



**Department of Environment Affairs and Development
Planning**

**A Proposed Renewable Energy Plan of Action for the
Western Cape**

**Resource Assessment, Scenarios, Proposed Objectives and
Actions**

**A Component of the Provincial Sustainable Energy
Strategy**

Final Draft for Approval

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Executive Summary

Overview

The proposed Renewable Energy Plan of Action is an integral part of the Sustainable Energy Strategy (SES) developed for the Western Cape Provincial Government. The plan feeds into the SES and Programme of Action and has helped to clarify many of the outstanding questions posed in the SES, most notably around the availability of the resources needed in order to realise the targets and actions proposed in the SES.

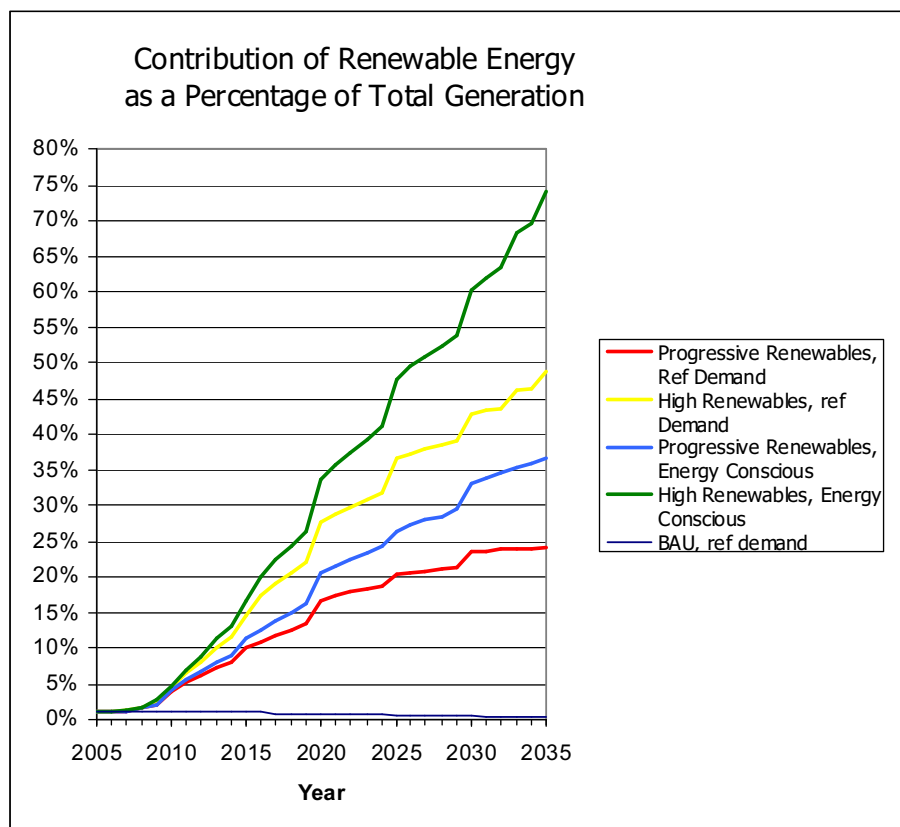
Renewable Energy resource base

The Plan of Action clearly outlines the viability of a 15% Renewable Electricity target by 2014, based on an analysis of six scenarios and highlights the challenges that will need to be overcome in order to deliver on this strategy. The plan shows clearly that the resources are available in the Province but highlights the challenges of exploiting these at a level of commercial viability over a short period of time. Provincial Government will work with a range of stakeholders across the Province to ensure that the objectives are achieved.

Scenarios

The six scenarios that were developed in order to assess the viability of the proposed targets provide role players with a clear idea of the enormity of the challenge facing the Province. These six scenarios are highlighted below:

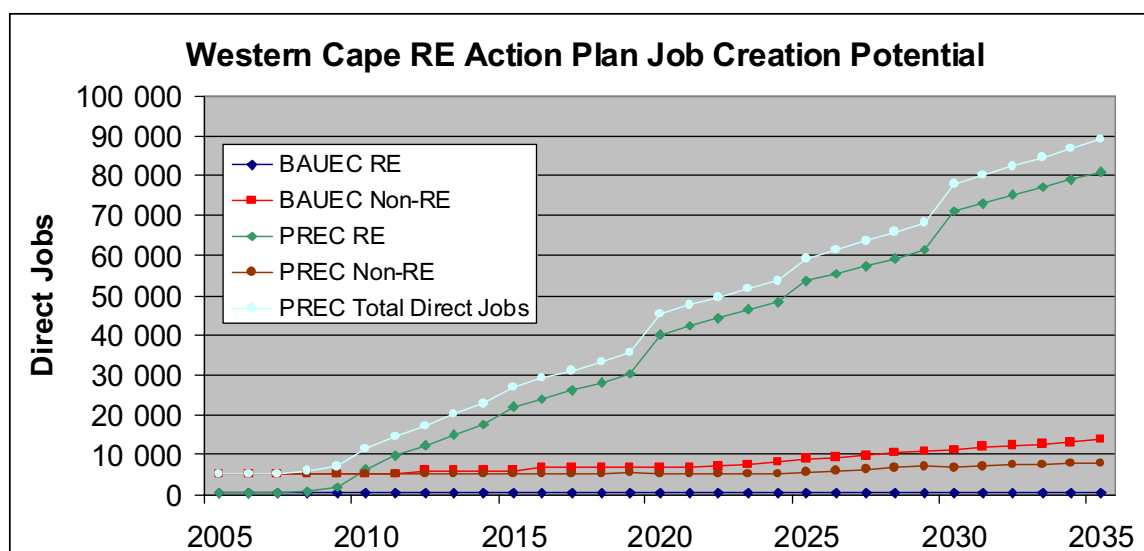
Short name	Longer description	Comments
BARD BAU Ref Demand	Business as usual, reference demand	Continued reliance on fossil fuels, demand growth as per demand study <i>reference</i> case
BAEC: BAU Engy Cons	Business as usual, energy conscious demand	Continued reliance on fossil fuels, demand growth as per <i>energy conscious</i> scenario.
PRRD: Prog Ren Ref Dem	Progressive Renewable, reference demand	Progressive renewable energy planning, demand growth as per <i>reference</i> scenario
PREC: Prog Ren Engy Cons	Progressive Renewable, energy conscious demand	Progressive renewable energy planning, demand growth as per <i>energy conscious</i> scenario
HRRD: High Ren Ref Dem	High Renewable, reference demand	High promotion of renewable energy, demand growth as per <i>reference</i> scenario
HREC: High Ren Eng Cons	High Renewable, energy conscious demand	High promotion of renewable energy, demand growth as per <i>energy conscious</i> scenario



The Department will focus on implementing a Plan of Action which achieves similar rates of renewable energy contribution to those outlined in the ‘high renewables, energy conscious demand’ as it will be necessary to do this if all the objectives are to be achieved by 2014. (Note that the high percentage of renewable energy generation shown in later years of this scenario would be modified through export potential, as well as network limitations).

Delivering on job creation

The progressive renewable energy, energy conscious scenario (PREC) indicates a net energy sector job benefit of 16 000 by 2014 and 75 000 by 2035 over the business as usual scenario. The High Renewables scenario would obviously show an even greater number of new jobs created. This provides Provincial Government with evidence that a renewable energy industry is desirable and will deliver economic and financial benefits to various stakeholders, over and above the environmental and social benefits of the plan.



Delivering on industry development potential

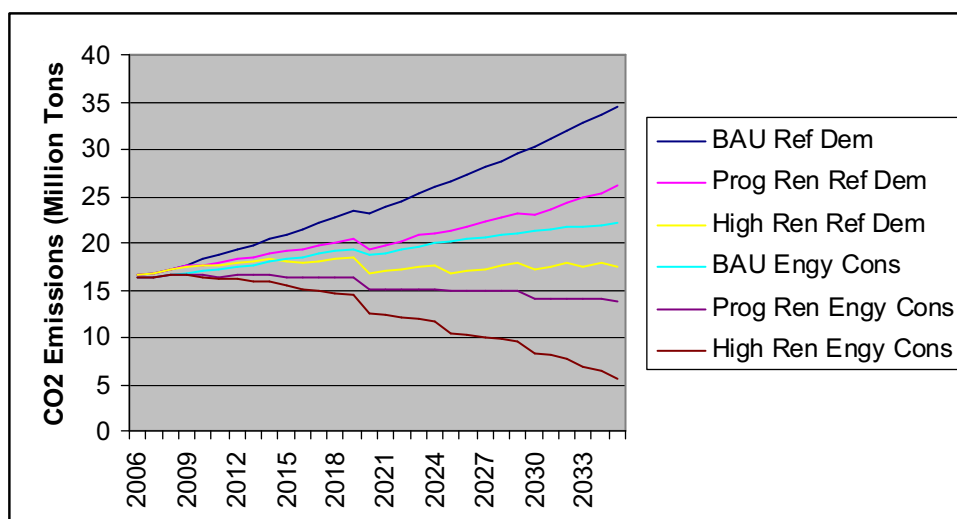
The required investment in renewable energy technologies is in the region of R 8,8 billion by 2014, R12 billion by 2015 and R26 billion by 2020. Although this represents a significant capital outflow, it also results in significant regional industry development, and high levels of permanent job creation. The capital needed will also hopefully stimulate investment into projects in the Province. Given the significant interest by various players (private sector, state institutions, local authorities) in developing energy projects, Province will aim to support these players in realising the benefits associated with the industry development.

Delivering on CO₂ emissions reductions

One of the main reasons for promoting a strongly renewable energy component for the Western Cape energy consumption is to reduce the green house gas emissions from use of electricity.

If the energy supply mix were to remain similar to current, and demand were to grow inline with the reference demand curve – by 2035 the Western Cape electricity sector would be responsible for more than double the current CO₂ equivalent emissions. The graph below clearly shows the significant impact of energy efficiency measures, with the BAU Energy Conscious Demand Curve reducing final emissions from just over 34 million tonnes to about 22 million tonnes (but still leaving emissions higher than they are in 2007).

The only scenarios which show a net reduction in emissions are the *progressive renewable energy conscious* scenario, and the *high renewables energy conscious scenario*. The *progressive renewable energy conscious* in particular shows the power of energy efficiency combined with active support of renewable energy to achieve mitigation objectives.



Delivering on cost objectives

Predicting future prices for electricity generated from fossil fuels, and from renewable energy resources is an uncertain science. However, based on the assumptions used for the analysis, the *progressive renewable energy conscious* and the *high renewable energy conscious scenario* indicate *average costs per unit energy* that are only marginally higher than for the *business as usual energy conscious scenario* by 2015. If renewable energy cost reductions continue as anticipated (assuming there is significant local investment), and fossil prices continue to climb, then the *progressive* and *high renewables* scenarios have *lower average costs per unit electricity* than the business as usual options post 2025. This does depend in part on the evolution of low cost electricity storage options.

Delivering on the overall objectives

Based on the assessment of renewable energy resources, conversion technologies, growth in demand and presented in the above scenarios, the following conclusions can be drawn:

- Energy efficiency is clearly shown as a critical tool to reducing CO2 emissions;
- There is significant potential in the medium to long term to generate a high proportion of electricity needs from renewable resources, and *based on the cost change assumptions used in the plan*, the cost differential compared to a business as usual scenario is reasonable;
- 12% *locally* generated renewable electricity by 2015 is just achievable (as per the scenarios investigated) if a highly aggressive renewable energy plan is implemented and strong energy efficiency is practiced – the High Renewables Energy Conscious scenario;
- It is likely that there would be scope to import renewable generated electricity from other regions. However, by 2015, the amount available nationally may not be sufficient to achieve a 15% WC target, and other renewable energy purchasers in the country will compete for this energy. This requires the Province to ensure that an aggressive local target is pursued.

- The *progressive renewable* and *high renewable* scenarios (coupled with *energy conscious demand*) illustrate the possible contributions that could be achieved (based on the models developed).

From an electricity perspective, the scenarios and plan show an encouraging picture in the longer term, as the resources are available to generate a high proportion of electricity from renewables (and in time to even export renewable energy). Furthermore, it is clear that the Province could keep CO₂ emissions from electricity consumption at current levels (using for example the *progressive renewable energy conscious scenario*), while still maintaining electricity prices within reasonable limits.

Significant challenges remain in the non-electricity sector. Important contributions can be made through biofuels, solar water heaters and building energy guidelines. However, the high reliance on fossil fuels in the non-electricity energy sector remains a key challenge that the province will have to apply focussed attention to if overall sustainable energy objectives are to be reached.

Proposed Provincial Energy Targets

The scenarios indicate an evolution in the energy sector. These scenarios are translated into a set of objectives or targets for the province – which are achievable as has been clearly articulated.

In some cases there is uncertainty associated with the targets, and revision/updates will be necessary over time as more detailed experience and research emerges. However, bold leadership and aggressive plans are needed if the province is to achieve sustainability.

Number	Target	Comment
RE 1	12% of the electricity consumed in the Western Cape will be from certified renewable energy resources by 2014, 18% by 2020, 30% by 2030	These are slightly higher than the <i>Progressive Renewable Energy Conscious Scenario</i> , but less than the <i>High Renewable Energy Conscious Scenario</i> . Assumes significant growth of the renewable energy generation <i>as well as</i> significant energy efficiency endeavours.
RE 2	Institutions with the Western Cape Government Structures (as well as local authority governments) will ensure that 15% of the electricity they use is generated from renewable energy resources by 2014	Although this is a relatively small amount of electricity, it will help to kick start activities in the sector and provide certainty for early stage investors

Number	Target	Comment
RE 3	Solar Water Heaters be installed at a rate compatible with the scenario presented in the Demand Side and Energy Efficiency Strategy.	The Provincial Government will need to work with major Metro's and towns to launch a SWH programme.
RE 4	Biofuels should be incorporated within the provincial diesel and petrol consumption, in line with Nationally agreed strategy	Although many may wish to propose a higher target than the National Target, caution is urged until more experience of this complex sector has been obtained
RE 5	Industry, electricity distributors and other key purchasers of electricity undertake to source a portion of their electricity from renewable resources, so as to individually achieve the targets set out in RE 1. This type of voluntary undertaking is consistent with recommendations of the national TREC system feasibility study.	<p>This is not a mandatory target. However, provincial government will investigate the option of introducing an environmental tax linked to the energy input mix of industries in the province.</p> <p>Provincial Government will work with key stakeholders to develop a Provincial Energy Charter.</p> <p>Provincial government will lobby municipalities to introduce a component of renewable electricity within their mix and establish generation projects.</p>
RE 6	New buildings include on site generation of 10% of their energy needs, and aligned with the building guidelines developed by D:EA&DP	Guidelines need to be implemented and regulations developed
RE 7	CO2 equivalent emissions attributable to the consumption of electricity should be held within 5% of 2006 levels, and by 2020 there should be a downward trend.	This can be achieved if actions similar to the Progressive Renewable Energy Conscious scenario are followed.

Plan of Action

Achieving the targets required to mitigate CO₂ emissions and to allow economic growth, improve energy efficiency and simply maintain power security is an enormous challenge. If renewable energy is to play the role envisaged in the progressive or high renewables scenarios proposed in this plan, then very significant changes in scale of the industry and financial flows are required. Provincial

Government will ensure these objectives are realised through an aggressive Plan of Action.

Furthermore, these are industries where the human and technical capacity required per unit of capital investment (or per MW installed) are larger than for equivalent large scale fossil plants. It is thus necessary to specifically look at strategies to rapidly develop and upscale new industries (such as the envisaged industry focus groups proposed by the Department of Economic Development), human resources, project development and approval processes, as well as finance flows. This plan provides some indications of what is needed. However, significantly more planning, research and strategy development is needed in order to put in place a concrete plan for expansion of the renewable energy contribution.

The Plan of Action will require co-ordination and collaboration across a number of government departments as well as with various external stakeholders.

Number	Area	Action	Inception date	Impact
REA 1	Establish mechanism for Renewable Energy accounting in the province	Support national development of a TREC's or similar system that can allow for clear accounting of renewable energy consumed in the province.	2007	Necessary input to market creation, and for implementation of renewable energy obligations
REA 2	Stimulating renewable electricity production	Support establishment of either feed-in-tariffs, renewable energy obligations, or similar for key consumer classes.	2007	Create viable market for electricity generated from renewable resources
REA 3	Stimulating renewable electricity production	Research option to introduce environmental tax or certificate buy-back level on all entities over certain size that do not meet provincial renewable energy targets. Ringfencing would provide a fund for direct support of projects.	2008	Create viable market for electricity generated from renewable resources
REA 4	Western Cape Government and local authorities to lead by example and purchase renewable electricity at more ambitious rate than	Purchase TRECs or equivalent certified renewable electricity or establish own generation projects.	2008	Create minimum secure market for renewable electricity

Number	Area	Action	Inception date	Impact
	provincial target			
REA 5	Renewable Electricity Generation Facilitation	Support research efforts that provide pre-feasibility grade information on resource/transmission capability/opportunities.	2008	Helps RE investors overcome preliminary project identification hurdles
REA 6	Renewable Electricity Generation Facilitation	Ensure that EIA processes are conducted efficiently and that blanket concerns about sensitive areas do not inhibit relatively benign projects.	2008	Critical to rapid project development
REA 7	Renewable Electricity Generation Facilitation	Assist with power purchase negotiations.	2007/8	Critical to financial closure on projects
REA 8	Renewable Electricity Generation Facilitation	Transmission line monitoring, enhancement , and network modelling.	2010	Government need to ensure that infrastructure is planned/in place to transmit power as needed
REA 9	Renewable Electricity Generation Facilitation	Carefully targeted subsidies/financial assistance for feasibility studies.	2009	
REA 10	Renewable Electricity Generation Facilitation	Grid connect codes, finalized, made easily available, applicable.	2008	These are significant barrier to small scale distributed generation (e.g. PV grid connect)
REA 11	Promotion of cleaner Fuels	Facilitate introduction of biodiesel and ethanol production and consumption in the province.	2007	
REA 12	Promotion of cleaner Fuels	Research support for biofuels feedstock development, as well as biofuels socio-economic impact assessment.	2007/8	
REA 13	Industry development	Incubator company support.	2008	
REA 14	Industry	R&D support (financial,	2008	Stimulate much

Number	Area	Action	Inception date	Impact
	Development	capacity development), also assist in making public sector funded research outputs available to public.		needed R&D. Ensure that R&D that has been done using public money is available for use.
REA 15	On site generation target	Investigate setting a 10% on-site renewable energy generation obligation for all new buildings over a certain size.	2009	This has significant economic implications which need to be properly investigated, but it could have important impacts. The city SWH by-law could provide guidance in this regard

Monitoring and ongoing revision

The Western Cape leads the way in terms of renewable energy planning given the development of the Sustainable Energy Strategy and Plan, and the targets which reflect a larger than provincial pro rata share of the national renewable energy target of 10 TWh by 2013.

Monitoring the uptake of renewable energy in the province will be critical to the successful design and refinement of a provincial strategy and ongoing action to stimulate renewable energy uptake. The process of monitoring and feeding results into policy decisions and the design of support measures and internal activities are critical for success.

The Department of Minerals and Energy prepared a feasibility study on the establishment of a national tradable renewable energy certificate system (DME 2007) and a methodology for monitoring progress towards the national renewable energy target (DME 2005). The PGWC will draw from, integrate with or build upon these initiatives depending on the rate at which the national system is put in place, and will look to facilitating the implementation of the system across the province.

Provincial Government commitment

The Plan of Action requires of Provincial Government to take bold and decisive action in order to address the challenges articulated in the Sustainable Energy Strategy. Critical challenges which will influence the achievement of the objectives of the Provincial Growth and Development Plan must be addressed and Government has committed to doing this. Demonstrating bold leadership in addressing climate change,

energy poverty, energy security and economic development, and mitigating these risks is a key responsibility of the Provincial Government.

The Plan of Action will be developed in collaboration with all stakeholders and Provincial Government will take the lead in ensuring these objectives are achieved. The remainder of the document provides all stakeholders with the information needed to work with Government in addressing these critical energy and sustainable development challenges.

Acknowledgements and limitations

This report has been informed by discussions with several participants in the Energy Sector in the Western Cape, as well as key National stakeholders. While responsibility for errors or inaccuracies rests with the authors, we wish to acknowledge the important inputs received from provincial officials, industry members, and interested parties. We also wish to acknowledge the contributions made by fellow members of the Sustainable Energy Africa led team under whom we worked on this project: Davin Chown, Mark Borchers, Leila Mohamed, Audrey Dobbins. Robbie Cahill contributed to the population of the LEAP model developed. Postgraduate students C van Dyk, B Bekker, J Taulo, A Stewart and R Omer helped gather background material on different resources (supported by lecturer Bill Cowan).

Projections into the future are of course fraught with many uncertainties. The models and scenarios presented here are not formal planning outputs resulting from detailed dialogue and interaction with the necessary players (as for example in the process followed for the National Integrated Resource Plan (NERSA) or the Integrated Energy Plan (DME)). They have been produced with far less resource input, and far less time. We trust that readers will take them as such.

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List of Abbreviations

D:EA&DP	Department: Environmental Affairs and Development Planning
DME	Department of Minerals and Energy
NERSA	National Electricity Regulator of South Africa
NPV	Net Present Value
PGWC	Provincial Government of the Western Cape
PV	Photovoltaic
TREC	Tradable Renewable Energy Certificate