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Taking A Fresh Look: Why Africa Is Re-Examining Renewables

by Mark Hankins

For too long, renewables in Afria have been associated solely with offgrid projects for poverty alleviation. However, things are changing fast. As renewable energy markets heat up in the rest of the world, as electricity prices rise, and as power shortfalls loom, power planners are reconsidering renewables. Mark Hankins examines present trends in East and Southern Africa, and suggests how the continent's renewable sector can be strengthened.

In Africa, renewables have, for the most part, has been the power sector's poor cousin. Through 2007 fossil fuels were cheap, and petroleum and natural gas fields were being discovered throughout the continent. In the power sector, large-scale gas, coal and hydro power projects (as well as geothermal developments in Kenya) were the order of the day. Meanwhile, cash-strapped governments focused on short-term planning fixes for fragile grids. While some countries looked forward to developing and expanding nuclear, most saw renewables as an expensive luxury.

Where renewables were used, it was off-grid and for good reason. Over half of the population is off-grid and not likely to be connected any time soon. Renewables are well-matched to the needs of decentralized sources but the off-grid renewable focus did not help as much as had been hoped. Government policy in most African countries traditionally focuses on building up the national grid and, however slowly it moves, electrification is a very political animal. Even where they are viable, ministers are often reluctant to implement 'off-grid' projects. Too many planners see off-grid renewables as second class and nobody wants to tell voters that they will not be getting 'real' electricity.

Fund-raising

Meanwhile, with little coming from government budgets, those funding renewables in Africa — such as the UN, GEF, the World Bank and so on — were unwilling to put resources into grid-connected initiatives. Donors wanted renewables to serve the poor. So a majority of African renewable efforts were rurally focused, donor driven and tied to poverty alleviation objectives. National renewable energy projects, out of step with government policy, thus squandered millions of dollars on small markets with little long-term impact. Whatever good it may do for poverty, sales to the rural poor have little chance of building a strong industry.

Another reason for the slow development was a lack of incentives. African power sectors have lacked the financial and technical resources to stimulate renewable growth. For years, low-cost power has been the mantra for African energy sector development, and until recently, the idea of subsidized feed-in tariffs was welcomed neither by governments nor the World Bank. Furthermore, unlike China and Asia, sub-Saharan Africa is already largely carbon neutral, and therefore has been unable to attract the carbon finance that has kick-started so many renewables projects elsewhere. The paucity of experience with renewables also meant that, until recently, there was a lack of clear policy for renewables from central governments. With no clear policy direction, international traders and investors steered away. Africa simply did not rate as a potential mark

Finally, African power sectors tend to be dominated by a few players with close links to the government. This lack of transparency makes it difficult and in Africa, international developers must do twice the work to get things moving.

New Directions

It is very early days for renewable energy industries in Africa, but change is in the air. Electricity and petroleum prices are high and rising. In landlocked countries like Rwanda, power prices are already above 20 US cents/kWh, and countries from Kenya to Malawi are having to implement unpopular price rises. There are also growing power shortfalls. Southern Africa was hit hard by unexpected power shortages in 2007 when a region that had always been a power exporter was suddenly load-shedding and scrambling to locate supply. East Africans also face unprecedented power crises, as steady economic growth strains overstretched power grids. Uganda, for example, is in a load-shedding situation permanently.

The prospect of cheap electricity from coal and large hydro in Africa was rightly intended to attract investors and create jobs, but it created unintended obstacles to renewables and energy conservation investment, too. Today, Africa's energy crunch is causing lost jobs and investment. Renewables and energy efficiency offer the potential to

create jobs locally. Certainly, successful renewable experiences elsewhere are beginning to turn the heads of old-school power planners and countries like South Africa and Kenya are re-examining the role of renewables in their power supply mix.

Wind

It has taken some time for sub-Saharan Africa to get wind projects started. With close to 400 MW of wind currently installed on the continent, up from 148 MW in 2002, the bulk of this is in the north where Egypt and Morocco dominate with total capacities of 230 MW and 124 MW respectively in 2006.

The Kenyan experience helps to illustrate why wind development has been so slow. In the early 1990s, the Belgian government donated three Windmaster generators, the largest in sub-Saharan Africa at that time. Two 600 kW units were grid-connected in the Ngong Hills outside Nairobi, and another 250 kW unit was installed north of Mount Kenya in an isolated hybrid grid in Marsabit.

Though largely unnoticed by power planners, the generators quietly made a point. Performance records indicated ample wind resources in both the Rift Valley and the northern districts. The machines covered their costs and showed that production of electricity from wind in Africa is viable both on-grid and in isolated mini-grids that are typically powered using diesel generators. Despite this, the Kenyan power sector viewed grid-connected wind to be too expensive and, without incentives, wind companies focused elsewhere.

A decade later, word has finally got out. There are at least three projects with a total combined capacity of 150 MW in various stages of planning in Kenya. These include wind farms that will take advantage of resources along the Ngong Hills, the Rift Valley (Kinyangop), and in the north (Marsabit). The government has also instituted a feed-in tariff of 9 US cents/kWh for the first 150 MW in the country.

Meanwhile, after years of planning, South Africa inaugurated its first commercial wind farm in 2008, the 5 MW Darling project in Western Cape province. There are plans for a second phase of Darling, and utility group Eskom is also studying a project of over 100 MW along the west coast. South Africa has also introduced feed-in tariffs for renewables. Moreover, in 2007, Ethiopia's EEPCO company, requested expressions of interest from developers to carry out a three-phase 120 MW wind farm.

Tanzania may shortly lead all of sub-Saharan Africa in wind. Wind East Africa is managing a $113 million effort to install 100 MW in two 50 MW phases in Singida along the Rift Valley. The company is finalizing a power purchase agreement and expects the first phase to be installed by December 2009. The major obstacle to project implementation is not a PPA, but the logistics of delivering the blades to the Singida site, over 400 km inland from the Indian Ocean.

Hydro

Small and micro-hydro projects have long been touted as serious alternatives to large hydro, and resource assessments from the 1980s identify massive resources. Historically, however, projects were only completed by the odd mission or tea factory as utility monopolies on power sales and production and a lack of incentives stifled the sector. Furthermore, it was impossible to develop a project when sales of electricity to both consumers and the grid were prohibited by numerous laws.

Since 2000, though, significant progress has been made. Countries as diverse as Rwanda, Uganda, Tanzania, Kenya, Zambia and South Africa have all created incentives to encourage small hydro, and real projects are happening on the ground.

Rwanda leads Africa with an aggressive market-oriented programme which is currently constructing over 20 small and micro-hydro systems totalling over 40 MW. Key to the Rwandan success has been support from the European Union, as well as technical assistance from Asian contractors. With assistance from national rural electrification agencies, Uganda, Tanzania and Zambia have project pipelines too. Kenya has a number of off-grid micro-hydro projects and at least half a dozen have been stimulated by the introduction of feed-in tariffs. Local group Green Energy, with the support of several donors, is installing four 100 kW off-grid systems and a regional UNEP project recently installed an 800 kW system at a Meru Tea Factory.

Photovoltaics

Before grid-connected systems were introduced in Japan, Germany and California, off-grid African PV markets made up a sizeable portion of world PV demand. But as sales skyrocketed elsewhere, they stagnated in Africa. Virtually all

of the 25 MWp installed in Africa in 2007 went off-grid. Rural demand for consumer electronics such as TVs, radios, and cell phones has spurred healthy, but small, markets for PV in East and Southern Africa. Today, there are well over half a million rural African households using solar systems. Innovative marketing, as well as subsidies, donor projects and loan programmes, are growing demand in Kenya, Tanzania, Uganda, South Africa, Zimbabwe, Namibia and elsewhere. Thousands of rural off-grid schools, hospitals and clinics have also been provided with solar systems, and programmes continue to roll out PV health and education sector systems in at least 10 countries in East and Southern Africa.

Nevertheless, approaches to building off-grid markets for PV among rural households and institutions have not been as successful as anticipated. Many rural homes are unsatisfied with small but expensive PV systems that restrict appliance use. The rural poor cannot afford to purchase and maintain full systems, and often make do with piecemeal inferior systems. Planners, meanwhile, see solar as a short-term fix until rural electrification is achieved.

Institutional solar PV systems also face challenges with very high failure rates and poor performance. Programmes that install them are often not long-term enough to replace old batteries or broken components. Theft, poor installation and maintenance, and lack of load management mean that the system, which may be the single largest investment at a site, is often not working. Large distances also make it expensive for installers to cover the customer network. Although there is a need to continue the important work of stimulating rural household use of PV and improving PV performance in public sector institutions, other markets are emerging that are more attractive and sustainable.

The unprecedented growth of the cellular telecom market in Africa has seen networks rapidly spread beyond power grids. In most African countries, a sizable portion of relay stations are off-grid, and companies are seeking low-cost power sources. Ethiopia installed more than 8 MW of PV in its telecom sector in the first half of the decade and as diesel prices rise, other countries are following suit. Consumers are also turning to PV, which provides the lowest-cost method of charging phones for off-grid customers.

Thousands of off-grid lodges, hotels and tented camps in the East and Southern Africa tourism market are also considering solar, with fuel prices and demands of environmentally conscious clients driving a trend toward increasingly complex systems. The 30 kW hybrid system installed in Namibia's Gobabeb Training and Research Centre, one of Africa's most modern and innovative PV mini-grid systems, is a harbinger of future initiatives in the sector.

Although feed-in tariffs have yet to be scaled up, there is a drift towards more grid-connected PV. In June 2007, Rwandan President Paul Kagame officially opened a 250 kWp system near Kigali, the largest in sub-Saharan Africa. Germany's Stadtwerke Mainz installed the system as a demonstration project, but is seeking to follow it up. In Capetown, a 65 kWp system atop the BP building feeds power to the grid and there are numerous smaller grid-connected systems in South Africa, Namibia, and even Kampala (where net metering is allowed).

What makes these grid-connected PV developments interesting is that they enable consumers to survive daily black-outs and already tens of thousands of inverter-battery chargers are in place in Africa. Renewables are also beginning to play a role in other important off-grid niches. Scores of taxpayer-funded remote grids around Africa, which sell power cheaply and buy fuel dearly, can save cash by incorporating renewables.

Improved environments for renewables

A policy and legislative background is now a reality in many countries. Not only are countries instituting feed-in tariffs, incentives and grants, they are also developing aggressive policies and making commitments. Rwanda targets 90% of its electricity to be renewable by 2012. South Africa has set a 2013 target of 10 TWh, about 4% of demand. Kenya has set targets for almost 400 MW from wind and biomass by 2020 and recently Uganda called for increases in use from 4% to 61% of total electricity demand by 2017.

The private sector is taking increasing interest both on the demand and supply side. Shifts are occurring from the old donor-led paradigm, where most activities were project-based and public sector, to a demand-led paradigm, where renewables are procured by a private sector chiefly interested in cost and performance. On the supply side, the industry is maturing and pioneers have given way to larger, more sophisticated companies with strong links to international players. There is also a steady movement away from demonstration and pilot programmes to large-scale initiatives.

Because of its economic connections to the rest of the continent, South Africa will be a key player in the build up of African renewable industries. The country is recognizing that its economy stands to benefit from being a regional leader in renewables. Although current feed-in tariffs are too small to allow profitable investment in renewables and

there is a need to keep power prices cheap to attract other forms of investment, they are being revisited.

Challenges to overcome

Africa's renewable energy industry is set for significant growth over the next decade. As with Europe and elsewhere, lessons have been learned and the field has matured. However, while the situation is improving, the pace at which the industry develops will depend on a number of factors. The most important is the lack of adequate policy and incentives for companies and consumers.

First, support programmes for renewables must be revisited and revitalized. Clearly, they must be scaled up. More than ever before, efforts must be co-ordinated. Development partners, governments and supporters of programmes need to have a long-term vision and leadership, not short-term project horizons. Countries which are more open to renewable development should be embraced.

Support must include capacity building of all types and at all levels. There is a need to support renewable energy champions and to target education and awareness-raising among power companies, consumers, regulators, government, and renewable industries. Policy makers require assistance developing regulatory structures and incentives. Those implementing projects require technical training, and assistance in project planning and financing.

The private sector must be the champion of renewable energy expansion programmes, and international companies should be encouraged to help build African markets. Experience in telecoms has demonstrated that, once frameworks are in place and legal obstacles are removed, private sector partnerships between local and international companies can result in profitable ventures that are good for African economies.

But support must be provided in combination with real projects and funding. Concessionary funding sources are absolutely essential to spur the development of renewables in Africa and these will come from governments, from green financing and from donors. There is much work to be done in developing subsidy frameworks for Africa. This is a critical area for donor engagement.

Secondly, renewables must be supported for the diversification they provide in over-stretched power sectors that are too heavily reliant on large hydro power and fossil fuels. Renewable solutions must be utilized both on-grid and off-grid. Electricity from wind farms, micro hydro and biomass can already contribute to power grids on a cost-effective basis. In the near future electricity from PV and solar thermal will also become much more viable.

Grid-connected renewable systems will build skills in an industry that has focused on small off-grid systems. They will increase business flow and revenue for new companies, create jobs and attract international players, thereby adding prestige and encouraging interest from investors. Finally, grid-connected systems will enable renewable companies to diversify their business and, in the long term, enhance their ability to serve rural customers.

But first, throughout the continent, on-grid renewables must be demystified so that they become part and parcel of national power sector planning processes. There is a need for regulatory bodies to simplify and expand grid code laws so that they actively encourage renewables. Electricity policies must be adjusted to provide incentives and clear procedures for connecting renewables. Frameworks need to be developed for the installation of grid-connected systems and resolution of technical and grid code issues, regulatory, tariff/financial as well as environmental accounting issues.

Off-grid, there is a need to go beyond the 'poverty alleviation and rural development' approach. Support for household and institutional PV systems should be actively encouraged. Renewables need to become part of the rural electrification planning process in countries where rural access to electricity is still insignificant. Intelligent subsidies and incentives should be made available for the development of renewable markets, preferably using the same rural electrification funds that are available for grid expansion. Governments should also be clear about limitations to rural grid expansion — such delineations are the basis for use of off-grid systems and provide a clear message to customers that no grid extension is planned for their area.

Moreover, in commercial sectors such as tourism, telecommunications, agriculture and rural enterprise, bankable projects should have incentives to take up cost-effective renewable energy sources. These are the real frontier for off-grid power, as they are far more likely to be maintained and they allow economic development in rural areas. In short, Africa can no longer ignore renewable energy. More that any other part of the world, renewable energy must play a role bringing light and power to the continent.

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http://www.renewableenergyworld.com/rea/news/article/2008/10/taking-a-fresh-look-why-africa-is-re-examining-renewables-53846