Powering Africa

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Africa, as a developing continent, is in a position to learn from the mistakes of the developed world. In terms of energy production, instead of trying to meet its requirements with fossil fuels alone, it should aim to implement renewable energy strategies wherever possible in the course of extending supply to its people. In terms of connectivity, the situation differs from the developed world in that a large proportion of the population (typically outside urban centres) is not connected to the electricity grid. This proportion varies from about 10% connectivity in Uganda to nearly 100% in Mauritius. In South Africa, about 35% of the population are not connected to the main grid, and these are mostly people living in remote rural areas.[1]

A week before COP 17 in Durban, members from the public and private sector met in Cape Town for the 'Powering Africa' energy summit, to discuss matters of energy production and distribution in Africa. Present were government representatives from South Africa, Lesotho, Swaziland, Botswana, Zimbabwe, Namibia, Uganda and Sierra Leone, as well as representatives from funding bodies, such as United Nations Environment Programme (UNEP), EDF Energy and the World Bank and private investors, such as banks and producers, ranging from Eskom and Shell to Vestas (which produces wind turbines) and academics working in this sector. The aim was to discuss the role that renewable energy could play both in addressing shortcomings in current energy distribution and the problems related to energy distribution to rural areas.

In all countries, the major problem in improving connectivity is the wide distribution of small villages (sometimes comprising only a handful of houses) that can be hundreds of kilometres away from the nearest road – and the nearest power line. Often a connection to the main grid is thus economically not feasible. Matthews Bantsijang from the Department of Energy reported that South Africa has tried to solve this problem in recent years with the installation of photovoltaic home (PVH) systems. This system involves equipping individual houses with solar cells, which produce enough electricity for lighting, but not for other domestic demands, which means that people still have to collect fire wood for cooking and space heating. Major problems experienced with this set-up were theft of the equipment and disappointment that the energy did not support other electric household items, such as a fridge or television. Representatives from Lesotho and Zimbabwe, as well as from international energy organisations, such as EDF, reported that people with PVH systems often felt treated as second-class citizens, because they do not receive their electricity like other people and because it provides only for lighting. It appears that people seem to prefer a service – such as electricity from a plug in the wall – rather than equipment that they have to maintain themselves, where the maintenance often requires a certain technical understanding that might not even be available.

This problem could be overcome to a large degree by the installation of mini-grids that serve about 100 houses with electricity that is generated in the most suitable form for the area at a centralised location. Tanzania has followed this route, which they financed through the Tanzania Energy Development Access Project,[2] with the aim of ultimately connecting these mini-grids to the main high-voltage electricity grid. Most of these mini-grids (will) distribute electricity obtained from hydro energy, solar energy and bioenergy.[3] The Kilombero project, for example, proposes the set-up of a biomass power station utilising agricultural waste to supply electricity to several villages.[4]

The other main focus of the summit – apart from connectivity – was of course the generation of electricity. Most participants agreed that regional power generation across borders could potentially present some solutions, but pointed out problems which need to be overcome first. Monyane Moleki, Minister of Natural Resources in Lesotho pointed out that his country could potentially generate an additional 10 GW from hydro and wind energy, which is obviously a lot more than it could ever consume. But a cross-border agreement with the neighbouring countries is essential before project planning can even start. Fawzi Issa from EDF reported that in central Africa, the DRC, Angola, Congo, Gabon, Cameroon and Chad already have a power sharing agreement to distribute hydro energy throughout all member countries of the Central African

A rural village in the Eastern Cape of South Africa with connection to the main grid (photo: Martina Meincken).

Power Pool. But the effects that climate change can have on rivers and dams in Africa needs to be taken into account before investing further in hydro energy. According to the Global Resource Information Database from UNEP,[5] Lake Chad, for example, shrank as much as 95% between 1963 and 1998, posing a serious problem for hydro energy.

To generate energy on a more local scale, the current possibilities with regards to renewable energy are wind, solar (photovoltaic), solar thermal (where heated water is used to generate electricity through steam turbines) and bio-energy. The problem associated with solar thermal energy is that it uses a lot of water and is therefore not necessarily the best option to produce energy in water-scarce areas, or areas that with the expected climate change can be expected to be dry in the near future – such as the west coast in South Africa, for example. As for energy production from biomass, the existing (Western) technology needs to be adjusted for the available biomass in Africa, which is not necessarily the high-quality, low-contaminant, softwood for which reactors are typically designed. Technology needs to be developed for local resources, which is cost intensive. Rojas Manyame from the Electricity Control Board of Namibia reported that with financial help from the World Bank they have successfully installed several biomass plants producing electricity from invasive trees, and even from animal remains from an abattoir. Mauritius and Swaziland are successfully producing centralised electricity from the gasification of bagasse[6] and wood, respectively.

One major obstacle to achieve solutions of this nature is obviously funding, so, in order to motivate funding agencies to invest money in African countries, political support is urgently needed to remove real and perceived risks. But local legislation often needs to be changed to accommodate – and even subsidise – alternative energy production. Power distribution utilities must agree to distribute any form of electricity through the main grid if alternative sources of energy production are to be viable.

The current status in South Africa does not facilitate cross-border power sharing agreements easily, and the power utility Eskom currently does not allow all small energy producers to feed their energy into the main grid, as the renewable energy feed-in tariff (REFIT) implementation process has not yet started[7] and generally the establishment of new facilities is hampered by too many regulations. The way forward needs to be an opening of the energy market and deregulation. Countries that have successfully implemented renewable energy production, such as Namibia and Tanzania, have a separation between the power generating and power distributing entities, or, as in the case of Namibia, more than one provider.

In conclusion, Africa could lead the way with regards to renewable energy implementation if it opened up the market and reduced the risks to funding agencies. Although skills and technology shortage are a real limitation, many successful case studies have shown that where this has taken place, alternative energy production is feasible, and electricity connection of rural areas is possible.

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