

NELSON MANDELA BAY METRO CASE STUDY

Introduction

South Africa is the 15th biggest producer, per capita, of Greenhouse Gases (GHGs) in the world and yet it is far behind in its renewable programme than other developing nations who produce less GHGs. Cheap and easy access to coal has largely been the culprit, making it challenging to promote electricity generation from any other source of primary fuel. But this is not deterring some municipalities; and while national government is busy preparing strategies for sustainable development and renewable energy, the Nelson Mandela Bay Metro (NMBM) is putting its thinking into action.

Showing clearly that times are changing, the Nelson Mandela Bay Metro, not shy to take some bold steps, is literally a trailblazer for a new paradigm on how cities can take forward the renewable energy agenda of South Africa.

The Renewable Energy, Energy Efficiency and Alternative Energy Project

The NMBM has embarked on a ground breaking renewable energy programme through its electricity and energy business unit. Even the fact that the Metro has a unit that is not solely described as the “electricity department” already shows that the city’s decision makers are thinking outside the box beyond electricity supply to energy supply.

The municipality responded to a number of issues and challenges facing both the world and its own municipality such as global warming, price increases, the growing need for energy and a nascent movement within government and parastatals to provide more renewable energy in response to these challenges.

National and international issues that impact on energy supply strategies

- Global warming caused by anthropogenic burning of fossil fuels for energy
- Increasing oil and coal prices (coal has increased 40% alongside oil)
- The threat of a large rise in the cost of electricity from Eskom as a result of the need to capitalize new power stations
- The possibility of mandatory renewable energy targets for energy producers within the regional energy distribution network (REDs)
- The South African renewable energy target of 10,000 Gigawatt hours by 2013

The NMBM had other specific motivations that were leading the way within the metro such as: wanting to support the 2003 white paper for renewable energy and contribute to the national target for renewable energy production; Recognizing the important role that municipalities can play in reducing carbon emissions; and to further the role that NMBM has been playing as a leader and innovator in many international and national goals and targets that support sustainable development.

Table 1: Factors both contributing for and against the proliferation of Renewable Energy Technologies (RETs) in South Africa

Contributing/enabling factors	Challenges facing the sector
A white paper for renewable energy (2003) with a target of 10 000 GWh by 2013 (cumulative) from new energy supplies	Abundance of coal in South Africa without any restrictions by national government on its use and poor regulations regarding emissions that make coal cheap economically but costly to human health and the environment
International imperatives like climate change where SA may have to accept global emission targets under the Kyoto Protocol in the next round of negotiations	Renewables are seen to be in competition with other energy supply sources rather than as complementary and environmentally sustainable
Proven technologies around the world mean that South Africa does not have to lead the way on technology development	High initial capital costs of renewable make them appear less attractive at first until analysis reveals that over 20 years many technologies are in fact cheaper
High oil and coal prices make renewables more competitive and attractive	Finance for renewable energy technologies has been harder to access in the past and specialized financial packages need to be set up to make this sector attractive to investment
Abundance of renewable energy supplies in South Africa, especially in terms of wind, sun and wave	RETs often require a more decentralised system, and can be more difficult to manage, so engineers and large power suppliers have been reluctant to change over from their existing highly developed systems

These imperatives, of political, social, ecological and economic nature, which were heightened by more recent events throughout the country with power outages caused by inadequate energy planning intensified the debates within the NMBM to do some serious energy planning. As a result of this, the electricity and energy business unit of the NMBM were given a mandate by the Executive Mayor on the 14th Nov 2005 to “pursue the possibility of implementing renewable energy and energy efficient projects in the NMBM”.

The challenges facing establishing a renewable energy programme in South Africa are significant but these did not deter the NMBM. They, as leaders recognize that there have to be risks takers, leaders that are prepared to try out new ideas and through “show and tell” can facilitate their fellow municipal

partners to also enter the market with much of the risk having been taken out of the programme. Even as the programme has progressed, the risks and barriers to success are gradually being removed. Oil price increases reduce the margin between the cost of the renewable energy production and that of fossil fuels, although it is still higher. Technologies are always being improved and with India and China entering the renewable energy market so firmly, this has significantly increased the suppliers of technology and the range of products, all important when dealing with issues that affect the success of renewable energy technologies such as variations in climate (wind and sun) and South Africa varying ability for consumer to afford the technologies.

The NMBM issued a tender that called for companies interested in supplying renewable energy technologies (RETs) to the municipality to come forward and provide a detailed analysis of how this could be done. It was advertised on the 1st February 2006.

Progress

Since the tender was announced, the NMBM has been intensely busy assessing the bids and developing the strategy. The metro deliberately left the tender very broad and open so as to encourage all ideas that might flow. As a result three bidders were selected:

- Lereko energy consortium
- Uluntu Holdings
- Enercon India (a 100% subsidiary of EIL South Africa Power Development (pty) Ltd

Lereko Energy consortium was made up of 5 companies,

Genesis – wind generation

Nyati Energy Services - to focus on energy efficiency in municipal buildings

Agama – solar water heaters

Jones and Wagner – landfill gas

Straights Chemicals – co-generation plant alongside the intended chlorine factory for the Coega Development and water reclamation works

The other companies were stand-alone bids as follows:

Uluntu Holdings (Thermo-Rec - a company from Sweden) have expressed an interest in waste incineration to produce electricity

Enercon India – long term wind generation

The project is still in its early development. All the bidders are currently doing feasibility studies at their own cost which establishes not only their *bona fides* and commitment but sends a strong market signal that these projects can work and that business is prepared to invest to make them happen. The programme

involves a billion Rand investment that will be funded in a number of different ways. One of these will be through the CDM, the tool developed through the Kyoto Protocol to assist developing non annex 1 countries to develop programmes to reduce or mitigate carbon emissions. But most of the funding will come directly from investments, which proves that renewable energy technologies (RETs) are good business.

The NMBM will outlay no capital although it will be seeking development assistance from its provincial partner, the Department of Environment. Instead, the municipality has agreed to pay for the green electricity at a price which guarantees the long term viability of the project. This guaranteed purchase agreement is all that is needed to incentivise private sector infrastructure investment at this scale. The actual agreements on pricing have not yet been finalized. The Nelson Mandela Bay municipality intends to enter into partnerships with many of its corporate and private sector clients to line up buyers of the green electricity.

In the absence of national policy, such as an electricity feed-in tariff regime, it is municipalities like NMBM that will forge the way towards a renewable energy future. National government could make it easy if they were to follow the examples of many developed and developing nations that have established enabling regulatory frameworks to support Eskom, utilities, REDs and local municipalities to introduce RETs.

The NMBM is not currently a power producer, it closed its Swartkops power station about 15 years ago and now purchases all of its electricity needs from Eskom. The current peak power load of the NMBM is in the order of 630 MW. The wind turbines will provide about 15-20 MW. The landfill projects, although not yet fully tested are anticipated to provide a further 4 MW. The solar water heaters will not generate power but could significantly reduce peak load demand for the power purchased from Eskom. So the project is small in comparison to the energy needs of the metro, in the order of 25 MW, but still significant enough to contribute to the renewable energy production in South Africa, which is currently extremely small.

In the absence of national legislation that would contribute to facilitating such brave ventures, the municipality has to rely on its own purchasing power and that of its industries. It has estimated that it can absorb about 20 MW of green electricity within the current tariff structures, as the cost will be significantly more than that of current coal powered generation. But the municipality is relying on the positive signals coming from DME and the REDS that renewable energy will be prioritised in the future. It is hoped that such legislation will make the purchase of green electricity mandatory by REDS and Eskom at fixed tariff rates. Such legislation exists already in most European countries and in India and many are covered by laws called "feed in tariffs". (See text box below)

Germany introduced a new law in 1990 called the Electricity Feed in law (EFL) based on successes with a similar law in Denmark. The law was made up of three pillars:

- Free access to the grid for any renewable energy supplier
- A guaranteed fixed price to a renewable energy supplier
- And an obligation by the German utilities to purchase green electricity.

The law was updated in April 2000 when Germany recommitted itself to renewable energy and promulgated the Renewable Energy (RE) law that worked through some of the unintended snags that come with most new laws.

The law is very simple and it means that even ordinary households that produce green electricity can feed this into the grid when they are not using it and be paid a guaranteed rate for this electricity; the household can then draw off electricity from the grid when it needs it. The price paid depends on a number of factors, the renewable energy technology employed and the geographical location. This is because some technologies are more expensive than others and the law is intended to promote all RE technologies and the efficiency of some RE technologies are dependent on location (i.e the wind blows better in some places than in others). The system has also been carefully designed so that the incentives are based on when you enter the scheme, trying to encourage efficiency and benefit from economies of scale. This has resulted in the RE sector becoming more competitive, forcing prices down, for instance wind energy prices have dropped by over 50% since the introduction of the scheme. Over 150,000 jobs have been created in Germany as a direct result of the RE sector.

The scheme is financed by electricity users themselves, taking the burden off the national fiscus. Electricity users typically pay a small annual fee of about 11 euros and this has funded the entire programme.

India has now adopted this system as well and in 2003 introduced it into the Electricity Act. It was the first developing country to do and has been quickly followed by many developing countries. Nowadays, 48 countries, 34 developed and 14 developing nations have some kind of law to support Renewable energy technologies.

Project summary

All the following companies work within the Lereko Consortium

Project and Energy emphasis	Company	Power supplied/saved And additional info
Energy efficiency – maximise saving in all areas of the municipality	Nyati Energy Services	
<i>Street lighting, dimming, energy efficient LED bulbs, better timing</i>		
<i>Waste water treatment plants – increased efficiency, not running in peak time, timing</i>		
<i>Large municipal buildings – retrofit, improve air conditioning systems, energy efficient lighting</i>		
Wind	Genesis	15-20Mw
<i>24 high mast 750Kw wind turbines</i>		Will sell the power to the metro, cost is high 50-60c/Kwh
Solar Geyser	Agama – Lerako special vehicle company established for this project	Will be backed up by electricity And save domestic consumption
<i>Start with 500 houses, ramp up to 10,000 houses or more</i>	Using a range of suppliers	Applying for DSM funding. This will be integrated within the municipality billing system and the charge to the householder will be the same as if they were heating water.
Waste water treatment plants		
<i>Methane recovery from a chlorine plant in Coega Located in the fish water flats</i>	Straights Chemicals-company from Singapore	2 MW Waste water effluent will be purified to industrial grade water
Landfill gas		
<i>2 landfill gas project Arlington – largest landfill in the metro Koedoeskloof</i>	Jones and Wagener	4 MW 3MW

Conclusion

There are many lessons to take away from this case study

1. Local municipalities do not have to wait for national government, they can take on this challenge themselves and reap the benefits
2. Adopting a renewable energy programme does not mean that the municipality has to invest any of its financial resources, but can rely on a market that is both hungry for energy and ready to finance RETs.
3. Municipalities can unlock the potential of their own renewable energy resources, be it wind, sun, wave, hydro or biomass, each city has its own unique renewable energy profile.
4. It takes a champion with a vision to drive the process and commitment from the government officials who will have to move out of their comfort zone into a potentially exciting and rewarding area of work.
5. The benefits to a local municipality are enormous, greater independence from an energy perspective, an ability to attract new business based on improved energy planning and a strategy to get energy to homes that have not previously had this advantage.

But the benefits go beyond energy security and many of them are not easy to notice at first. By using renewable energy, the local air quality should improve, as people stop burning low grade coal and industries create closed loop systems that trap potential greenhouse gases for use as energy sources. The impacts of this will only be seen over time, with less people frequenting clinics and the incidence of chronic lung conditions decreasing. This is still the beginning of a process that can escalate into something that we cannot imagine yet.

Useful resources

Internationally and locally there are many organizations that can help you with your quest to develop your city energy strategy.

The Department of minerals and Energy has two programmes that can help you to finance your renewable energy and energy efficiency programmes which can all be found on their web site by following the correct links on the home page www.dme.gov.za. The first is the REFSO programme (Renewable Energy Finance and Subsidy Office) contact refso@dme.gov.za which provides subsidies. The second is the Designated National Authority (DNA) of the Kyoto protocol's Clean Development Mechanism (CDM) financing tool which can be contacted at +27 (0)12 317 8227.

The Central Energy Fund (CEF) is also taking renewable energy more seriously these days and they have invested in programmes that support these initiatives. The South African National Energy Research Institutes (SANERI), a subsidiary of

CEF is making renewable energy a priority and you can find them by going to the CEF web site www.cef.org.za and following the “groups” link on the home page.

SEA, Sustainable Energy Africa has a specific programme that focuses on the development of City Energy strategies. Its recent publication “State of Energy in South African Cities 2006” is well worth getting hold of. It’s soon to be released web site “ Cities Energy Alliance” Website will be a useful place to get information. www.sustainable.org.za.

REEEP web site www.reeep.org. REEEP is an international organization that supports renewable energy programmes through networking, funding and information sharing. It also funds local government for policy development and concept development depending on the annual focus at the time. Southern Africa has its own office located in Cape Town and can be contacted for information on Carmen.armstrong@reeep-sa.org

ICLEI has an international programme called the Cities for Climate Change Programme which most of the South African major centers have also joined and been actively involved with. ICLEI’s web site contains details of this plus about a US programme called Mayors for Climate Change. www.iclei.org

CURES (Citizens United for Renewable Energy and Sustainability) is a global network with a local Southern African office. CURES can help cities with information and contact details of those involved with renewable energy. CURES has set a target of 15% renewables by 2020 in South Africa and is working closely with government and its parastatals like CEF to achieve this. Go to www.cures-network.org and click on the various southern NGOs work to find contacts in Southern Africa.