Integrated Southern Africa Business Advisory (INSABA)

Development of RE in the South Africa and Namibia

Report for Deliverable 4.1

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Renewable Energy in Namibia

There have been many laudable developments in the launching, sales and use of renewable energy systems in Namibia in the past 20 years. The abundance of sunshine hours and the needs for off-grid power supply, motivated mostly private individuals and entrepreneurs to invest in solar power. However it remained a fringe enterprise until the price and supply of electricity through the national grid or produced by Diesel generators became unsatisfactory and forced the private sector as well as government and public agencies to look for alternatives. The INSABA project started just before and commenced right into this period when it could be used for public education around the value and economic use of renewable energy.

Solar

Greater Namibia receives solar radiation of 5.8 to 6.4 KWh per square meter per day – of the highest in the world. With 8 to 11 average hours of sunshine per day through out the year, this offers fantastic potential for solar power, both photovoltaics and solar thermal. With one solar plant of 6500 hectares (an 8 by 8 km solar farm), we could supply the entire country's electrical need. Of course, a centralized single plant like that in the desert is not economically feasible at present, but it gives an indication of how much solar potential there is.

Solar potential is so high in Namibia that it would be futile to enumerate all the possibilities. Among others, a study "Assessment for the *Feasibility for the Replacement of Electrical Water Heaters with Solar Water Heaters" (Final Report August 2005)* by Axel Scholle and Glenn Howard of EMCON Consulting Group has shown significant potential in terms of electricity savings for the country. This and other official studies can be down-loaded from the Ministry of Mines and Energy website[1].

Wind

Average wind speeds inland, like most of Africa, are low (below3,0 m/s) and wind is infrequent. On the coast, however, wind speeds reach up to 6.5 m/s average, and Lüderitz even has an average wind speed of over 7.5 m/s. Erongo RED at Walvis Bay (the regional electricity distributor at the coast) has already installed a 220 kW wind generator to demonstrate a positive effect on peak demand in the early evening. In terms productive use of wind energy – other than for the production of grid electricity – the proposal of wind powered desalination has been brought up. Several Uranium mines are in production or planning to start production as soon as possible which have a large need of sweet water and electricity. All mines are close to the

[1] http://www.mme.gov.na/energy/renewable.htm

Namibian coastline were potable water resources are limited. Because of the existing supply shortage for electricity wind power is seen as a potential resource to overcome these limitations.

Other RE initiatives

Biomass conversion to electricity is spearheaded by the Desert Research Foundation of Namibia (DRFN)[2], with generous financial support from the EU and participation by farmers and farmer's unions in Namibia. The Bush-to-Electricity Project aims to utilize encroacher bushes that negatively affect livestock production in most of the country's rangelands. Bush encroachment cause losses up to N$ 700 Million per year in lost grazing land. This bush encroachment has a sustainable energy potential of 25 000 GWh per year of 500 MW to 1000 MW electric generating capacity, which would realistically cover 80% of Namibia's national demand. Biomass could supply both grid and off-grid energy. Through labour intensive harvesting and decentralized wood gasification farmers will be able to generate their own electricity needs and feed excess power into the national grid. Up to 30 000 jobs could be created[3].

In connection with biomass, we also want to mention the use of wood-saving stoves. See chapter 7.6 in this report.

The Agronomic Board of Namibia and farmer's interest groups are investigating and some have already established plantations of bio fuel crops, particularly Jatropha. Early observations show that they require initial irrigation and in general the effects of the use of food crop land for bio fuel production must still undergo careful scrutiny. Jatropha needs about 700-750 mm rainfall or equivalent irrigation per year. It is not very likely however that Jatropha will be right bio-fuel-plant for Namibia.

Geo-thermal energy is explored for low-heat power generation systems at six sites in Namibia. The first stakeholder has announced his project to go into installation phase in 2008.

Opportunities realised by the RE industry

Once the small scale INSABA ideas created a market it created demand for the relevant RE energy systems at the same time. This already has begun to grow into a lucrative branch for some RE energy companies in Namibia where several have started to manufacture and sell small packaged systems which support the INSABA business ideas. These packaged system constitute an ideal product which is marketed by the Solar Technicians in their function as interdisciplinary advisors (IAs).

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[2] http://www.drfn.org.na/mission.htm

[3] www.drfn.org

Large scale conversions to RE for farms and lodges are becoming the order of the day with the rising fossil-based energy price jointly working with the INSABA process to convince potential clients.

Both – small-scale and large-scale – system provision is greatly enhanced by the increased interest of the banking industry

THE ENERGY SECTOR IN SOUTH AFRICA

South Africa (SA) has a relatively well-developed energy production and supply infrastructure compared to most countries in the Southern African Development Community (SADC) region. The country is endowed with vast coal deposits, whereas natural gas and crude oil reserves are limited resulting in almost all of the demand for crude oil being imported. There are also large reserves of uranium in the country. Renewable energy sources such as hydroelectric power forms a very small percentage of total power production because of the country's low rainfall and the absence of river flows of significant hydroelectric potential. More recently the country's abundant sunshine is being harnessed in remote areas for the generation of electricity for both domestic and economic applications. Wind energy though a possible source of energy generation in certain regions of South Africa compares poorly in unit generation costs in relation to conventional energy sources in the country such as coal (DME, 2006). The Government's renewable energy target as well as opportunities offered by the Kyoto protocol on climate change have together increased the importance of renewables in the country's energy mix.

The energy sector contributes considerably to Gross Domestic Product (GDP), employment, taxes and balance of payment situation in the economy and the sector is therefore an important driver of growth and development in South Africa. For instance, the energy sector contributes 15% of the GDP and employs a quarter of a million people in South Africa. Currently, the bulk of the energy used in the country comes from coal (75.4%) the other sources are oil (20.1%), nuclear (2.8%) and hydro (0.1%). ESKOM, the public electric power generator accounts for over 95% of the electricity produced while other producers including co-generating facilities account for the rest.

The demand for electricity in the country has surpassed supply and this has put a strain on the generating capacities of power producers in South Africa. ESKOM has therefore resorted to a vigorous demand-side management, which includes free distribution of energy-saving bulbs and power rationing. These scheduled (known as 'load shedding') and unscheduled power cuts have placed the country in an 'energy crisis' position which has occupied economic and development debate for all of this year (2008). Business and industry have suffered substantial economic and financial loss as a result and it has become increasingly clear that consumers will need to start investing in energy security for themselves should they wish to continue on a 'business as usual' path. Likewise, the SA government has to make some tough decisions about the future of electricity generation capacity and related infrastructure should the country wish to continue with its high economic growth agenda.
Eskom plans to add 40,000MW of capacity to her existing 38,000MW capacity[4] by 2025. The company intend to generate 20,000MW of the proposed new capacity

4 Mostly from the 11 coal-fired power stations and one nuclear power plant near Cape Town.

from 5 or 6 nuclear plants with the rest coming from coal-fired plants[5]. Currently 3 mothballed coal plants are being brought on stream while a new 4,500MW capacity coal-fired plant is under construction. Eskom intend spending ZAR300 billion in building the new plants. There are moves now to increase the historically low tariff levels enjoyed in South Africa to take account of huge cost involved in building the new infrastructure. The low tariff structure has been said to be based on the depreciated asset base of the old generating infrastructure which has seen no new additions for at least the past decade[6]. In addition, these low costs are also as a result of the price of coal not being factored into electricity costs and also because consumers have never had to pay for the capital infrastructure costs either.

Finally, it is also generally the far-flung domestic consumer who is subsidising big industry. A good example of this situation is where Alcan (an aluminium smelting giant in the Eastern Cape) is paying approximatelyt ZAR7c per kWh compared to a domestic consumer in Jozini (a small town in the north-eastern part of KwaZulu-Natal) paying 48c per kWh.

Renewables

The installed capacity of renewable energy electricity generation as a proportion of SA's energy output is relatively small (3%). Over the past 14 years the total primary energy supply that comes from renewable energy has not seen any significant increase. The total output of renewables has been less than 10 Million tons of oil equivalent (Mtoe) as compared to the total primary energy supply which has increased from a little less than 100 Mtoe in 1992 to over 120 Mtoe by 2006 (Morris, 2007).

South Africa has the potential for increased use of renewable energy. Currently, photovoltaic modules are used in clinics, schools, lighting, water pumps, television and telecommunication in remote areas across the country but new technologies such as super capacitors, fly wheels, fuel cells etc can reduce significantly the storage costs. In the rural areas biomass is used directly for cooking and space heating, biomass is also used indirectly for biological processes to produce liquid fuels and electricity. The City of Cape Town intend passing a by-law to make use of SWH in new buildings for dwelling mandatory. There is also the Darling Wind Power Farm, a private initiative with the Government (Central Energy Fund) and the Development Bank SA investment that has a draft power purchase agreement with the City of Cape Town. A wave energy power facility with a capacity of 20MW is also under consideration for construction by Finevera Renewables, a private company at

5 http://uk.reuters.com/article/oilRpt/idUKL2926392420080129. Accessed on March 6, 2008.

6 http://www.eskom.co.za/live/content.php?Item_ID=5981. Accessed on March 5, 2008.

the West Coast of the Western Province. The company is in the process of assessing the essential permits from the relevant government departments[7].

The Department of Minerals and Energy has set up the Renewable Energy Finance and Subsidy Office (REFSO) to support private enterprise related to renewables by providing project finance support. Other attempts to support renewables include, the DME's proposed Tradable Renewable Energy Certificates (TREC), the Top-up feed-in-tariff regime being planned by the South African energy regulator, NERSA and the promotion of biofuels by the DME are all part of efforts to boost output of renewables. ESKOM also promotes renewables as part of her demand-side management of the country's energy shortfall. Eskom's support is in the form of subsidy for Solar Water Heaters (SWH). The facility is valued at US$45million and is expected to run for 5 years.

Government energy policy

In recent times the South African Government has developed a number of policies to stimulate development in the energy sector including the renewable energy sub-sector. A list of policy documents for the sector includes the following; the 1998 Government White Paper on Energy; White Paper on Renewable Energy, 2003 and the Industrial Policy of 2007. The recent policy document related to renewables is the Biofuels Industrial Strategy for South Africa 2007.

Productive Use of Renewable Energy in South Africa

The role of energy in poverty reduction is generally considered to be positive. However, practise often defeats theory when energy projects have attempted to contribute to the Millennium Development Goal 1: The link between energy supply and increased opportunities for income generation for the poor. Not only does this topic receive very little attention from national governments who tend to focus on large scale energy supply especially for energy intensive industry, but also from practitioners in the field of small scale energy supply. The term "productive uses of energy" is commonly used for income generation by selling energy or energy technologies, and sometimes in a broad sense, including energy services to schools and health services. Both uses of the term "productive uses" divert attention away from the potentially huge, but in practice small, contribution of modern (renewable) energy to income generation in small enterprises by the poor themselves. (ref: PureSIG The Special Interest Group on the Productive Use of Renewable Energy: http://www.hedon.info/goto.php/PureSIG).

Renewable energy for productive use has typically only had success in South Africa in rural areas where the national grid has no or limited reach. This is because the cheap supply of grid-based electricity has made alternatives economically unviable

7 http://www.finavera.com/wave/south_africa. Accessed on March 5, 2008.

and so renewables have only really been able to compete where there is no alternative to the grid. This points more and more to decentralised energy supply in a country that is characterised by its highly centralised energy systems. The scenario is however changing, albeit later than anticipated. As the generation and transmission supply capacity in South Africa is increasingly under strain, so more and more consumers (domestic and industrial) are turning to alternatives – with reliability and continuity of supply being their primary motivation. This means that indirect economic factors have also started to play a role in comparative analyses between established energy and electricity sources such as diesel and paraffin (distributed energy supply feedstock) and coal based electricity fed through the grid and alternatives such as renewable resources. It is for precisely this reason that the Biomass to energy plant project in Howick, KwaZulu Natal is now viable, whereas an evaluation 18 months ago showed that the project that was not feasible.

This is an important transition as rural based applications, whilst useful are unlikely to gain traction in the large scale energy picture in South Africa as these projects are not perceived to contribute significantly to the economic well-being of the country. It is a transition that is reflected in the successful development of the proposed Solar Water Heater by-law for Cape Town, now in its final draft and being accepted by the City and its councillors. This by-law is also being considered on a national level to be incorporated into national building regulations.

Although the project team were well aware of the barriers to entry for productive use that arise from South Africa's cheap electricity at the outset of INSABA, the South African team (Oneworld) was equally aware that SA had reached a critical threshold in terms of generation capacity and that the cost of electricity/kWh would need to go up accordingly. The political scene in South Africa has however prevented this from happening sooner and the focus on economic growth and development took a one-dimensional view of attracting FDI at all costs. The result is the current power outages and load shedding prevalent in the country at present – with debilitating economic impacts.

OneWorld began partnering with RESTIO Energy in March 2007 in working collaboratively on productive use projects and applications, culminating in a workshop with the Central Energy Fund, the Development Bank of South Africa and other key players in South African energy development in March 2008.


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