce emissions. Together, both the public and the private sectors have to promote renewable energy from the sun, wind and waves.

The proposed Western Cape Sustainable Energy Facilitation Act is seen to be a very important step in supporting and realizing the PGWC's vision. To realize the PGWC's vision the PGDS commits not only the PGWC but also the entire Province to the following long-term goals to guide policy-making and resource allocation:

- Grow and share the economy;
- Build a more equal and caring society where poverty is eradicated;
- Promote ecologically sustainable development;
- Foster greater spatial integration;
- Ensure effective governance and institutional strengthening.

For the PGDS to deliver on shared growth and integrated, sustainable development through the lead interventions, all spheres of government must commit to the following points:

- The implementation of the iKapa PGDS lead interventions;
- Effective participation in institutional machinery;
- The development and implementation of strategic plans and programmes;
- The reporting of progress on key programmes as part of implementation;
- The provision of the necessary support and resources;
- The attraction and encouragement of investment initiatives.

The Western Cape Sustainable Energy White Paper with subsequent legislation will be a driver of at least two of the key iKapa strategies i.e. the Climate Change Response Strategy and Action Plan and the Sustainable Development Implementation Plan.

Appendix 2: Process and Participation in the Energy policy development in the Western Cape 2005 – 2008

This White Paper on Sustainable Energy is a result of a long process of policy development as well as participation activities.

As described in Appendix 1, the policy formulation of this White Paper on Energy is an integrated and logical result of the PGDS and the SDIP.

Prior to those policy documents, the PGWC had drafted what is now called the Sustainable Energy Strategy, which is an internal department document. The Sustainable Energy Strategy Process started in 2005 with the development of a status quo document outlining the energy issues in the Western Cape. From the status quo document followed research that could provide facts around options and the actual energy situation.

The support documents included the Energy Profile of the Western Cape based on 2004 data, the Renewable Energy Scenarios and Action Plan and Energy Efficiency Scenarios and priorities. This formed the Sustainable Energy Strategy Compendium. This was also summarised into the current Sustainable Energy Strategy.

Throughout the process there has been engagement with stakeholders.

In 2006 a series of Workshops endorsed by the PDC and advertised in the local newspapers were held for the following sectors: local government; labour; NGOs; business and the public.

The draft strategy was finalised based on the comments received.

During that process the above-mentioned Sustainable Development Implementation Plan was also being developed. Energy was one of the areas defined and this was clearly linked to the strategy. Through their consultation process the energy issue and strategy was discussed and noted by stakeholders through the PDC.

The process included one-on-one meetings with internal stakeholders on the potential impact of the proposed strategy on their area of work – for example from the Health Department to the Economic Development Department. That process was complimented by the engagement of the multi-stakeholder Energy Risk Management Committee which was set up around the time of a crisis relating to electricity shortages.

This process was followed in 2007 by a conference on climate change and energy. The strategy was presented and a call for legislation that would entrench the outcomes of the conference and the strategy was proposed. At this conference the draft strategy document was made available.

The draft climate change strategy, its supporting documents as well as popular brochures of the energy profile and strategy have been made available on the special purpose website www.wcapeenergy.net.

The participation process on the development of the White Paper on Sustainable Energy has included:

- internal consultations;

- establishment of a reference group and consultation;
- external consultation with local municipalities, national departments, business and Labour; and
- Public hearings.

The White Paper process complied with the PGWC guidelines on formulation of policy and legislative documents.

Appendix 3: Key Stakeholder Roles for Development of WCPG Sustainable Energy Framework 2008-2014

Role/ Stakeholder Groups	Policy	Legislation/ Standards	Enforcement	Implementation	Finance	Research	Education/ Awareness	Monitoring	Other roles
WCPG	V	V	V	(V)			V	V	
Local Government	(v)	V	V	V	V		V	V	V
National Government	(V)	V			(V)		(V)		V
NERSA		V	V						
User Group: Industry	(v)			V	(v)		V		
User Group: Buildings	(v)			V	(v)		V		
User Group: Residents	(v)			V	(v)				
Organised Labour	(v)								
IPPs				V	V				
Eskom				V	V				
ESCOs				V					
NGOs	(v)					V	V		V
Donors					V				V
Universities						V			
Consultants				V					
Individuals / Others	(V)					V			V
V = Key role and (v) = Consultation role									