

# SUSTAINABLE ENERGY STRATEGY FOR THE WESTERN CAPE

DRAFT SUMMARY DOCUMENT



May 2007

Department of Environmental  
Affairs and Development Planning



## FOREWORD



The blackouts experienced in the Western Cape during 2005 and 2006 have highlighted the importance of sustainable energy supplies to the successful socio-economic development of the region. With the aim of ensuring that the crucial issues of energy and economic development, climate change, human capital development and regional investment priorities are effectively addressed, the Department of Environmental Affairs and Development Planning is launching this *Sustainable Energy Strategy and Programme of Action*.

The initiative forms a vital cornerstone in sustainable development policy for the Western Cape. As has recently been so clearly demonstrated, energy security plays a crucial role in ensuring that the province can meet its economic, social and environmental objectives, and that it remains an attractive destination for investment.

A sound energy strategy and programme is essential in addressing environmental concerns, including climate change. The need to secure sources of cleaner, non-polluting and renewable energy as part of our future development plans has become an important consideration and this strategy addresses the challenges of developing a clean energy industry in the Province. This strategy and programme is being developed and refined in partnership with key stakeholders in the Province and will continue to evolve to ensure its relevance with the aim of ensuring energy security and sustainable development. Working within the parameters set by national government, and taking into account the various initiatives at local government level across the Province, the strategy and programme seeks to:

- support economic and social development poverty alleviation and

- infrastructure development;
- address environmental issues such as air quality, energy conservation and climate change;
- foster the development of a clean energy sector; and
- support and enhance provincial investment programmes in an effective manner.

The *Sustainable Energy Strategy and Programme of Action* has been developed to support and complement our commitments contained in the Provincial Growth and Development Strategy and the envisaged Sustainable Development Implementation Plan, as well as contributing to the achievement of the Millennium Development Goals and the Johannesburg Plan of Implementation. This will all be supported through a future envisaged Provincial Sustainable Energy entity. Thus our approach towards embedding sustainable development – social equity, economic development and ecological integrity – as a fundamental aspect of *Ikapa Elihlumayo* is proactive and bold.

I invite all of you as stakeholders to partner with government in further developing and refining this sustainable energy strategy and programme so that we can ensure that we continue to live up to our commitment to ensuring the Western Cape is a "Sustainable Home for All, Forever".

Tasneem Essop  
Minister of Environmental Affairs and  
Development Planning

# DOCUMENT STRUCTURE

Introduction	1
1 Motivations for a Sustainable Energy Strategy	2
2 Provincial Government Mandate	3
3 Portfolio Approach to Energy Planning	4
4 Energy Profile in the Western Cape	4
5 Sector Energy Use & Opportunities for Energy Efficiency	6
5.1 Transport Sector	6
5.2 Industry	7
5.3 Commerce and Government	8
5.4 Residential	9
6 Increasing the Energy Supply	9
6.1 Current Energy Supply	9
6.2 Opportunities for Increasing Supply	9
6.3 Supporting Clean, Renewable Energies	12
7 Integration	15
7.1 Multi-Stakeholder Integration	15
7.2 Cross-Sectoral Integration	15
7.3 Intergovernmental Energy Task Team	15
8 Recommendations	16
8.1 Policy Recommendations	16
8.2 Strategy and Programme of Action	18
9 Conclusion	28
References	32
Websites	36

## 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 quickly 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 sources 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 govern-

ment 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 26 February 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 Sustainable Energy Strategy .

## Vision

The Provincial Government's Sustainable 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 A SUSTAINABLE 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 sustainable 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 dif-

ferent 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 Sustainable 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.

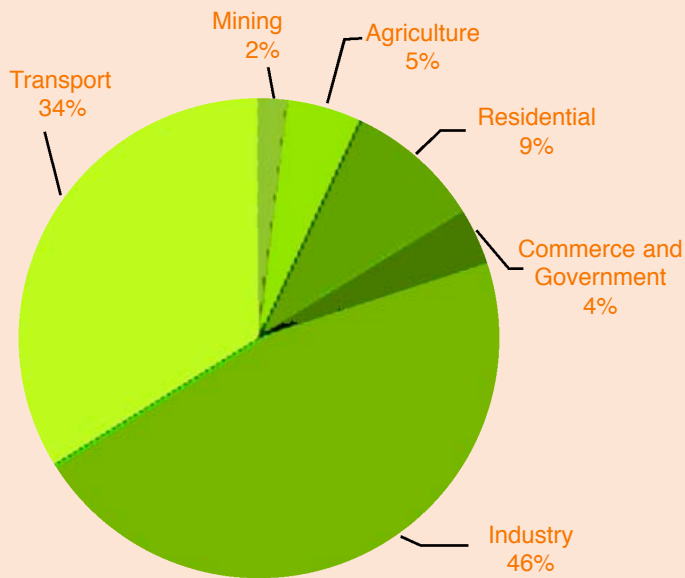
### 4. ENERGY PROFILE IN THE WESTERN CAPE

#### 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.

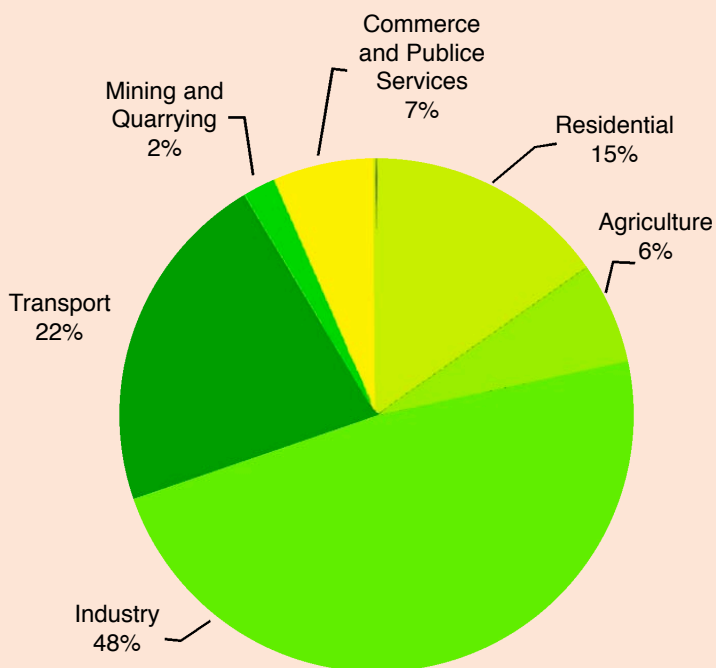




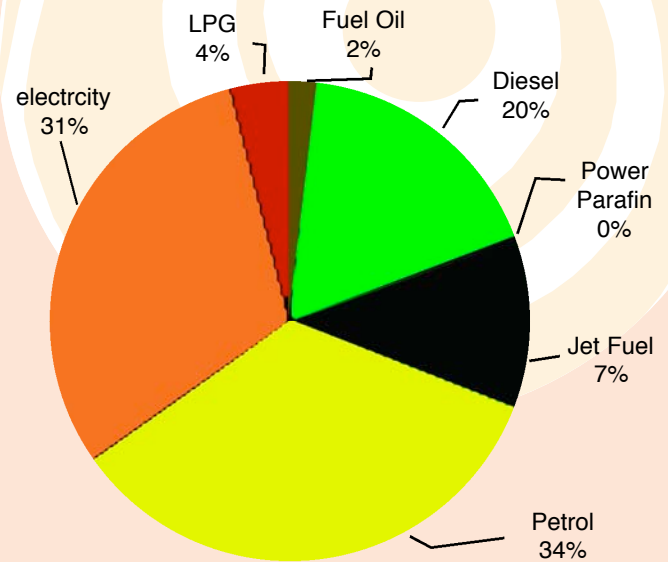
**CHART 1:**  
WESTERN CAPE ENERGY CONSUMPTION BY SECTOR

## Carbon Emissions

The Western Cape is currently producing 30,536,000 tonnes of CO<sub>2</sub> per year – with almost half this amount originating from the industrial sector and a further 22% stemming from the transport sector.

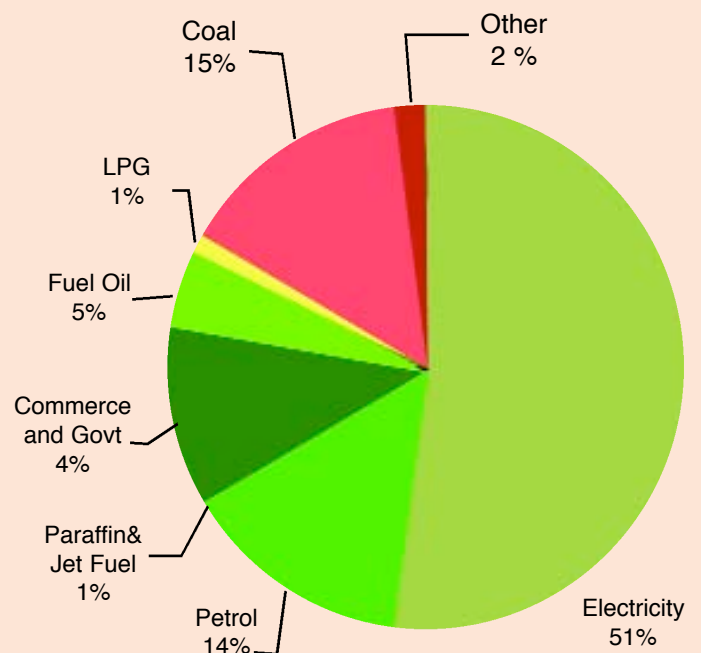


**CHART 3:**  
WESTERN CAPE CARBON EMISSIONS BY SECTOR



**CHART 2:**  
WESTERN CAPE ENERGY CONSUMPTION BY FUEL TYPE

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 CO<sub>2</sub> intensity. However coal use (other than for electricity) and petrol consumption are also important sources of Carbon emissions.



**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%, freight and rail accounts 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, CO<sub>2</sub> 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 <sub>2</sub> emissions
3,561,500 kg	2,658,120 kg	Total Suspended iculates

#### 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 <sub>2</sub> emissions
263,390 kg	42,290 kg	SO <sub>2</sub> emissions

### Switch to BioDiesel

If BioDiesel can capture 15% of the diesel market by 2024, CO<sub>2</sub> and SO<sub>2</sub> emissions could be further reduced.

## 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.

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



### 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 CO<sub>2</sub> reductions of 35.328 billion kilograms.

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 <sub>2</sub> 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 CO<sub>2</sub> emissions would be significant, amounting to a saving of 12.98 billion kilograms 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 <sub>2</sub> 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 CO<sub>2</sub> emissions would also be realised (2,426,035 tonnes of CO<sub>2</sub> 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 <sub>2</sub> 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 CO<sub>2</sub> 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 <sub>2</sub> 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.

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.

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 CO<sub>2</sub> 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.



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

Projections For 2024		SWH Carbon emissions
Low Income	Medium-High Income	
240,000 t	3,500,000 t	Medium-High Income
R44,771,099	R269,313,334	Cumulative Savings





### 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.

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.

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 <sub>2</sub> emissions savings

### 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.

A summary of the feasibility and challenges of various energy efficiency interventions is documented in Table1.

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



TABLE 1: VIABILITY OF ENERGY EFFICIENT 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.

## 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. However, 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 Table 2 together with comments on their viability and sustainability.



**TABLE 2: OPPORTUNITIES FOR ENERGY GENERATION IN THE WESTERN CAPE**

Energy Source	Potential	Sustainability issues
<b>Coal generated electricity</b>	<ul style="list-style-type: none"> <li>• High potential.</li> <li>• SA has significant coal reserves and new technologies for clean coal (gasification) are being developed.</li> <li>• Will produce base load.</li> <li>• Line strengthening to Western Cape will be essential.</li> </ul>	<ul style="list-style-type: none"> <li>• Building new generation capacity will see an increase in electricity prices that may not make it financially sustainable unless heavily subsidised.</li> <li>• Fluctuations in commodity prices increase financial risk.</li> <li>• Accompanying CO<sub>2</sub> increase is not desirable in light of SA's ratification of the Kyoto Protocol and the National Climate Change Response Strategy.</li> <li>• There are concerns regarding health-related issues in Mpumalanga.</li> <li>• Increased coal usage will also jeopardise the City of Cape Town and other cities' commitments to clean energy targets.</li> </ul>
<b>Nuclear energy</b>	<ul style="list-style-type: none"> <li>• Significant potential.</li> <li>• Costly.</li> <li>• Long development lead times will not see plants on stream in time to meet envisaged shortages in the Western Cape in the short-term.</li> </ul>	<ul style="list-style-type: none"> <li>• Nuclear energy is viewed as controversial yet is seen as cleaner than coal.</li> <li>• No clear, acceptable strategies and options exist for disposal of radioactive waste.</li> <li>• Decommissioning of old Nuclear Power plants is extremely costly.</li> <li>• Heavy subsidisation is necessary.</li> <li>• Public resistance may increase times to development.</li> </ul>
<b>Natural gas</b>	<ul style="list-style-type: none"> <li>• High potential if sufficient resources of gas are discovered.</li> <li>• Importing gas is an option if no sufficient domestic sources are available.</li> <li>• Supplies are currently not confirmed.</li> </ul>	<ul style="list-style-type: none"> <li>• Natural gas is a cleaner fossil fuel-based option than coal.</li> <li>• It is less controversial than nuclear energy and can provide base load capacity.</li> <li>• Options for local job creation are high.</li> </ul>
<b>Wind energy</b>	<ul style="list-style-type: none"> <li>• High potential (3000 MW approx.) in the Western Cape, but resources need to be confirmed.</li> <li>• Technology &amp; capital costs are reducing rapidly.</li> <li>• Low maintenance.</li> </ul>	<ul style="list-style-type: none"> <li>• Clean option.</li> <li>• Intermittent supply and storage issues need to be resolved.</li> <li>• Cannot supply base load unless working with hybrid solutions.</li> <li>• Can be quickly installed in areas needing new supply.</li> </ul>
<b>Biomass</b>	<ul style="list-style-type: none"> <li>• Medium potential: 1 to 50 GJ/ha/yr.</li> <li>• Insufficient assessment of commercial potential in Western Cape.</li> <li>• Opportunities for small biomass projects particularly within forestry and agricultural industry.</li> <li>• No clear assessment of other biomass potential e.g. sewage waste.</li> </ul>	<ul style="list-style-type: none"> <li>• Renewable resource.</li> <li>• Job creation in downstream and upstream industries.</li> <li>• Lower emissions if sound technology is used.</li> <li>• Producers obtain their own energy requirements from this source, therefore lessening the demand on the grid.</li> </ul>



<b>Solar radiation</b>	<ul style="list-style-type: none"> <li>• Medium to high potential.</li> <li>• Radiation varies from 6,501- 7 000 MJ/m<sup>2</sup>/pa across the province.</li> <li>• Solar PV technology is expensive.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant potential for SWH projects either at large residential scale or individual level.</li> <li>• A clean technology from a renewable source</li> <li>• Small business opportunities exist</li> <li>• Few local manufacturers</li> <li>• Possibility of subsidisation from national bodies</li> </ul>
<b>Wave power</b>	<ul style="list-style-type: none"> <li>• High potential.</li> <li>• Significant resources along West Coast particularly Cape Columbine through to the Cape Agulhas area.</li> <li>• Availability of appropriate technology to be assessed.</li> <li>• High capital costs.</li> </ul>	<ul style="list-style-type: none"> <li>• Renewable energy source</li> <li>• No CO<sub>2</sub> emissions but may have high ecological impact.</li> <li>• Job creation potential not quantified but is significant.</li> </ul>
<b>Waste</b>	<ul style="list-style-type: none"> <li>• High potential for energy recovery from waste – landfill gas in particular (e.g. 6 sites in Cape Town).</li> <li>• Capital investment high.</li> </ul>	<ul style="list-style-type: none"> <li>• Controversial in the case of incineration of certain wastes.</li> <li>• Landfill gas projects are viable and can benefit from the Cleaner Development Mechanism (CDM) financing support.</li> <li>• Financial viability marginal but new technology may improve this.</li> </ul>
<b>Hydropower</b>	<ul style="list-style-type: none"> <li>• Low potential.</li> <li>• Depending on resource assessments, potential for small-scale stand-alone projects may exist.</li> <li>• These will not be suited for grid connection.</li> </ul>	<ul style="list-style-type: none"> <li>• Renewable resource but impact may be high especially in sensitive aquatic systems.</li> <li>• Financially not viable without significant subsidies or innovative financial engineering.</li> </ul>

### 6.3 Supporting Clean, Renewable Energies

In order 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.

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.

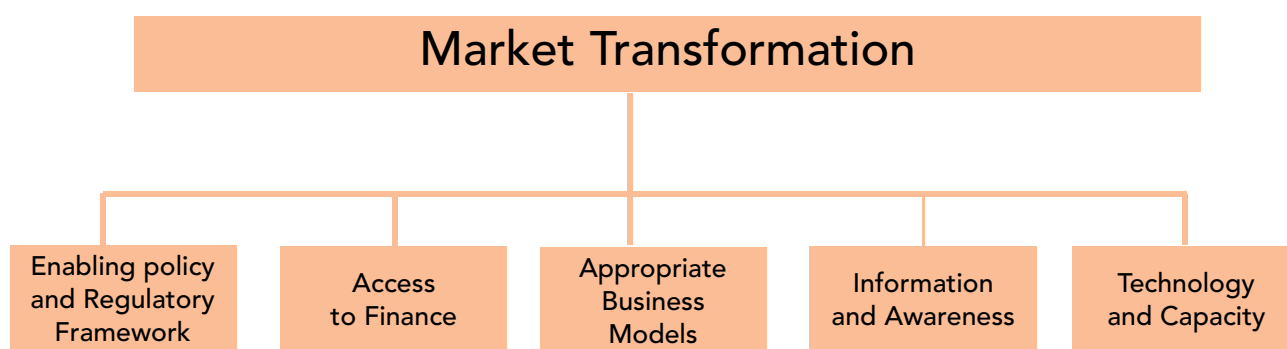


FIGURE 1: BARRIERS TO MARKET TRANSFORMATION (EBERHARD, 2005)

## 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 Sustainable 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 Sustainable Energy Strategy 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 Sustainable Energy Strategy, 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 Sustainable 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 a Sustainable 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**

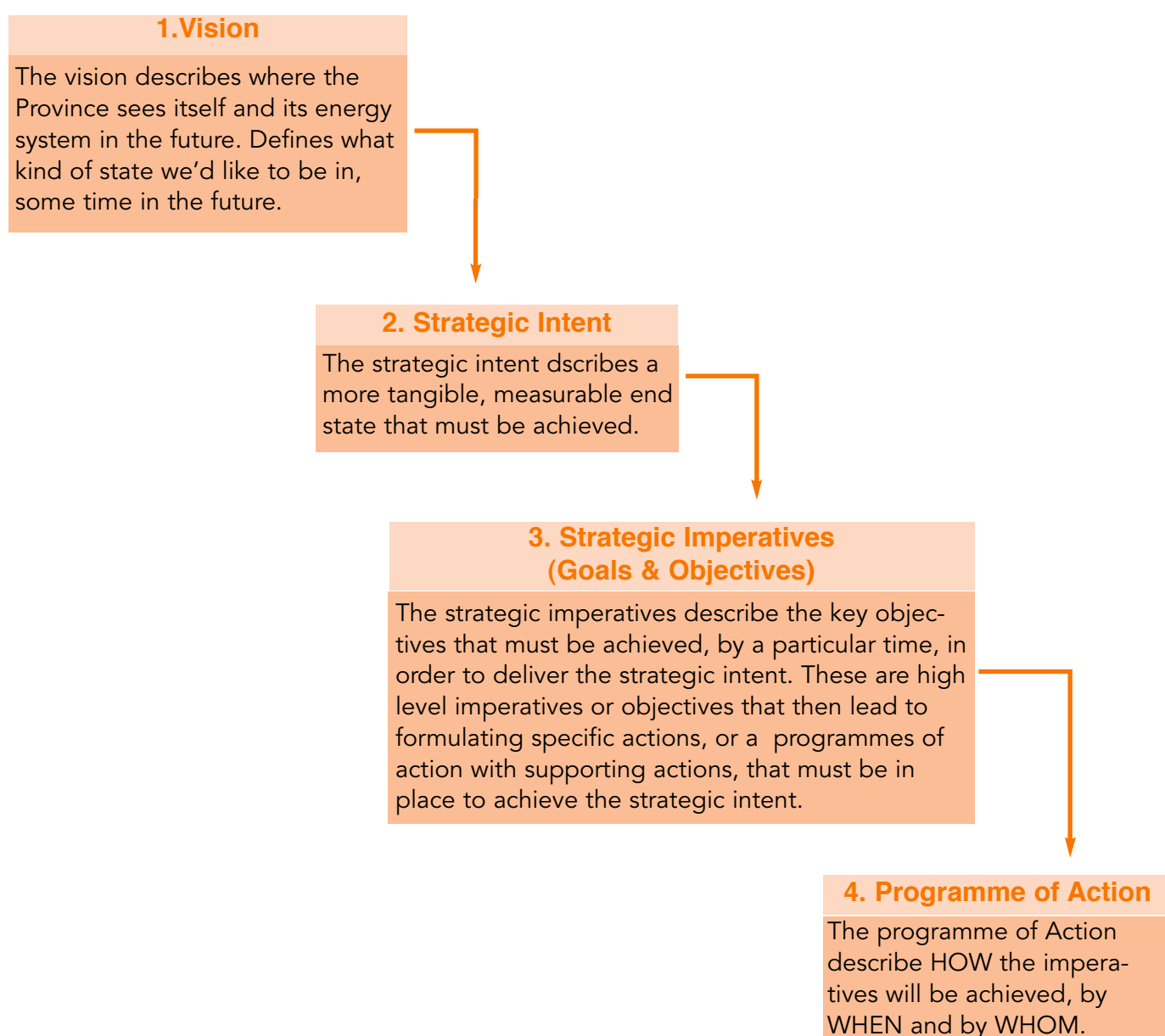
Target	Objective	Date
15%	Renewable energy generation (electricity only) in the Western Cape off the 2006 generation baseline	2014
15%	Overall energy efficiency against business as usual scenario	2014
20%	Industry energy efficiency	2014
10%	Residential energy efficiency	2014
11%	Commercial energy efficiency	2014
12%	Transport energy efficiency	2014
10%	Carbon emissions reduction (off 2000 levels)	2014
15%	Carbon emissions reduction (off 2000 levels)	2020
10%	Renewable Energy purchased by Provincial Government	2010
50%	Government vehicles converted to cleaner fuels	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 diagram below.

**FIGURE 2: ENERGY STRATEGY FRAMEWORK**



The **Key Principles** on which the success of the SES 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 Table 4 below.

**TABLE 4: VISION AND STRATEGIC INTENT**

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

In order to deliver on the SES (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 on

feedback from stakeholder groups and its social partners.

The strategic imperatives or high level goals will be achieved by implementing the specific objectives highlighted in the tables on the following pages.

**TABLE 5: STRATEGIC IMPERATIVES (HIGH LEVEL GOALS)**

Strategic imperatives	<ol style="list-style-type: none"> <li>1. To improve the health, welfare and prosperity of all citizens in the Province;</li> <li>2. to reduce the Province's contribution to climate change by reducing CO<sub>2</sub> emissions from all sectors primarily through energy efficiency, renewable energy and cleaner fuels;</li> <li>3. to reduce, and where possible eliminate, pollution from a variety of sources especially vehicle emissions;</li> <li>4. to promote the development of sustainable energy technologies and projects and enhance energy efficiency;</li> <li>5. to eradicate fuel poverty and provide access to modern energy sources;</li> <li>6. to provide energy security through diversifying the energy mix; and</li> <li>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.</li> </ol>
-----------------------	---

**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:EA&DP) 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:EA&DP and continued by Independent Body/PEA	May 2008
	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.	D:EA&DP Provincial Treasury	May 2008
	Energy Policy and Strategy Integration	Sustainable energy efficiency and renewable energy principles and objectives into the relevant Provincial planning frameworks	D:EA&DP Premiers Office	Sept 2007
Ensure that the technology and capacity exists in the Province to implement the projects	Local Authority Support	Support cities 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	D:EA&DP Dept of Local Government & Housing (D:LH&G) Municipalities	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:EA&T) D:EA&DP, Industry, Local Govt	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	<ul style="list-style-type: none"> <li>Implement second phase of inter-departmental consultations and discussion forums to take forward energy issues developed during initial consultation phase</li> </ul>	D:EA&DP	March 2008
Ensure energy strategy is integrated as a core cluster of the SDIP	SDIP	<ul style="list-style-type: none"> <li>Establish an energy cluster in the SDIP and conduct briefings with other SDIP clusters and run cluster workshops</li> </ul>	SDIP coordinating team	Sept 2007
Secure support of national government departments	Endorsement of the energy strategy and participation in various programmes	<ul style="list-style-type: none"> <li>Conduct briefings with individual ministries and departments and include nominated representative on Provincial energy task team</li> </ul>	IETT D:EA&DP	Oct 2007
Secure support and participation of various sector partners	WC Energy charter	<ul style="list-style-type: none"> <li>Identify sectoral groupings e.g. learning institutions, business groupings, trade groupings, energy companies, NGOs and community groupings, Trade Unions.</li> <li>Conduct workshops/briefings with key groupings. Formalize signed off action plans with each sector.</li> <li>Establish monitoring and regular review mechanisms with each sector body, grouping</li> </ul>	D:EA&DP	May 2008

## 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	• Convert 50% of the Government vehicle fleet to cleaner fuels	D:T&PW	October 2008
		• Monitor the health impacts of the national and provincial clean fuels programme (shift to unleaded fuel and introduction of low sulphur diesel)	D:LG&H	June 2008
	Subsidised Car Schemes	• Revise the tender requirements for the subsidised car scheme to include zero emissions or hybrid vehicles like the Toyota Prius	D:EA&DP	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	• Conduct an Energy Audit of all provincial government buildings	D:T&PW	Dec 2008
		• Retrofit the Provincial Parliament Complex in Cape Town for energy efficiency (including solar water heating and energy from a photo-voltaic system)	D:EA&DP	Sept 2008
	Incentive Programme for Energy Efficiency	• Initiate a study into incentives around energy efficiency together with the City of Cape Town and the Provincial Treasury	D:EA&DP Provincial Treasury	June 2008
	PGWC Solar Programme	• Implement pilot solar water heater programme	D:EA&DP Provincial Treasury	June 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	D:EA&DP	April 2007
		• Develop new Provincial Government Complexes according to green design principles	D:T&PW	October 2007
		• Work with developers to showcase five energy efficient developments in the Province	D:EA&DP	October 2009
	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:EA&DP	November 2009

## 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	<ul style="list-style-type: none"> <li>PGWC to procure 15% of its energy from renewable sources by 2014</li> </ul>	Treasury D:EA&DP	July 2008
	Energy Investment Programme	<ul style="list-style-type: none"> <li>Work with Wesgro to develop an energy investment programme for the province</li> </ul>	Provincial Treasury WESGRO	Aug 2007
Support research, development and roll-out of clean energy sources	Renewable Energy Development Programme and investment case	<ul style="list-style-type: none"> <li>Work with industry associations to assist in the development and refinement of information to support business model development</li> </ul>	D:EA&DP	Sept 2007
	'Solar Challenge' Programme	<ul style="list-style-type: none"> <li>Use this mechanism to introduce solar photovoltaic systems and accompanying financial incentives and financing options</li> </ul>	D:EA&DP Provincial Treasury NERSA/CEF	Feb 2009
	Energy Resource Assessments Assessment	<ul style="list-style-type: none"> <li>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</li> </ul>	D:EA&DP SESSA/SAWEA/ industry groups	March 2008
	Finance Mechanisms and Incentives	<ul style="list-style-type: none"> <li>Create a framework for financing renewable energy and energy efficiency projects in conjunction with the Provincial Treasury, the Department of Minerals and Energy and the Central Energy Fund.</li> </ul>	Provincial Treasury DME Central Energy Fund	April 2008
Ensure the feasibility of developing a clean energy portfolio in the Western Cape	Generation Study	<ul style="list-style-type: none"> <li>Quantify the costs of developing a clean energy portfolio</li> </ul>	D:EA&DP Provincial Treasury	Aug 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"> <li>Introduce safer fuels to informal, semi-formal and low-income households.</li> </ul>	D:EA&DP D:LG&H DoH	Sept 2008
	Safer Energy Plan	<ul style="list-style-type: none"> <li>Introduce a province-wide plan to introduce LPG, gel fuel or other forms of energy in mass housing development to replace paraffin</li> </ul>	D:EA&DP D:LG&H DoH City of Cape Town	June 2008
	Solar Water Heating by-laws	<ul style="list-style-type: none"> <li>Work with key local governments to introduce solar water heating by-laws</li> </ul>	D:EA&DP Municipalities NEEA	June 2008
	Housing Developments energy design programme	<ul style="list-style-type: none"> <li>Ensure that energy efficiency and green design principles are incorporated into planning approval processes at local government levels</li> </ul>	D:EA&DP D:LG&H	March 2008
	Integration into Strategic Human Settlements Programme	<ul style="list-style-type: none"> <li>Develop guidelines and practices for energy efficiency and green design for all new large human scale settlements</li> </ul>	D:LG&H	October 2007
	Health Studies Review	<ul style="list-style-type: none"> <li>Monitor the health conditions and safety improvements resulting from the switch to cleaner domestic fuels</li> </ul>	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"> <li>In conjunction with the Department of Education and Eskom, undertake a province-wide education and awareness programme.</li> </ul>	D:EA&DP DoE Eskom	October 2008
		<ul style="list-style-type: none"> <li>Include energy awareness as part of schools' curricula, in conjunction with the national Department of Education</li> </ul>	DoE	January 2010

## FOCAL POINT: CLIMATE CHANGE

Objective	Output	Action	Who – Partners / stakeholders	Initiation Date
Initiate efforts to reduce the Province's Carbon footprint	ClimateChange Assessment	<ul style="list-style-type: none"> <li>Develop a carbon emission reduction programme with quantifiable benefits and targets</li> </ul>	D:EA&DP	June 2008

## 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"> <li>Cost the strategy and develop a medium-term budget. Develop a finance plan to support government's target of 15% of electricity from renewable sources by 2014.</li> </ul>	D:EA&DP in collaboration with all stakeholders	Sept 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"> <li>Conduct an assessment of key departmental/ provincial projects and determine funding needs.</li> <li>Develop guidelines for applications for support. Develop a financing plan along with incentive options in conjunction with the Provincial Treasury.</li> </ul>	D:EA&DP Provincial Treasury	June 2009
Establish benefits case for decentralised energy strategy	Decentralised Energy Benefits case	<ul style="list-style-type: none"> <li>Source funding to work with World Alliance on Decentralised Energy to develop a benefits case for Western Cape.</li> </ul>	D:EAD&P Provincial Treasury and external advisors	June 2009
Establish energy efficiency and renewable energy funding programme	Comprehensive energy funding plan	<ul style="list-style-type: none"> <li>Assemble a team of local and international energy finance experts.</li> <li>Conduct consultative workshops.</li> <li>Formulate a funding and financing plan.</li> </ul>	D:EA&DP DME Provincial Treasury Development Finance Institutions	June 2009



**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"> <li>Initiate discussions with local government and AMEU in order to establish forum. Participate in AMEU and other local government initiatives.</li> </ul>	D:EA&DP in collaboration with AMEU, Provincial Treasury	May 2008
Support the development of a sustainable energy programme in each Local Authority	Local Government energy programme	<ul style="list-style-type: none"> <li>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.</li> </ul>	D:EA&DP Provincial Treasury and external advisors	June 2008
Establish RE/EE funding programme to support local government	RE/EE Funding Programme	<ul style="list-style-type: none"> <li>Conduct assessments to establish support needs</li> <li>Support LG in developing financing programmes</li> <li>Agree funding mechanisms and options with LG/Municipalities</li> </ul>	D:EA&DP DME Provincial Treasury	June 2008

## CONCLUSION

Ultimately the *Provincial Sustainable 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 a Sustainable 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.

## TERMS USED IN THIS DOCUMENT

### Abbreviations:

CFLs	- Compact Fluorescent Lights
CO <sub>2</sub>	- Carbon Dioxide
D:EADP	- The Department of Environmental Affairs and Development Planning
GJ	- Gigajoules
HVAC	- Heating, ventilation and air conditioning
SES	- Sustainable 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

<b>BioDiesel</b>	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.
<b>Biomass Energy</b>	Energy from the burning of agricultural, forestry, and other organic material (including landfill gas, digester gas, and municipal solid waste).
<b>Carbon Footprint</b>	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).
<b>Carbon Tax</b>	A tax on energy sources which emit carbon dioxide into the atmosphere. It is an example of a pollution tax.
<b>CFL</b>	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.
<b>Coal Thermal Power Plant/Station</b>	A power station that generates electricity through the burning of coal.
<b>Co-generation</b>	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.
<b>Climate change</b>	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.
<b>DME</b>	The National Department of Minerals and Energy in South Africa.
<b>Electricity Grid</b>	The electricity supply line system.
<b>Energy</b>	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).
<b>Energy Audit</b>	A process whereby the energy use profile of an entity is determined i.e. amounts of energy used, types of energy used etc.

<b>Energy Efficiency</b>	Using less energy to achieve the same objective, e.g. an energy efficient air conditioner uses less energy to achieve the same cooling.
<b>Energy Conservation</b>	Measures to avoid the use of energy services.
<b>ESCO</b>	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.
<b>Fossil Fuel</b>	A fuel such as coal, oil, natural gas, produced from the decomposition of ancient plants and animals.
<b>Fossil Fuel Power Station/Plant</b>	A power station that generates electricity through the burning any fossil fuel.
<b>Global Warming</b>	An overall rise in the global temperature presently thought to be faster than the natural rate, due to human activity (see Climate Change).
<b>Gigajoules</b>	A gigajoule (GJ) is 1,000,000,000 joules. It is a unit of energy.
<b>Natural Gas</b>	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.
<b>Hydropower</b>	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.
<b>Nuclear Energy</b>	Energy released by radioactive decay, through a nuclear reaction, or in the course of fission or fusion of atomic nuclei.
<b>Renewable Energy</b>	Energy which can be replenished at the same rate it is used.
<b>Solar Radiation</b>	All the constituents that make up the total electromagnetic radiation emitted by the sun.
<b>Sustainability</b>	An attempt to provide the best outcomes for the human and natural environments both now and into the indefinite future.
<b>Wave Power</b>	Energy generated by the oceans's wave currents, especially wind-generated waves.
<b>Wind Energy</b>	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.

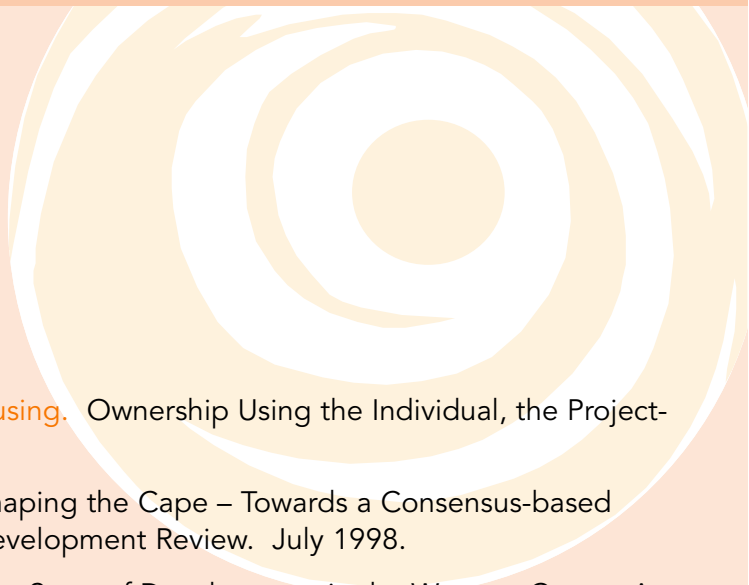


## REFERENCES

- **Awerbuch and Bekker.** Applying Portfolio Planning to Electricity Planning and Policy-Making. February 2003.
- **Cape Town Regional Chamber of Commerce and Industry.** Directory of Services. No date.
- **City of Cape Town and Sustainable Energy Africa.** State of Energy Report for Cape Town. Sustainable Energy for Environment and Development (SEED) Programme. June 2003.
- **City of Cape Town.** Cape Town Energy Strategy – Draft. In collaboration with Sustainable Energy Africa and the International Council for Local Environmental Initiatives (ICLEI). October 2003.
- **City of Cape Town.** Cape Town Public Transport Guide – Central Cape Town. Z-File. Information correct to November 2001. No date.
- **City of Cape Town.** Integrated Metropolitan Environmental Policy - The Environmental Policy of the City of Cape Town. October 2001.
- **City of Cape Town.** Public Transport in Cape Town – Summary of CPTR (Current Public Transport Record) 2000-1.
- **City of Cape Town.** State of Energy – Report for Cape Town. Compiled by Sustainable Energy Africa. June 2003.
- **City of Cape Town.** State of the Environment for the City of Cape Town – Summary –Year Four 2001. Special Edition for the World Summit on Sustainable Development.
- **Commonwealth of Australia.** Securing Australia's Energy Future. Energy Task Force. 2004.
- **Conservation Council of Ontario.** A Green Energy Strategy for Ontario. January 2002.
- **Cornwall Local Authority Support Programme.** Towards well being in a sustainable energy future. July 2001.
- **Department of Environmental Affairs and Tourism.** National Environmental Management: Air Quality Bill. B62B 2003. August 2004 (Pending signature of Minister of EA&T)
- **Department of Minerals and Energy, Eskom and Energy Research Institute.** Energy Outlook for South Africa: 2002. University of Cape Town. May 2002.
- **Department of Minerals and Energy.** Draft Energy Efficiency Strategy of the Republic of South Africa. April 2004.
- **East Midlands Regional Assembly.** East Midlands Energy Challenge. 2004.
- **Energy & Development Research Centre.** Policies and Measures for Renewable Energy and Energy
- **Efficiency in South Africa.** An Independent study Commissioned by the Sustainable Energy & Climate Change Partnership. University of Cape Town. 2002.

- **Energy Research Centre.** Energy for Sustainable Development – South African Profile. Phase 1- Final Report. University of Cape Town. 2003.
- **Eskom.** Cape Strengthening Programme. Brochure. 2000.
- **Future Energy West.** Strategy and Action Plan for the West of England – Sustainable Energy Development Programme. 2004.
- **Greater Vancouver Regional District.** Forging a Sustainable Energy System in Greater Vancouver. July 2003.
- **Marquard, Andrew and Anton Eberhard.** Towards Energy Equity, Efficiency and Environmental Sustainability in South Africa: Policy Challenges. Energy for Sustainable Development. Vol.4 No. 4. International Energy Institute. December 2000.
- **National Electricity Regulator (NER).** Company Profile.
- **Nova Scotia Department of Energy.** Nova Scotia Energy Strategy. 2004.
- **Parliament of the Republic of South Africa.** Parliament - The National Council of Provinces. Issued by the Public Education Office of Parliament. May 2002.
- **Participants of the City Energy Strategies Conference.** The Cape Town Declaration on Energy for Cities. 21 November 2003.
- **Praetorius, Barbara and Jan Bleyl.** Improving the Institutional Structures for Disseminating Energy Efficiency in Emerging Nations: Energy Agencies in South Africa. DIW Berlin. German Institute for Economic Research. Discussion Papers 347. May 2003.
- **Prince Edward Island Department of Environment and Energy.** Energy Framework and Renewable Energy Strategy. June 2004.
- **Province of the Western Cape.** Department of Environmental Affairs and Development Planning. Strategic Plan – 2004/05-2006/07.
- **Province of the Western Cape.** Department of Transport and Public Works. White Paper on Western Cape Provincial Transport Policy. June 1997.
- **Province of the Western Cape.** Framework for the Development of the Western Cape Province – 2004-2007.
- **Provincial Administration: Western Cape (PAWC).** Chief Directorate of Policy and Strategic Management. Policy and Strategic Management. Framework for the Development of the Western Cape Province. No date.
- **Republic of South Africa.** Department of Minerals and Energy. White Paper on Renewable Energy. November 2003.
- **Republic of South Africa.** Government Gazette. Energy Regulator Bill. No. 25994. 2004.
- **Republic of South Africa.** Government Gazette. No. 209 of 1993. Local Government Transition Act.
- **Republic of South Africa.** Government Gazette. No. 3007 of 1998. Department of Minerals and Energy. White Paper on the Energy Policy of the Republic of South Africa. Vol. 402, No. 19606. 17 December 1998.
- **Republic of South Africa.** Government Gazette. No. 32 of 2000: Local Government: Municipal Systems Act, 2000. Vol. 425, No. 21776. 20 November 2000.

- **Republic of South Africa.** Government Gazette. No. 41 of 1987. Electricity Act.
- **Republic of South Africa.** Government Gazette. No. 51 of 2002: Local Government Laws Amendment Act, 2002. Vol. 450, No. 24149. 5 December 2002.
- **Republic of South Africa.** No. 108 of 1996: Constitution of the Republic of South Africa.
- **San Diego regional Energy Office.** San Diego Regional Energy Strategy. May 2003.
- **SEA.** 2003, City of Cape Town State of Energy Report.
- **Spalding-Fecher, Randall.** Energy Sustainability Indicators for South Africa. Prepared for Sustainable Energy & Climate Change Partnership. Energy & Development Research Centre. University of Cape Town. May 2002.
- **Statistics South Africa.** Stats in Brief – Ten Years of Democratic Governance. 2004.
- **Sustainable Energy Africa.** Provincial Energy Futures. February 2006.
- **Sustainable Energy Society of Southern Africa.** Strategy for Renewable Energy in South Africa. March 2001.
- **TERI.** Defining an Sustainable Energy Strategy for India. 2002.
- **Thailand Ministry of Energy.** Energy Strategy-Energy for Thailand's Competitiveness. April 2004.
- **The Western Cape Policy Framework.** Fact Sheet. No date.
- **United Nations Environment Programme.** Division of Technology, Industry and Economics. International Environmental Technology Centre. Energy Savings in Cities – Issues, Strategies and Options for Local Governments. CD-ROM. 2003.
- **WESGRO.** Annual Report-2004. 2004.
- **WESGRO.** Biotechnology. Sector Fact Sheet. 2002.
- **WESGRO.** Environment. Sector Fact Sheet. 2002.
- **WESGRO.** South Africa's Western Cape. Business Facts and Opportunities. Fact Sheet. August 2002.
- **WESGRO.** Study Report for WESGRO. Offshore Oil and Gas. 2002.
- **WESGRO.** WESGRO Background Report - The Renewable Energy Industry in Western Cape of South Africa. 2000.
- **WESGRO.** Western Cape Petrochemical Industry. Sector Fact Sheet. 2000.
- **WESGRO.** Western Cape Renewable Energy Industry. Sector Fact Sheet. 2000.



- Western Cape Ministry of Local Government & Housing. Ownership Using the Individual, the Project-linked or Consolidation Subsidy. No date.
  - Western Cape Provincial Development Council. Shaping the Cape – Towards a Consensus-based Provincial Growth and Development Strategy: A Development Review. July 1998.
  - Western Cape Provincial Development Council. The State of Development in the Western Cape – An Assessment of the Provincial Government's Growth and Development Strategy and the Way Forward. July 1998.
  - Western Cape. Budget 2004 at a Glance. Fact Card.
  - Western Cape. Cabinet of the Western Cape. Fact Card.
  - Western Cape. Department of Economic Development and Tourism. Annual Report 2002-2003.
  - Western Cape. Department of Environmental Affairs and Development Planning. Annual Report – 2004.
  - Western Cape. Department of Environmental Affairs and Development Planning. Provincial Spatial Development Framework - 2005.
  - Western Cape. Department of Housing. Directorate of Departmental Finance. Annual Report 2003/2004.
  - Western Cape. Department of Transport and Public Works. Mobility Strategy – A Shared Vision. In collaboration with the City of Cape Town. No date.
  - World Alliance for Decentralised Energy. World Survey of Decentralised Energy. March 2005.
-

## WEBSITES

South African Department of Minerals and Energy	<a href="http://www.dme.gov.za">www.dme.gov.za</a>
South African Government Information	<a href="http://www.info.gov.za">www.info.gov.za</a>
South African National Electricity Regulator	<a href="http://www.ner.org.za">www.ner.org.za</a>
South Africa – Regional (Western Cape)	
Western Cape Provincial Government	<a href="http://www.capegateway.gov.za">www.capegateway.gov.za</a>
Western Cape Trade and Investment Promotion Agency	<a href="http://www.wesgro.org.za">www.wesgro.org.za</a>
South Africa – Local	
Cape Town Chamber of Commerce and Industry	<a href="http://www.caperegionalchamber.co.za">www.caperegionalchamber.co.za</a>
City of Cape Town Government	<a href="http://www.capetown.gov.za">www.capetown.gov.za</a>
South African Cities	<a href="http://www.sacities.org">www.sacities.org</a>
SouthSouthNorth	<a href="http://www.southsouthnorth.org">www.southsouthnorth.org</a>
University of Cape Town	<a href="http://www.uct.ac.za">www.uct.ac.za</a>
University of Cape Town – Energy Research Centre	<a href="http://www.erc.uct.ac.za">www.erc.uct.ac.za</a>
International	
Australian Department of the Prime Minister and Cabinet	<a href="http://www.dpmmc.gov.au">www.dpmmc.gov.au</a>
Canada – Natural Resources Canada	<a href="http://www.nrcan.gc.ca">www.nrcan.gc.ca</a>
Cities Energy Strategies Conference	<a href="http://www.sustainable.org.za/CESConference">www.sustainable.org.za/CESConference</a>
Cities for Climate Protection	<a href="http://www.iclei.org/co2/">www.iclei.org/co2/</a>
City of London Government	<a href="http://www.london.gov.uk">www.london.gov.uk</a>
City of London Hydrogen Partnership	<a href="http://www.lhp.org.uk">www.lhp.org.uk</a>
Danish Energy Agency	<a href="http://www.ens.dk/uk/index">www.ens.dk/uk/index</a>
Danish Energy Information Centre	<a href="http://www.energioplysningen.dk/english">www.energioplysningen.dk/english</a>
DIW Berlin – German Institute for Economic Research	<a href="http://www.diw.de">www.diw.de</a>
Energy for Development 2004	<a href="http://www.energyfordevelopment.org">www.energyfordevelopment.org</a>
International Conference for Renewable Energy	<a href="http://www.renewables2004.de">www.renewables2004.de</a>
Ministry of Foreign Affairs of Denmark	<a href="http://www.ambbankok.um/dk/en/menu/">www.ambbankok.um/dk/en/menu/</a>
San Francisco Energy Agency	<a href="http://www.sustainable-city.org">www.sustainable-city.org</a>
State of California, United States of America	<a href="http://www.energy.ca.gov">www.energy.ca.gov</a>
State of Nevada, United States of America	<a href="http://www.energy.state.nv.us">www.energy.state.nv.us</a>
State of New York, United States of America	<a href="http://www.dps.state.ny.us/index">www.dps.state.ny.us/index</a>
State of Oregon, United States of America	<a href="http://www.oregon.gov/energy/cons">www.oregon.gov/energy/cons</a>
Tata Energy Research Institute (India)	<a href="http://www.teriin.org">www.teriin.org</a>
The World Energy Council (WEC)	<a href="http://www.worldenergy.org">www.worldenergy.org</a>
United Nations Department of Economic and Social Affairs	<a href="http://www.un.org/esa">www.un.org/esa</a>
United Nations Development Programme	<a href="http://www.undp.org/seed/eap">www.undp.org/seed/eap</a>
United Nations Environment Programme	<a href="http://www.unep.or.jp">www.unep.or.jp</a>
United States Department of Energy	<a href="http://www.eia.doe.gov">www.eia.doe.gov</a>



