



**Provincial Government Western Cape
Department of Environmental Affairs and
Development Planning**

**Draft Western Cape
Integrated Energy Strategy**

January 2007

DOCUMENT STRUCTURE

Introduction.....	2
1 Motivations for an Integrated Energy Strategy.....	2
2 Provincial Government Mandate	3
3 Portfolio Approach to Energy Planning	3
4 Energy Profile in the Western Cape.....	4
5 Sector Energy Use & Opportunities for Energy Efficiency.....	5
5.1 Transport Sector.....	5
5.2 Industry	6
5.3 Commerce and Government	6
5.4 Residential	7
6 Increasing the Energy Supply.....	10
6.1 Current Energy Supply	10
6.2 Opportunities for Increasing Supply.....	10
6.3 Supporting Clean, Renewable Energies	13
7 Integration	13
7.1 Multi-Stakeholder Integration.....	13
7.2 Cross-Sectoral Integration.....	14
7.3 Intergovernmental Energy Task Team.....	14
8 Recommendations	14
8.1 Policy Recommendations	14
8.2 Strategy Framework and Programme of Action	16
9 Conclusion	26
10 Terms used in this document.....	26
References	28

**PLEASE SEND COMMENTS TO ELIZABETH@SUSTAINABLE.ORG.ZA BY
7 MARCH 2007**

INTRODUCTION

Due to the recent energy crisis in the Western Cape, the process of introducing a renewable energy policy, strategy and programme of action has been fast-tracked. It is believed that this is necessary to ensure that measures to reduce energy consumption and increase the supply of clean, renewable energy can be taken as soon as possible.

This discussion paper outlines the key energy concerns and opportunities facing the Western Cape. It proposes a range of policies, strategies and actions that will allow the Province to develop a sustainable portfolio of energy solutions while also reducing pollution and increasing access to energy for all citizens in the Province.

Energy concerns are cross-sectoral and must be handled in an integrated manner. It is therefore essential for the full range of stakeholders to have input into the strategy from all levels of government and all sectors, including transport, housing, health, social development, and economic development. It is also pivotal for the Province's energy strategies to be integrated into existing and pending policies and strategies for the Province's development, such as the Strategic Infrastructure Plan, the Micro-Economic Development Strategy (MEDs), the Spatial Development Framework (SDF) and the Local Economic Development Strategies (LEDs).

The Department of Environmental Affairs and Development Planning (D:EADP) thus calls on all stakeholders in government, as well as business and civil society to comment on the proposed approach and strategies before **7 March 2007**. The discussions stemming from this document, as well as all comments received on it will be taken into account in developing the Province's Integrated Energy Strategy.

Vision

The Provincial Government's Integrated Energy Strategy seeks to ensure that the Western Cape has a secure supply of quality, reliable, clean energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and eradicating fuel poverty.

1 MOTIVATIONS FOR AN INTEGRATED ENERGY STRATEGY

The recent energy crisis in the Western Cape has highlighted the need to develop a plan for sustainable, secure energy provision in the Western Cape. Although various national efforts are underway to increase energy provision to the Western Cape, the Provincial Government believes that additional efforts need to be made to address the other energy challenges facing the Province, including the challenges of:

- reducing the Province's carbon footprint,
- providing access to energy to all citizens in the province, and
- addressing the numerous health, social and environmental problems associated with our current energy use patterns.

These challenges need to be addressed in the context of supporting the Province's economic development and job creation.

The development of this discussion document was preceded by a Status Quo and Gap Analysis which highlighted the need for an effective energy policy to ensure the availability of background information and data for policy-makers, provide an effective institutional structure for integrated energy management, develop a regulatory and policy framework, develop a

training, communications and awareness raising programme and establish partnerships with public and private sector bodies.

Based on the gaps identified, certain actions have already been taken, including:

- the formation of an Intergovernmental Energy Task Team (IETT)
- ongoing engagement with stakeholders at provincial and national level
- completion of a provincial energy inventory, which has been used to inform this discussion document
- adoption of a resolution at the Sustainable Development Conference requiring the Province to develop a strategy to address energy and climate change
- drafting of this discussion document.

2 PROVINCIAL GOVERNMENT MANDATE

The arguments supporting the Provincial Government's mandate to develop an Energy Policy and Strategy are complex and need to be clearly articulated to ensure that all stakeholders understand and agree to the scope of the Provincial Government's efforts.

The South African Constitution sets out the competencies of the national, provincial and local spheres of government. Schedule 5 of the Constitution sets out the areas that are the exclusive responsibility of the provincial and local spheres of government, while Schedule 4 sets out areas of concurrent competence. While electricity and gas reticulation is listed as the concurrent responsibility of national and local government, broader energy concerns are not specifically addressed. However, the Provincial Government has a clear mandate around economic development, housing, provision of public transport and environmental protection.

It is not proposed that the Provincial Government should act as a reticulator or generator of energy, but rather that it should act in a capacity which stimulates the economy, combats climate change, improves public transport, promotes sustainable practices and supports local government. In this context, promoting renewable energy and energy efficiency is well within the Provincial Government of the Western Cape's (PGWC's) mandate.

Energy concerns impact on a full range of sectors and activities and this issue is a prime example of an area requiring co-operation between the different spheres of government. The PGWC is actively seeking to co-operate with other government bodies around energy concerns, and proposes to provide assistance, support, and leadership. Through a process of internal discussion as well as public participation, the Provincial Government is attempting to ensure that its efforts to develop the renewable energy sector and promote energy efficiency are co-ordinated with the efforts of other spheres of government relating to energy.

The Provincial Government can also play a leadership role in this area, by ensuring that its internal functioning promotes energy efficiency, and that it supports research, development and implementation of cleaner energy production, distribution and consumption.

The kind of role that the PGWC wishes to adopt in relation to energy is consistent with the roles adopted by provincial governments across the world, and the PGWC is taking some direction in this matter from the governments with which it has twinning arrangements.

3 PORTFOLIO APPROACH TO ENERGY PLANNING

Traditionally, energy planning has followed a least cost approach which often fails to take into consideration issues of sustainability, social development and environmental protection.

In order to avoid these oversights, the Provincial Integrated Energy Strategy will adopt a portfolio-based approach which focuses on securing a range of secure energy generation and management options including demand and supply-side options.

This approach promotes a range of energy efficiency and conservation measures and the diversification of the energy supply mix, with a focus on sustainable and clean energy sources.

4 ENERGY PROFILE IN THE WESTERN CAPE

Energy Consumption

In 2004, approximately 250 million GJ of energy was consumed in the Western Cape. Over the next 20 years, if the economy continues to grow as expected, it is predicted that the demand will grow to 420 million GJ, unless energy consumption patterns change drastically.

As shown in Chart 1, the industrial and transport sectors are currently the largest energy consumers. The transport sector is heavily dependent on petrol, while the industrial sector is the largest electricity consumer, and the second largest petrol consumer.

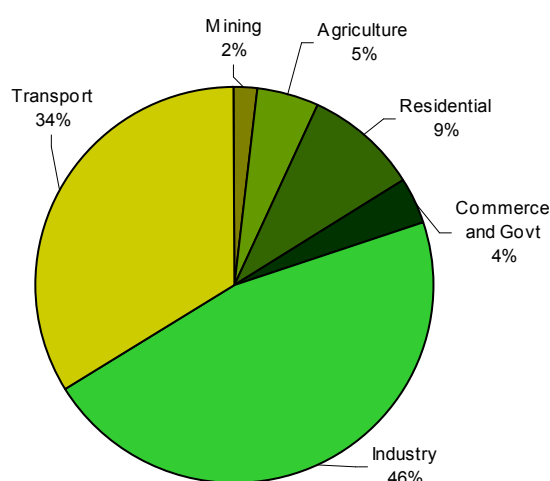


Chart 1:
Western Cape Energy Consumption by Sector

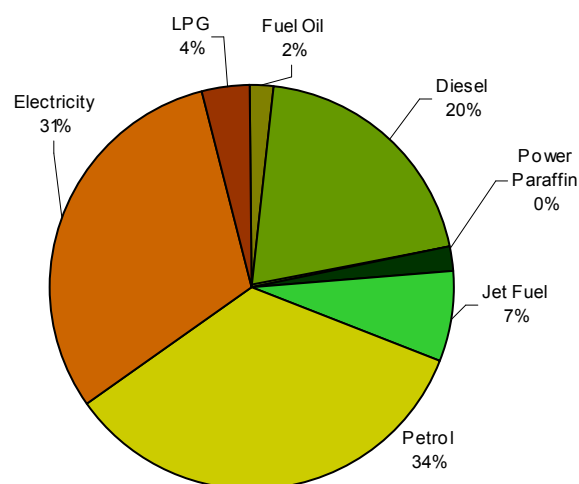


Chart 2:
Western Cape Energy Consumption by Fuel Type

Carbon Emissions

The Western Cape is currently producing 30,536,000 tonnes of CO₂ per year – with almost half this amount originating from the industrial sector and a further 22% stemming from the transport sector.

Most of the Carbon emissions are as a result of electricity production, since most of South Africa's electricity is generated from coal sources which have a high CO₂ intensity. However coal use (other than for electricity) and petrol consumption are also important sources of Carbon emissions.

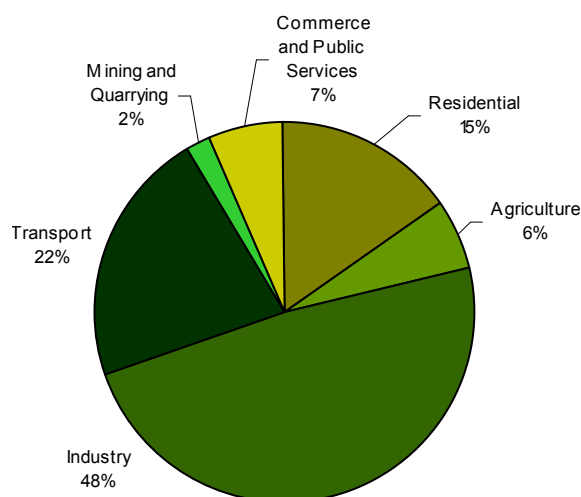


Chart 3:
Western Cape Carbon Emissions by Sector

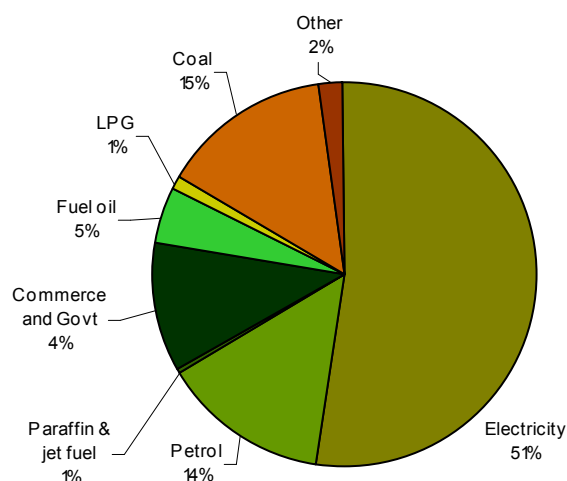


Chart 4:
Western Cape Carbon Emissions by Fuel Type

5 SECTOR ENERGY USE & OPPORTUNITIES FOR ENERGY EFFICIENCY

5.1 Transport Sector

The transport sector is responsible for 34% of total energy consumption in the Western Cape, and produces 22% of carbon emissions. The sector relies predominantly on petrol (67%) and diesel (30%).

Private passenger transport accounts for 75% of energy use in the sector. While public transport accounts for 20% and freight and rail account for 4%.

Exhaust emissions account for a large percentage of the Province's particulate air pollution.

Modal Shift

A shift from private to public transport could result in massive energy savings, CO₂ emissions reductions and air particle pollution reductions. If private transport is reduced to 25% and public transport increased to 75%, almost R40 billion can be saved by 2024. This will require massive changes in infrastructure, the costs of which have not been calculated here, but some of these costs can be offset by resultant savings, such as fuel savings.

Projections For 2024		Modal Shift
Business as Usual	Efficiency Scenario	
116,793,000 GJ	90,540,000 GJ	Energy
9,011,790 kg	7,235,840 kg	CO ₂ emissions
3,561,500 kg	2,658,120 kg	Total Suspended Particulates

Taxi Shift to Diesel

Switching sections of the sector, such as the mini-bus taxi industry, to diesel vehicles, as foreseen in the Taxi Recapitalisation programme, also offers potential for reduced pollution, especially when low sulphur Diesel is introduced. If 100% of taxis are converted to Diesel vehicles, this could result in a saving of over R3 billion rand by 2024.

Projections For 2024		Taxi Shift to Diesel
Business as Usual	Efficiency Scenario	
19,603,000 GJ	18,343,000 GJ	Energy
1,387,110 kg	1,349,490 kg	CO ₂ emissions
263,390 kg	42,290 kg	SO ₂ emissions

Switch to BioDiesel

If BioDiesel can capture 15% of the diesel market by 2024, CO₂ and SO₂ emissions could be further reduced.

Projections For 2024		Switch to BioDiesel
Business as Usual	Efficiency Scenario	
9,656,110 kg	9,222,740 kg	CO ₂ emissions
2,749,530 kg	2,739,300 kg	SO ₂ emissions

5.2 Industry

The industrial sector accounts for 46% of total energy consumption in the Western Cape, and produces 48% of the province's carbon emissions. Industry is heavily reliant on electricity.

Energy Efficiency

There are proven opportunities for demand-side efficiency measures which have very short pay-back periods and can be immediately implemented. Many of these only require changes in behaviour. If the industrial sector becomes 10% more efficient, this could amount to cumulative savings in 2024 of 278 million GJ and CO₂ reductions of 35.328 billion kilogrammes.

Projections For 2024		Industrial energy efficiency
Business as Usual	Efficiency Scenario	
229.38 mil GJ	206.45 mil GJ	Energy
29.278 bil kg	26.35 bil kg	CO ₂ emissions

Fuel Switching

If half the thermal energy demand in the industrial sector is supplied by natural gas instead of coal, there would be a small decrease in energy use by 2024. However the reduction in CO₂ emissions would be significant, amounting to a saving of 12.98 billion kilogrammes of emissions.

Projections For 2024		Fuel switching: coal to natural gas
Business as Usual	Efficiency Scenario	
229.38 mil GJ	227.57 mil GJ	Energy
29.278 bil kg	27.759 bil kg	CO ₂ emissions

5.3 Commerce and Government

The Commercial and Public sectors account for 4% of total energy consumption in the Province. These sectors together produce 7% of the carbon emissions in the Western Cape.

Energy in the commercial sector is predominantly used for lighting and heating, ventilation and cooling (HVAC) of buildings. Government energy consumption is also predominantly for lighting and HVAC, but also includes streetlights and water supply and treatment.

Significant opportunities for greater energy efficiency in this sector include efficiency in lighting, solar water heating, HVAC efficiency and green building design.

Lighting

If all lights in the commercial and government sectors were replaced with compact fluorescent lights (CFLs) and efficient fluorescent lights by 2024, an electricity saving of almost R600 million could be achieved in the commercial sector and a further R69 million in the government sector. Additional savings accrue due to the fact that CFLs do not need to be replaced as often as incandescent bulbs. These replacement savings alone, far outweigh the greater cost of the CFLs. Significant savings in CO₂ emissions would also be realised (2,426,035 tonnes of CO₂ in the commercial sector and over 300,000 tonnes in the government sector).

Projections For 2024		Lighting
Commercial	Government	
R589 mil	R69 mil	Electricity Saving
2,426,035 t	327,481 t	CO ₂ emissions savings

Heating Ventilation and Cooling

It is relatively easy to improve HVAC efficiency by 10% just through behavioural change. If this could be achieved by 2024, a cumulative saving of over R180 million could be realised in the commercial sector, and R21 million in the government sector. 1,216,000 and 143,000 tonnes of CO₂ could be saved in the commercial and government sectors respectively.

Projections For 2024		HVAC
Commercial	Government	
R180,887,945	R21,214,148	Electricity Saving
1,216,000 t	143,000 t	CO ₂ emissions savings

5.4 Residential

Residences consume 9% of all energy in the Western Cape, producing 15% of the province's carbon emissions.

While only 65% of rural households in the Western Cape are electrified, 85% of urban households are electrified, and urban medium-high income households are the largest consumers of energy, using 54% of all energy in the residential sector.

Solar Water Heaters (SWHs)

There is significant potential for solar water heaters to reduce electricity consumption in medium-high income households, and in institutions such as hospitals, hotels and old age homes. If 15% of electric geysers were replaced with SWH by 2024, cumulative savings of almost R670 million would accrue. This can be offset against the cost of the installations (conservatively estimated at R6000 per unit), and would still amount to savings of over R400 million.

Projections For 2024		SWH Financial Viability
Savings	Capital Outlay	
R668,019,224	- R240,440,443	Medium-High Income
R44,771,099	- R269,313,334	Low Income

Installation of SWH in low-cost households is not financially attractive as the energy savings do not outweigh the capital outlay over the projection period. However, the energy saving per household is significant if one considers it in terms of the percentage of income that low-cost households spend on energy. Innovative financial options should therefore be considered in this context.

Projections For 2024		SWH Carbon emissions
Low Income	Medium-High Income	
240,000 t	3,500,000 t	Cumulative Savings

Overall, in the residential sector, savings from SWH in 15% of all households can result in a saving of R200 million, including installation costs. An increase in demand for SWH could well result in lowered installation costs which would make a significant difference to this scenario.

SWH in the residential sector can result in savings of over 3.5 million tonnes of CO₂ emissions. If funding could be obtained from the Cleaner Development Mechanism, at a price of \$5 per tonne, R15 million could be obtained towards the low-cost housing sector fitments alone.

Lighting

Use of CFLs instead of inefficient incandescent lights also has the potential to significantly reduce energy consumption in the residential sector, amongst both medium-high and lower income households.

Projections For 2024		Lighting Financial Viability
Low Income	Medium-High Income	
R2,120,381 mil	R5,920,152 mil	Energy savings
1,800,000 t	5,000,000 t	CO ₂ emissions savings

If all households in the Province were fitted with CFLs (2 per low-income household and 4 per medium-high income household), a cumulative saving of R5 billion could be achieved by 2024. Cumulative carbon emissions savings of almost 5 million tonnes could also be achieved.

Ceilings

Installation of ceilings into low-income households results in lower energy use per household for space heating. However, the installation cost is not offset by the energy savings over the period considered. Significant carbon emissions savings however can be achieved.

Projections For 2024	Ceilings
R269,164,079	Cumulative Cost
285,457 t	CO ₂ emissions savings

A summary of the feasibility and challenges of various energy efficiency interventions is tabled below:

Table 1: Viability of Energy Efficiency Measures

	Efficiency Measure	Financial Feasibility	Social Benefit	Environmental Benefits	Implementation Priority	Challenges
Residential	SWH	✓	✓	✓	Immediate	Establishing suitable financing mechanisms may be institutionally demanding. Also, appropriate standards for equipment and operation need to be in place.
	CFL	✓	✓	✓	Immediate	Dissemination of CFLs and information dissemination poses a minor challenge.
	Ceilings	✗	✓	✓	Medium-Term	Installation costs are prohibitive in the low-income residential sector
Commercial & Government	CFL	✓	-	✓	Immediate	Information dissemination poses a minor challenge.
	HVAC efficiency	✓	-	✓	Immediate	Information dissemination to ensure behaviour change poses a minor challenge.
Industry	Efficiency	✓	✓	✓	Immediate	Information dissemination to ensure behaviour change poses a minor challenge.
	Industry fuel switch	?	✓	✓	Medium to Long	Distribution infrastructure of natural gas is a large project, but is being addressed nationally.
Transport	Modal shift	?	✓	✓	Immediate Long-Term Duration	Infrastructure and planning demands are significant to realise a significant modal shift. Infrastructure costs are likely to be huge.
	Taxis to diesel	?	✓	✓	Medium to Long	Challenging to realise changes in a poorly regulated industry such as this.
	Bio-diesel fuel switch	?	✓	✓	Medium-Term (Immediately start with promotion strategy)	Inclusion of bio-diesel in the supply network poses an institutional challenge, however the oil companies can undertake this with relative ease.

? = unknown, needs further investigation

✓ = yes

✗ = no

6 INCREASING THE ENERGY SUPPLY

The Western Cape currently relies heavily on coal-produced electricity and on petrochemicals for its energy supply. This is consistent with the rest of the country, where 90% of the electricity supply is derived from coal. Producing electricity from coal leads to air and ground pollution and consequently a range of associated health problems (e.g. asthma).

In order to ensure that energy can be accessed from various sources in emergency situations, it is necessary to explore alternative sources of energy. The expected increase in energy demand also motivates strongly for exploring new energy sources. (Energy demand across the country is increasing by 2-3% annually and may be higher in the Western Cape due to anticipated economic growth and industrial development).

6.1 Current Energy Supply

Electricity Profile

The Western Cape buys most of its electricity from Eskom, much of which comes from coal generated energy plants elsewhere in the country (predominantly from Mpumalanga). However, a portion of our electricity is generated locally, including energy from the Koeberg Nuclear Power Plant, the Acacia Gas Turbines, the Palmiet Pumped Storage Facility and the Klipheuwel Demonstration Wind Farm. The City of Cape Town also produces a small amount of electricity through the Steenbras Pumped Storage facility and local Gas turbines.

Although Eskom has line strengthening plans in place to help secure electricity for the Western Cape, there are a range of other options that may be preferable, including diversifying the supply mix and broadening the energy generation options.

Petrochemical and Fuel Profile

A large portion of the Province's liquid fuels are imported, though the Caltex refinery in Milnerton supplies a significant portion of refined liquid fuels.

The Provincial Strategic Infrastructure Plan aims to address options for expanding the province's public transport network. Strategies for introducing cleaner fuels need to be integrated into this plan.

6.2 Opportunities for Increasing Supply

There are a number of ways in which the energy supply to the province could be increased and diversified, ensuring energy security and promoting clean, renewable energy sources.

The various opportunities are outlined in the table below with comments on their viability and sustainability.

Table 2: Opportunities for Energy Generation in the Western Cape

Energy Source	Potential	Sustainability issues
Coal generated electricity	<ul style="list-style-type: none"> • High potential. • SA has significant coal reserves and new technologies for clean coal (gasification) are being developed. • Will produce base load. • Line strengthening to Western Cape will be essential. 	<ul style="list-style-type: none"> • Building new generation capacity will see an increase in electricity prices that may not make it financially sustainable unless heavily subsidised. • Fluctuations in commodity prices increase financial risk. • Accompanying CO₂ increase is not desirable in light of SA's ratification of the Kyoto Protocol and the National Climate Change Response Strategy. • There are concerns regarding health-related issues in Mpumalanga. • Increased coal usage will also jeopardise the City of Cape Town and other cities' commitments to clean energy targets.
Nuclear energy	<ul style="list-style-type: none"> • Significant potential. • Costly. • Long development lead times will not see plants on stream in time to meet envisaged shortages in the Western Cape in the short-term. 	<ul style="list-style-type: none"> • Nuclear energy is viewed as controversial yet is seen as cleaner than coal. • No clear, acceptable strategies and options exist for disposal of radioactive waste. • Decommissioning of old Nuclear Power plants is extremely costly. • Heavy subsidisation is necessary. • Public resistance may increase times to development.
Natural gas	<ul style="list-style-type: none"> • High potential if sufficient resources of gas are discovered. • Importing gas is an option if no sufficient domestic sources are available. • Supplies are currently not confirmed. 	<ul style="list-style-type: none"> • Natural gas is a cleaner fossil fuel-based option than coal. • It is less controversial than nuclear energy and can provide base load capacity. • Options for local job creation are high.
Wind energy	<ul style="list-style-type: none"> • High potential (3000 MW approx.) in the Western Cape, but resources need to be confirmed. • Technology & capital costs are reducing rapidly. • Low maintenance. 	<ul style="list-style-type: none"> • Clean option. • Intermittent supply and storage issues need to be resolved. • Cannot supply base load unless working with hybrid solutions. • Can be quickly installed in areas needing new supply.
Biomass	<ul style="list-style-type: none"> • Medium potential: 1 to 50 GJ/ha/yr. • Insufficient assessment of commercial potential in Western Cape. • Opportunities for small biomass projects particularly within forestry and agricultural industry. • No clear assessment of other biomass potential e.g. sewage waste. 	<ul style="list-style-type: none"> • Renewable resource. • Job creation in downstream and upstream industries. • Lower emissions if sound technology is used. • Producers obtain their own energy requirements from this source, therefore lessening the demand on the grid.

Energy Source	Potential	Sustainability issues
Solar radiation	<ul style="list-style-type: none"> • Medium to high potential. • Radiation varies from 6,501- 7 000 MJ/m²/pa across the province. • Solar PV technology is expensive. 	<ul style="list-style-type: none"> • Significant potential for SWH projects either at large residential scale or individual level. • A clean technology from a renewable source • Small business opportunities exist • Few local manufacturers • Possibility of subsidisation from national bodies
Wave power	<ul style="list-style-type: none"> • High potential. • Significant resources along West Coast particularly Cape Columbine through to the Cape Agulhas area. • Availability of appropriate technology to be assessed. • High capital costs. 	<ul style="list-style-type: none"> • Renewable energy source • No CO₂ emissions but may have high ecological impact. • Job creation potential not quantified but is significant.
Waste	<ul style="list-style-type: none"> • High potential for energy recovery from waste – landfill gas in particular (e.g. 6 sites in Cape Town). • Capital investment high. 	<ul style="list-style-type: none"> • Controversial in the case of incineration of certain wastes. • Landfill gas projects are viable and can benefit from the Cleaner Development Mechanism (CDM) financing support. • Financial viability marginal but new technology may improve this.
Hydropower	<ul style="list-style-type: none"> • Low potential. • Depending on resource assessments, potential for small-scale stand-alone projects may exist. • These will not be suited for grid connection. 	<ul style="list-style-type: none"> • Renewable resource but impact may be high especially in sensitive aquatic systems. • Financially not viable without significant subsidies or innovative financial engineering.

6.3 Supporting Clean, Renewable Energies

In order to for a renewable, clean energy industry to develop in the Western Cape, certain barriers need to be addressed. Through its various programmes, the Provincial Government of the Western Cape will seek to create a supportive and enabling environment which addresses the key barriers to market transformation as outlined in Figure 1 below.

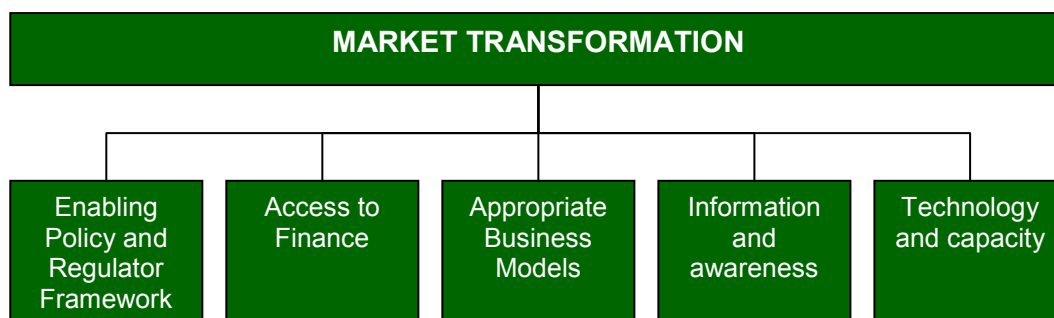


Figure 1: Barriers to Market Transformation (Eberhard, 2005)

The development of a Renewable Energy Strategy forms part of this initiative. Integration of renewable energy principles and strategies into key Provincial plans is also of fundamental importance.

7 INTEGRATION

7.1 Multi-Stakeholder Integration

The Provincial Government is adopting a facilitation and co-ordination role regarding renewable energy and energy efficiency in the Western Cape. The PGWC will work closely with National and Local Government, as well as with civil society to ensure that the integrated energy strategy complements energy work being done at various levels, and to ensure that implementation occurs as envisaged.

The Provincial Government will ensure that the Western Cape Integrated Energy programme complements the policies and strategies of **National Government**. The province will also lobby National Government for financial support for energy projects in the Province.

Local Government plays a crucial role in energy planning and delivery. To support local government, the Provincial Government will inter alia, conduct energy audits at local level, provide support for incorporating energy concerns into Local Economic Development plans, offer capacity building programmes and improve communication and planning between government spheres and components.

The Provincial Government will also work closely with **Wesgro**. Amongst other things, Wesgro has played a key role in championing the establishment of an oil and gas hub in Saldanha, and has helped facilitate the introduction of international energy companies into the Western Cape. Wesgro will continue to be a valuable sector development partner.

Civil society also has a key role to play, and the Provincial Government will involve the **Provincial Development Council (PDC)** in energy planning and will ensure that the PDC is regularly updated on progress through quarterly updates.

7.2 Cross-Sectoral Integration

Energy concerns are not isolated to a single sector or government department – energy supports all aspects of industry, commerce, residential, healthcare, social development, economic development, transport etc and renewable energy principles and strategies need to be incorporated into the strategies affecting all these areas.

As such, it is essential that the Provincial Government's approach to energy planning is integrated into the following key strategies and plans:

- Spatial Development Framework
- Strategic Infrastructure Plan
- Micro-economic Development Strategy
- Local Economic Development Strategies

7.3 Intergovernmental Energy Task Team

To help ensure that all stakeholders are actively involved in the integrated energy programme, the PGWC will create an Intergovernmental Energy Task Team, which will consist of representatives from all the relevant government stakeholder groups.

8 RECOMMENDATIONS

The various aspects of the Integrated Energy Strategy affect different implementing bodies and will occur across an extended time line, with a focus on achieving certain objectives by 2015. Various policy and strategy recommendations are outlined below, along with a programme of action.

8.1 Policy Recommendations

The Provincial Government of the Western Cape is committed to energy efficiency and renewable energy, and to reducing the Province's carbon footprint and eradicating energy poverty. In order to achieve this vision, the PGWC will:

- Support the achievement of the Province's economic development objectives and contribute to the goals of iKapa Elihlumayo through an Integrated Energy Strategy and associated Programme of Action.
- Show effective leadership and play a co-ordinating role around energy policy and programmes in the Province.
- Support an approach to energy planning, which takes into account environmental, social and economic considerations.
- Develop effective partnerships with all key role players in the provincial energy system ensuring the Programme of Action is implemented and the targets achieved.

- Initiate fiscal reforms, aligned with the national Treasury Environmental Fiscal Reform process, examining new means of financing clean energy initiatives and removing market barriers.
- Support research and development around renewable energy and energy efficiency technologies.
- Promote demand-side energy efficiency programmes in the industry, commerce, government and residential sectors.
- Support a modal shift in the Transport sector towards greater use of public transport.
- Develop a series of new policy and practice guidelines, at Local and Provincial Government level prioritising energy efficiency in buildings (residential, commercial), vehicles and industrial settings.
- Engage with the building industry in the Province to establish an Energy Charter that will guide the development of new buildings and the retrofitting of existing buildings. The Provincial government will support programmes and projects that are aimed at creating environmentally friendly buildings.
- Become a showcase for sustainable commercial and public sector buildings.

The PGWC will set clear targets that are at least consistent with national targets and will take proactive measures to meet these commitments. These targets should include the following:

Table 3: Energy Targets for the Western Cape

Target	Objective	Date
15%	Renewable energy generation (electricity only) in the Western Cape off the current generation baseline of 5500MW	by 2015
10%	Overall energy efficiency against business as usual scenario	by 2015
10%	Industry energy efficiency	by 2015
15%	Residential energy efficiency	by 2015
15%	Commercial energy efficiency	by 2015
30%	Transport energy efficiency	by 2015
15%	Overall energy efficiency against business as usual scenario	by 2020
10%	Carbon emissions reduction (in 2000 levels)	by 2015
15%	Carbon emissions reduction (in 2000 levels)	By 2020
10%	Renewable Energy purchased by Provincial Government	by 2010
50%	Government vehicles converted to cleaner fuels	June 2008
1	Green development in each development node	July 2008

8.2 Strategy Framework and Programme of Action

The strategy developed by the Provincial Government comprises a number of elements. Each of these is key in shaping the overall programme that has been developed and is highlighted in the diagramme below.

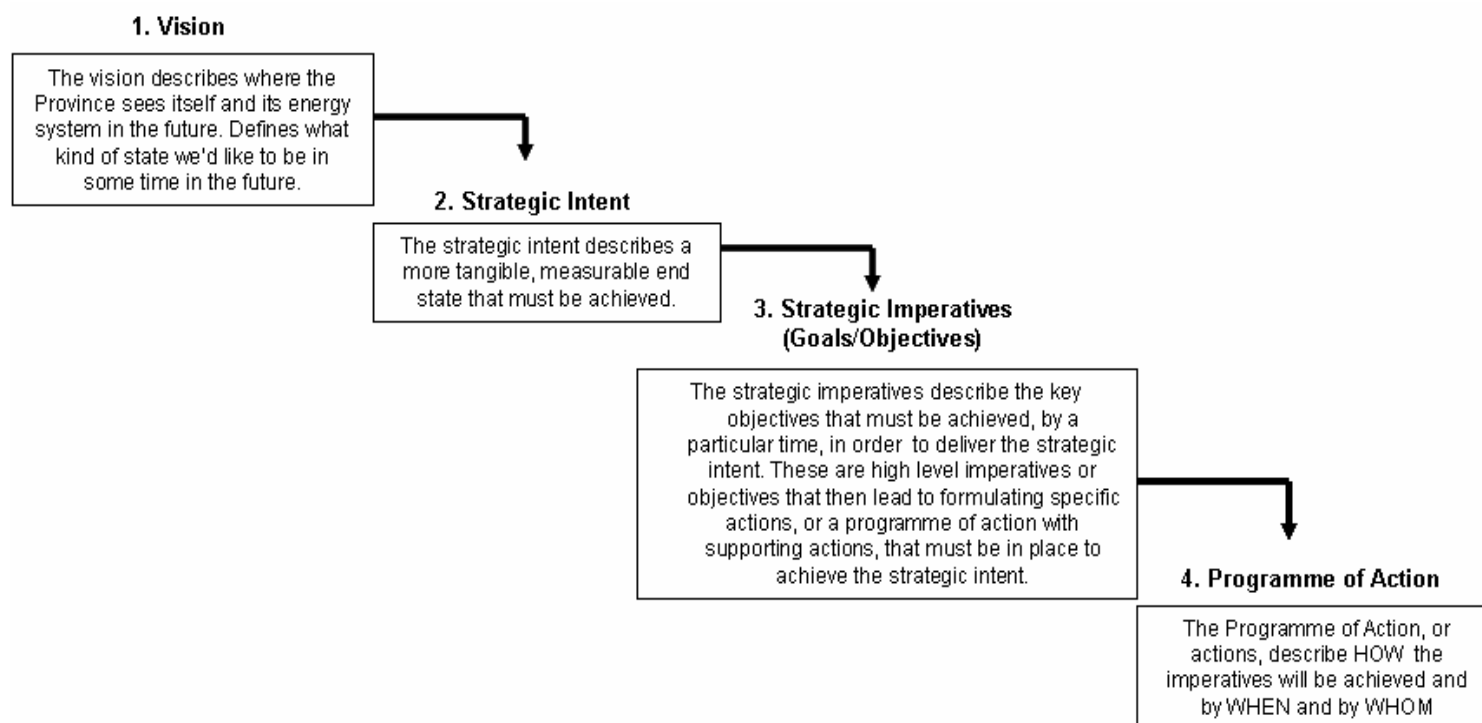


Figure 2: Energy Strategy framework

The **Key Principles** on which the success of the IES is based are listed below. These are crucial in ensuring that an enabling environment is created that will allow the Government to achieve the goals and objectives set out. They are pre-conditions to the success of the overall programme:

- Demonstrating Leadership through action;
- Building Effective Partnerships;
- Stimulating the Market for renewable energy and energy efficiency;
- Implementing Appropriate Financial Mechanisms to support market development, and;
- Supporting Local Government.

The **Energy Vision and Strategic Intent** are described in the diagramme below.

Table 4: Vision and Strategic Intent

Energy Vision	To ensure that the Western Cape has a secure supply of quality, reliable, clean energy, which delivers social, economic and environmental benefits to the Province's citizens, while also addressing the climate change challenges facing the region and eradicating energy poverty.
Strategic Intent	To develop a sustainable energy system that reduces its impact on people's health and the environment whilst contributing to long term sustainable economic development (PGDS, SDIP).

In order to deliver on the IES (i.e. to achieve the vision, reduce dependence on fossil fuels, as well as achieve the targets and goals for energy efficiency, renewable energy generation and carbon reduction) the PGWC has to create an enabling environment that will allow for these objectives to be reached. The creation of this enabling environment forms the basis of the PGWC's **Programme of Action**.

By leading by example, the PGWC will demonstrate its commitment to the energy strategy and demonstrate the viability and effectiveness of some of the interventions. Working with all stakeholders will make implementation possible on a wider scale. Providing both incentives and disincentives will help direct behaviour toward more energy efficient and sustainable practices.

The **Strategic Imperatives**, or high level objectives are described in the table below. These form the basis of the Programme of Action that is laid out in the tables on the following pages. The Programme of Action describes a number of activities and programmes that have already been initiated by various entities as well as those that the PGWC intends to develop depending of feedback from stakeholder groups and its social partners.

Table 5: Strategic Imperatives (High Level Goals)

<p>Strategic Imperatives</p>	<ol style="list-style-type: none"> 1. to improve the health, welfare and prosperity of all citizens in the Province; 2. to reduce the Province's contribution to climate change by reducing CO₂ emissions from all sectors primarily through energy efficiency, renewable energy and cleaner fuels; 3. to reduce, and where possible eliminate, pollution from a variety of sources especially vehicular emissions; 4. to promote the development of sustainable energy technologies and projects and enhance energy efficiency; 5. to eradicate fuel poverty and provide access to modern energy services; 6. to provide energy security through diversifying the energy mix; and 7. to contribute to greater economic development, economic competitiveness and job creation through delivering sustainable energy and improving the performance of our building and housing programmes.
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The strategic imperatives or high level goals will be achieved by implementing the specific objectives highlighted in the tables on the following pages.

Table 6: Goals and Associated Actions

STRATEGIC OBJECTIVE 1: LEADERSHIP THROUGH ACTION				
Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Co-ordinate and provide leadership	Clear Mandate and Institutional Mechanism	Develop a Renewable Energy Act and Provincial Energy Agency (PEA)	Dept of Environment Affairs & Development Planning (D:EADP) Premiers Office	May 2008
	Energy Efficiency Map	Track the implementation of energy saving and efficiency programmes across the province, in conjunction with local authorities	D:EADP and continued by Independent Body/PEA	May 2007
	Provincial Energy Budget	Investigate mechanisms for expanding the provincial discretionary budget to fund clean energy programmes to complement the Department of Minerals and Energy's renewable energy subsidy programme and future feed-in tariffs.	Provincial Treasury	May 2008
	Energy Policy and Strategy Integration	Integrated energy efficiency and renewable energy principles and objectives into the relevant Provincial planning frameworks (SIP, PSDF, MEDS, LEDS)	D:EADP Premiers Office	May 2007
Ensure that the technology and capacity exists in the Province to implement the projects	Local Authority Support	Support municipalities to undertake city energy strategies and set sustainable energy goals and implement on projects. Support capacity building programmes with local authorities, in conjunction with the National Energy Efficiency Agency. Energy audits will also be conducted at local level	Dept of Housing & Local Government (D:H&LG)	June 2008
	Capacity Building and Industry Development	Assisting industry, NGOs and other stakeholders to develop capacity to deliver by identifying needs in the Province working in conjunction with the various stakeholders. Work with tertiary institutions in developing capacity within the province.	Department of Economic Affairs & Tourism (D:EAT) and D:EA&DP	Sept 2008

STRATEGIC OBJECTIVE 2: BUILDING EFFECTIVE PARTNERSHIPS

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Enlist support of key Provincial governmental partners	Intergovernmental Energy Task Team established	Implement second phase of inter-departmental consultations and discussion forums to take forward energy issues developed during initial consultation phase	D:EADP	March 2007
Secure support and participation of the Provincial Development Council (PDC)	Inclusion of the PDC in energy task team	Provide briefings to the PDC and secure members to serve on the Intergovernmental Energy Task Team	D:EADP	May 2007
Ensure energy strategy is integrated as a core cluster of the SDIP	SDIP	Establish an energy cluster in the SDIP and conduct briefings with other SDIP clusters and run cluster workshops	SDIP coordinating team	March 2007
Secure support of national government departments	Endorsement of the energy strategy and participation in various programmes	Conduct briefings with individual ministries and departments and include nominated representative on Provincial energy task team	IETT D:EADP	April 2007
Secure support and participation of various sector partners	WC Energy charter	<ul style="list-style-type: none"> Identify sectoral groupings e.g. learning institutions, business groupings, trade groupings, energy companies, NGOs and community groupings, Trade Unions. Conduct workshops/briefings with key groupings. Formalize signed off action plans with each sector. Establish monitoring and regular review mechanisms with each sector body, grouping 	D:EADP	May 2007

STRATEGIC OBJECTIVE 3: STIMULATING THE MARKET FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY
FOCAL POINT: TRANSPORT

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Reduce fuel consumption and carbon emissions from the transport sector through modal shift and fuel switching	Cleaner Fuels Programme	<ul style="list-style-type: none"> Convert 50% of the Government vehicle fleet to cleaner fuels 	D:T&PW	October 2007
		<ul style="list-style-type: none"> Monitor the health impacts of the national and provincial clean fuels programme (shift to unleaded fuel and introduction of low sulphur diesel) 	D:H&LG	June 2008
	Taxi Recapitalisation	<ul style="list-style-type: none"> Incorporate plans for conversion to bio-diesel or bio-ethanol into the Taxi Recapitalisation programme 	Department of Transport & Public Works (D:T&PW)	June 2008
	Subsidised Car Schemes	<ul style="list-style-type: none"> Revise the tender requirements for the subsidised car scheme to include zero emissions or hybrid vehicles like the Toyota Prius 	D:EADP	June 2008

FOCAL POINT: BUILDINGS

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Reduce energy consumption and carbon emissions from buildings in the commercial and government sectors through energy efficiency behavioural changes, and building retrofitting.	Energy Audit and Retrofit Programme	<ul style="list-style-type: none"> Conduct an Energy Audit of all provincial government buildings 	D:T&PW	Dec 2007
		<ul style="list-style-type: none"> Retrofit the Provincial Parliament Complex in Cape Town for energy efficiency (including solar water heating and energy from a photo-voltaic system) 		Sept 2008
	Incentive Programme for Energy Efficiency	<ul style="list-style-type: none"> Initiate a study into incentives around energy efficiency together with the City of Cape Town and the Provincial Treasury 	D:EADP CCT Provincial Treasury	June 2007
	PGWC Employee Solar Programme	<ul style="list-style-type: none"> Implement pilot solar hot water heater programme for PGWC employees 	D:EA&DP Eskom Provincial Treasury	March 2007

Ensure that new buildings in the commercial and government sectors are energy efficient	Develop & Implement Green Design Programme	• Work with industry partners to develop guidelines for energy efficient design		April 2007
		• Develop the new Provincial Government Complex in George according to green design principles	DT&PW	October 2007
		• Develop the new hospital in Khayelitsha according to green design principles	DT&PW	June 2007
		• Work with developers to showcase five energy efficient developments in the Province		October 2007
	Green Procurement Policy	• Adopt a green procurement policy based on the recommendations of the Waste Management Directorate of the D:EA&DP	Provincial Treasury D:EADP	November 2007

FOCAL POINT: CLEAN ENERGY SUPPLY

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Stimulate demand for renewable energy, and reduce carbon emissions from general energy consumption	Clean Energy Procurement Programme	• PGWC to procure 15% of its energy from renewable sources by 2010	Treasury D:EA&DP	March 2007
	Energy Investment Programme	• Work with Wesgro to develop an energy investment programme for the province.	Provincial Treasury WESGRO	April 2007
Support research, development and roll-out of clean energy sources	Renewable Energy Development Programme and investment case	• Work with industry associations to assist in the development and refinement of information to support business model development	D:EA&DP	May 2007
	'Solar Challenge' Programme	• Use this mechanism to introduce solar photovoltaic systems and accompanying financial incentives and financing options	D:EA&DP Provincial Treasury NERSA/CEF	Oct 2007
	Energy Resource Assessments Assessment	• Further clarify the feasibility of renewable energy options in the Western Cape through a wind energy resource assessment conducted in conjunction with industry sector organisations	D:EADP SESSA/SAWEA/industry groups	March 2008

	Finance Mechanisms and Incentives	<ul style="list-style-type: none"> Create a framework for financing renewable energy an energy efficiency projects in conjunction with the Provincial Treasury, the Department of Minerals and Energy and the Central Energy Fund. 	Provincial Treasury DME Central Energy Fund	April 2006
Ensure the feasibility of developing a clean energy portfolio in the Western Cape	Generation Study	<ul style="list-style-type: none"> Quantify the costs of developing a clean energy portfolio 	D:EA&DP Provincial Treasury	April 2007
FOCAL POINT: RESIDENTIAL ENERGY EFFICIENCY				
Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Reduce the energy consumption and carbon emissions from the residential sector and reduce health and safety dangers associated with current fuel types.	Domestic Energy Use Programme	<ul style="list-style-type: none"> Introduce safer fuels to informal, semi-formal and low-income households. 	D:EA&DP DLG&H DoH City of Cape Town	September 2006
	Safer Energy Plan	<ul style="list-style-type: none"> Introduce a province-wide plan to introduce LPG, gel fuel or other forms of energy in mass housing development to replace paraffin 	D:EA&DP DLG&H DoH City of Cape Town	June 2006
	Solar Water Heating by-laws	<ul style="list-style-type: none"> Work with key local governments to introduce solar water heating by-laws 	D:EA&DP City of Cape Town NEEA	June 2006
	Housing Developments energy design programme	<ul style="list-style-type: none"> Ensure that energy efficiency and green design principles are incorporated into planning approval processes at local government levels 	D:EA&DP DLG&H	March 2008
	Integration into Strategic Human Settlements Programme	<ul style="list-style-type: none"> Develop guidelines and practices for energy efficiency and green design for all new large human scale settlements 	D:LG&H	October 2007
	Health Studies Review	<ul style="list-style-type: none"> Monitor the health conditions and safety improvements resulting from the switch to cleaner domestic fuels 	DoH	January 2008

Raise awareness and educate the public around energy efficiency, climate change and renewable energy	Energy Awareness Programme	<ul style="list-style-type: none">• In conjunction with the Department of Education and Eskom, undertake a province-wide education and awareness programme.	D:EADP DoE Eskom	October 2007
		<ul style="list-style-type: none">• Include energy awareness as part of schools' curricula, in conjunction with the national Department of Education	DoE	January 2010
FOCAL POINT: CLIMATE CHANGE				
Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Initiate efforts to reduce the Province's Carbon footprint	Carbon Tax	<ul style="list-style-type: none">• Investigate developing a province-wide carbon tax in line with the national environmental fiscal reform processes	Provincial Treasury	June 2009
	Climate Change Assessment	<ul style="list-style-type: none">• Develop a carbon emission reduction programme with quantifiable benefits and targets	D:EA&DP	June 2007

STRATEGIC OBJECTIVE 4: IMPLEMENTING EFFECTIVE FINANCIAL MECHANISMS

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Develop an internal funding plan to support the roll-out of key aspects of the strategy	Energy Funding plan	<ul style="list-style-type: none"> Cost the strategy and develop a medium-term budget. Develop a finance plan to support government's targeted purchase of 15% of its electricity from renewable sources by 2010. 	D:EADP in collaboration with AMEU, Provincial Treasury	June 2007
Implement a framework for longer term financial support for provincial government energy projects	Energy financing programme and objectives	<ul style="list-style-type: none"> Conduct an assessment of key departmental/ provincial projects and determine funding needs. Develop guidelines for applications for support. Develop a financing plan along with incentive options in conjunction with the Provincial Treasury. 	D:EADP Provincial Treasury	April 2007

STRATEGIC OBJECTIVE 4: IMPLEMENTING EFFECTIVE FINANCIAL MECHANISMS

Establish benefits case for decentralised energy strategy	Decentralised Energy Benefits case	<ul style="list-style-type: none"> Source funding to work with World Alliance on Decentralised Energy to develop a benefits case for Western Cape. 	D:EADP Provincial Treasury and external advisors	June 2007
Establish energy efficiency and renewable energy funding programme	Comprehensive energy funding plan	<ul style="list-style-type: none"> Assemble a team of local and international energy finance experts. Conduct consultative workshops. Formulate a funding and financing plan. 	D:EADP DME Provincial Treasury Development Finance Institutions	June 2007

STRATEGIC OBJECTIVE 5: SUPPORTING LOCAL GOVERNMENT

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Establish energy forum with Local Government participation	Energy Forum	<ul style="list-style-type: none"> Initiate discussions with local government and AMEU in order to establish forum. Participate in AMEU and other local government initiatives. 	D:EADP in collaboration with AMEU, Provincial Treasury	May 2007
Develop joint programme with city of Cape Town to establish energy agency	Energy Agency	<ul style="list-style-type: none"> Conduct an assessment of key departmental/ provincial projects and determine funding needs. Develop guidelines for applications for support. Develop a financing plan along with incentive options in conjunction with the Provincial Treasury. 	D:EADP Provincial Treasury	April 2007
Support the development of an energy programme in each Local Authority	Local Government energy programme	<ul style="list-style-type: none"> Work with electricity and energy departments of Local Authorities to establish energy programmes and objectives that will support the Province's overall objectives and aims. 	D:EADP Provincial Treasury and external advisors	June 2007
Establish RE/EE funding programme to support local government	REEE Funding Programme	<ul style="list-style-type: none"> Conduct assessments to establish support needs Support LG in developing financing programmes Agree funding mechanisms and options with LG/Municipalities 	D:EADP DME Provincial Treasury	June 2007

9 CONCLUSION

Ultimately the *Provincial Integrated Energy Strategy* will aim to establish a sustainable energy system across the Province that will assist in ensuring long term energy security for all stakeholders. This requires a new approach to energy planning that encourages greater levels of energy efficiency, and that supports decentralised, renewable energy options as an essential component of the new energy system.

Current energy intensive behaviour across all sectors of the provincial economy assumes that current energy sources are cheap and limitless. Indications are that this is no longer the case and that future energy challenges must be addressed in a timely manner, and wisely, in order to ensure that the Provincial Growth and Development strategy is not undermined in the longer term.

Comments received around the recommendations in this Discussion Document will be used to craft an Integrate Energy Strategy which complements and strengthens the work of the various stakeholder groups, while also offering a bold and progressive strategy for ensuring energy sustainability in the Province.

10 TERMS USED IN THIS DOCUMENT

Abbreviations:

CFLs - Compact Fluorescent Lights

CO₂ - Carbon Dioxide

D:EADP - The Department of Environmental Affairs and Development Planning

GJ- Gigajoules

HVAC - an acronym for heating, ventilation and air conditioning

IES – Integrated Energy Strategy

IETT - Intergovernmental Energy Task Team

LED - light-emitting diode

LED's - Local Economic Development Strategies

MEDS - Micro-Economic Development Strategy

PDC - Provincial Development Council

PGWC's - Provincial Government of the Western Cape's

SDF – Spatial Development Framework

SIP – Strategic Infrastructure Plan

SWHs - Solar Water Heaters

WESGRO – Western Cape Economic Development Body

Glossary of Terms:

BioDiesel	Refers to a diesel-equivalent, processed fuel derived from biological sources (such as), vegetable-oils which can be used in <i>unmodified</i> diesel-engined 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 lightbulbs, using about 25% of the power of incandescent lightbulbs, 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 (eg 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.
DME	The National Department of Minerals and Energy in South Africa.
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 outcomes for the human and natural environments both now and into the indefinite future.
Wave Power	Energy generated by the oceans's 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.

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Western Cape Trade and Investment Promotion Agency	www.wesgro.org.za
South Africa – Local	
Cape Town Chamber of Commerce and Industry	www.caperegionalchamber.co.za
City of Cape Town Government	www.capetown.gov.za
South African Cities	www.sacities.org
South Africa – Miscellaneous	
SouthSouthNorth	www.southsouthnorth.org

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University of Cape Town – Energy Research Centre	www.erc.uct.ac.za
International	
Australian Department of the Prime Minister and Cabinet	www.dpmc.gov.au
Canada – Natural Resources Canada	www.nrcan.gc.ca
Cities Energy Strategies Conference	www.sustainable.org.za/CESConference
Cities for Climate Protection	www.iclei.org/co2/
City of London Government	www.london.gov.uk
City of London Hydrogen Partnership	www.lhp.org.uk
Danish Energy Agency	www.ens.dk/uk/index
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