Powering Up Africa's Economies

Regional Initiatives Can Help Cover Deficits

Mary Kimani

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A poor neighbourhood in Cape Town, South Africa, in the shadow of a high-tension power line: Africa's poor need access to affordable, reliable electricity to improve their lives.

People in Zanzibar danced in the streets in June to celebrate the resumption of power after a month-long blackout. Zanzibar, part of the United Republic of Tanzania, gets its electricity from the grid on the Tanzanian mainland, through underwater cables. The blackout occurred after cable lines supplying Zanzibar failed following a surge in demand. For a month, residents paid about $10 daily to fuel diesel generators for power. Small businesses requiring refrigeration or welding had to close because they could not afford the extra cost.

While Zanzibar has suffered the most prolonged recent blackout, its plight is not unique. In April 2008, the International Monetary Fund (IMF) reported that some 30 of the 48 countries in sub-Saharan Africa have "suffered acute energy crises" in recent years.

But solutions exist. Beyond building up basic generating capacity, countries are moving towards "power pooling." Regional systems of power generation and distribution allow countries with high production capacity to transmit their excess electricity to countries with deficits. The larger market that a regional power pool could potentially serve is also more attractive for investors and donor organizations, compared to small national electricity grids that serve smaller populations. By connecting with neighbors, countries can also benefit from regional investments, instead of struggling to finance their own small and often inefficient power sectors.

Such regional solutions, notes Mr. Ram Babu, the chief power engineer at the African Development Bank (ADB), are "in the spirit" of the New Partnership for Africa's Development (NEPAD), the continent's blueprint for economic, social and political progress adopted by African leaders in 2001.

Faster Growth, Lagging Capacity

According to Mr. Babu, recent power blackouts happen because the continent's power infrastructure is poorly maintained, prone to collapse and unable to keep up with surging demand. Until recently, he told *Africa Renewal*, governments invested little in power utilities, but demanded that the utilities supply electricity to the public at low rates. As a result, he explains, "Many utilities are heavily indebted. They are selling power at a cost sometimes lower than that of production. So they are making losses and have hardly any resources with which to maintain their current infrastructure."

The situation has been worsened by increasing demand, Mr. Babu adds, driven by Africa's growing population, especially in urban settlements. "Unfortunately the power supply has not kept up."


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An electricity sub-station in Kenya: Much of Africa's existing power generating capacity is aging and needs to be upgraded.

Vijay Modi, an engineering professor at Columbia University in New York, cited another factor. "African economies," he noted in an interview with *Africa Renewal*, "have been growing rapidly in the last couple of years." That growth, however, has come after a long period of economic stagnation during which there was little new demand for power and thus little incentive to maintain existing infrastructure, let alone to create new means of generating electricity. "It is critical that just as economic growth rates pick up in Africa, energy access and supply does not become one of the bottlenecks," Mr. Modi says.

According to the International Energy Agency (IEA), South Africa, the continent's largest economy, accounts for 46 per cent of Africa's power-generating capacity, North Africa for 34 per cent and the rest of Africa for only 20 per cent. Moreover, a quarter of sub-Saharan Africa's power plants are not in operating condition and existing infrastructure rarely extends beyond the main cities. All of sub-Saharan Africa's generating capacity combined does not exceed that of Spain.

Southern Africa Hard-Hit

Southern Africa, one of Africa's most productive regions, has been hit especially hard. In January, South Africa experienced rolling blackouts that literally brought cities to a standstill as traffic lights went dark. Small businesses suffered and mining companies were asked to cut down their power use.

To meet internal demand, Eskom, South Africa's state-owned power-generating utility, reduced power exports in January and early February, causing regional blackouts. This affected Botswana and Namibia in particular, since they import more than 50 per cent of their power needs from Eskom.

Mozambique, Lesotho and Swaziland were also hit.

The blackouts were hardly unexpected. As early as 1998, the South African government acknowledged that it had to invest in electricity infrastructure or face a shortage by 2007. To address the issue, the government hoped to privatize Eskom to bring in new capital and make it more efficient. But parliamentary deputies opposed privatization, preferring to keep Eskom as a government-owned utility. With the question of privatization pending, no funds for expanding capacity were allotted in government budgets. By January 2008, the utility was unable to cope with demand.

Similarly, in January 2008, Joseph Raleru, then acting chief executive officer of the Botswana Power Corporation (BPC), revealed that while the authorities had anticipated the possibility of power shortages because of increased economic growth, they had seriously underestimated power requirements. "When we re-looked at the demand in 2006, it had increased significantly because of new mines, due to the high demand for copper on the world market," Mr. Raleru said. "This rate of growth did not only take Botswana by surprise, but countries like Zambia also saw an increase in copper mining."

Zambian Secretary to the Treasury Evans Chibiliti confirmed that assessment. He told the media that his country now faces "a serious power deficit, which poses a major risk to the sustainability and acceleration of recent gains made in the economy."

According to the World Bank, the demand for power in Southern Africa is growing at about 4 per cent a year. To meet this growth, utilities in the region must not only maintain current capacity, but expand supply rapidly if they want to avoid holding back economic growth.

Huge Investments Needed

Expanding power production will not come cheap. The South African government estimates that just keeping up with growing demand from industries and the population will require doubling its generating capacity by 2025 at a cost of $171 bn. Of that amount, $45 bn will be needed before 2013.

To raise some of those funds, the government has approved power rate hikes of about 27.5 per cent since 2007. Further hikes of about 20–25 per cent are expected over the next three years. The increases have stirred alarm and protests from the powerful trade unions, which fear the impact on the poor and worry that mines and industries will have to cut power use, thus jeopardizing production and jobs.

Botswana currently imports most of its electricity from Eskom, through a contract that expires in 2012. While it has been cheaper for Botswana to import power than to produce it locally, the government is now supporting construction of an ambitious coal power station in Mmamabula, an area in the country with an estimated 3 bn tons of unused coal resources. The project will include two 2,500-megawatt power stations, a coal export unit and a coal-to-methane plant that is being developed by CIC Energy, a consortium of private investors.

But there have been problems. Securing an agreement with regional power suppliers to buy the extra production has taken time, pushing back the anticipated start of operations by two years, to 2013. Costs for the first phase also jumped from $5.5 bn to $9.5 bn. Nevertheless, Botswana's image as a stable democracy with relative economic success has been vital in securing the private sector's commitment to the project. When done, the $28 bn Mmamabula facility will be one of the largest independent power projects ever built. If successful, it would turn Botswana from a net importer into a power-exporting country.

The IEA estimates that overall, Africa needs about $344 bn to create additional electricity capacity, upgrade installed equipment and extend transmission and distribution networks to households and factories.

The massive scale of required investment has prompted governments to ask for assistance. At a meeting with officials of the World Bank's International Finance Corporation (IFC) in February, Kenneth Konga, Zambia's water and development minister, asked donor agencies to help the region meet the gap in financing power generation. "Zambia and the region are going through a challenging period," Mr. Konga said. The deficit can only be resolved "if all the stakeholders come together and pull in the same direction."

Zambia is estimated to need $2 bn to raise power output to meet its expanding demand. The country has sometimes been obliged to ration power to households and smaller industries to maintain supply to the copper and cobalt mines, the economy's mainstay.

Africa's Paradox

According to David Donaldson, the IFC's infrastructure manager for Africa, the problem is not that investors and donors are not willing to put money into the sector. On the contrary, the power sector "is an interesting sector for investors, banks, the private sector and even institutions such as the IFC."

But some problems make investors hesitate, Mr. Donaldson told *Africa Renewal*. "The high figures that an investor would have to put in, the poor financial state of the utilities, their continued ownership or management by governments, the heavily controlled tariffs and lack of guarantees that the law would protect investments — all these make the risk of investing very high."

Although the lack of funds limits the ability of utilities to expand supply, poor management is an even bigger issue, Eddy Njoroge, managing director of one of Kenya's power companies, KenGen, said at a June meeting in Nairobi of African power utilities. Nearly three-quarters of African countries have experimented with privatizing management of their power infrastructure, and about two-thirds have formed independent corporations. Over half have appointed regulators to monitor how the sector works.

But few such reforms have been properly implemented, Mr. Njoroge argues. African governments continue to award contracts and to appoint people to head utilities not on the basis of merit, but because of political and personal connections. "Leadership and good governance have come short of expectations." African governments, he added, have "refused to let go the management of these firms and continue to appoint people they can control and manipulate to give contracts and reward cronies."

Nor are these the only challenges to attracting investors. Grand Inga, the huge hydropower dam first proposed in the Democratic Republic of the Congo (DRC) in the late 1980s, would have a projected capacity of 39,000 megawatts. But getting the project off the ground has been difficult. Beyond the vast sums of money needed — an estimated $80 bn — investors are hesitant because of the DRC's political instability.

According to the IMF, it is one of Africa's paradoxes that while endowed with huge resources for power generation, the continent is often unable to benefit. So while the DRC accounts for about 40 per cent of sub-Saharan Africa's hydroelectric potential and Ethiopia another 20 per cent, both countries lack the needed investments to make that capacity a reality.

Sharing Power

"This is why we are thinking in terms of regional integration," says Mr. Babu of the African Development Bank. "In the spirit of NEPAD, regional integration helps to open up resources and markets."

In the energy sector, he adds, "regional integration is best expressed in electricity power pooling." Under such systems, governments commit themselves to regional projects based in countries with the highest potential for producing power. The power is then exported to the rest of the pool members at affordable costs.

Regional pooling would also help countries that lack hydropower generation or coal resources. These countries have suffered particular hardships in recent years because they rely on expensive thermal production methods — burning diesel or heavy fuel — to produce electricity. It currently costs Uganda $0.25 per unit to buy emergency power from British Aggreko, a private company operating one of Uganda's older plants. A new plant, fuelled with cheaper heavy oil, is to start operations in September 2008, at $0.14 per unit.

But with rising world fuel prices, such national solutions may only be of temporary relief. Niger, Senegal and Nigeria have all seen their electricity production costs triple. However, "Pooling power at the regional level is economically rational, permitting savings estimated at $3–5 bn over 20 years," states a joint report by the UN Industrial Development Organization and the UN Economic Commission for Africa.

The West African Power Pool (WAPP) is made up of 14 countries. WAPP is hoping to build a power sharing and trading network at an estimated cost of $4.6 bn. Towards that goal, the ADB signed an agreement in June 2008 for a $28.2 mn loan to finance some of the first pool projects, a power connection between Togo and Ghana and a transmission line from Benin via Togo to the Volta substation in Ghana. WAPP has also contracted

the Korea Electric Power Corp (KEPCO) to build and operate for 20 years a power station in Benin. The project will likewise expand existing national infrastructure and increase power transmission capacity between Nigeria, Benin, Togo and Ghana.

Such a system will enable countries to trade electricity, making power supply more reliable and reducing costs, says Mandla Gantsho, the ADB's vice-president for infrastructure and private sector development. The West African pool, he explains, will "allow for the movement of power from countries with the potential to produce cheap hydropower to other countries, which currently depend on thermal power stations running on expensive imported petroleum for their electricity supply."

East African countries are also integrating their transmission networks. Kenya is already connected to Uganda and the two countries have traded electricity for several years. Kenya and Ethiopia began building a similar connection in April 2008. Ethiopia has the capacity to produce 1,875 megawatts of electricity, far above its current demand for 400 megawatts, and is building three hydropower dams to add another 1,155 megawatts of capacity production by 2010.

In Southern Africa, Zambia and Malawi have created a joint project through which Zambia can connect to the Malawian grid. The link will supply power to the town of Chama, which is currently not electrified, but holds large deposits of untapped oil and copper. While none of these efforts to pool resources is yet fully operational, says Mr. Babu, they represent one of Africa's best options for resolving its power shortfall.

'Smart Subsidies' Can Help The Poor Plug In

Shortages of electricity do not only affect economic productivity. They also reduce people's quality of life and hinder achievement of many Millennium Development Goals. Without power, "clinics cannot deliver babies safely at night, children cannot study longer, businesses close at sunset and vaccines cannot be reliably refrigerated," observes Vijay Modi, a researcher on alternative fuels for Africa at Columbia University in New York.

Despite decades in which African governments heavily subsidized power rates and promoted rural electrification campaigns, some 550 million people, or almost 75 per cent of the population of sub-Saharan Africa, still do not have access to electricity. In 2004 in East Africa, less than 3 per cent of rural people and 32 per cent of urban residents were connected to their national grids. According to the World Bank, only Côte d'Ivoire and Zimbabwe exceed 70 per cent coverage.

If connection rates are so dismal, what happened to all the pro-poor and rural electrification campaigns? The answer, says Mr. Ram Babu, a power specialist at the African Development Bank, is that governments' efforts to expand access have relied mostly on capping the amount of money the power utilities can charge. But that "doesn't help the people who need the power most," he points out. Rural people and other poor consumers whose homes are not yet linked to the power grid face very high connection costs. In cities where grids exist, the cost of connection may start at $200. Where there are none, construction and connection costs can exceed $1,500. As a result, "poor people in rural areas are simply not connected to the grid," Mr. Babu told *Africa Renewal.*

To expand access for the poor, a change in approach is needed, Mr. Babu argues. "What are needed are smart subsidies, to facilitate connection to the grid and for those with lower levels of consumption." Most Africans, except the very poor, are willing to pay for electricity, he notes, since they already pay for candles, kerosene, firewood and other sources of power. Expanding access will thus mean reducing the costs of connection, while ensuring that the better off pay more for their electricity use. That would provide utilities with the resources to maintain their systems.

Small businesses are often willing to pay a little more than the current rate, if that would enable utilities to maintain power and avoid periodic blackouts, which can inflict serious losses on business activities. So instead of keeping electricity prices artificially low, Mr. Babu argues, governments would be better advised to use a tiered system of charges.

Kenya is already experimenting with such an approach. Poorer sectors of the community that consume less pay a lower rate than middle-income sectors that consume more. Industries and large businesses pay rates that increase steadily with their level of usage. These power revenues

enable the government to subsidize grid connection fees.

In addition, the Kenyan government has opened the generation of electricity to private companies, which compete to sell power to the government-run transmission utility. That has increased the power supply and ended the blackouts that were common in the late 1990s. The government has also sold shares in its transmission company and main power producer, increasing public scrutiny and pressure for better performance.

In South Africa, the government supplies free basic electricity services to the poor in selected areas. Those not connected to the electricity grid, but who use alternative fuels, such as solar power, are granted about $6 a month to help defray the costs of maintaining and operating such systems. But these subsidies do not come cheap. They cost the government nearly $78 mn a year, raising questions about their sustainability.

Cleaner Power For Africa's Development

Sub-Saharan Africa's energy crisis comes at a time when the world is grappling with climate change. The region therefore needs to adopt solutions that move in the direction of cleaner energy. Currently, the bulk of Africa's electricity is produced from thermal stations, such as coal plants in Southern Africa and oil-fired generators in Nigeria and North Africa. Coal and oil generation contribute to carbon emissions, environmental degradation and global warming. "We need to look at these issues," says Mr. Ram Babu of the African Development Bank (ADB).

Africa exploits only 8 per cent of its potential for hydroelectric power, one of the cleanest forms of energy available. The Democratic Republic of the Congo alone has the third largest hydroelectric potential in the world, after China and Russia, but less than 6 per cent of its population has access to electricity.

Yet developing more hydropower will be of limited use in areas where climate change and increasing drought have reduced the flow of rivers and waterfalls. There are other options, according to the International Energy Agency, such as harnessing the natural gas now burned off as waste in Nigeria and the rest of the Gulf of Guinea, which could meet a substantial share of Africa's power needs.

Projects such as the Mmamabula coal project in Botswana are potentially large sources of carbon emissions, but CIC Energy, the company behind the project, intends to produce gas from coal, including methanol. "Methanol can be used as a cheaper and cleaner fuel substitute for small diesel-fired power plants in Africa," says a company statement. The plant will also look at ways of converting the heat produced during production into steam power.

In East Africa, geothermal energy (produced from volcanic heat) is a potential source of clean and reliable power. Kenya, the first African country to build a geothermal plant, is revamping the facility and adding wells to raise geothermal production to 25 per cent of the country's total current power output.

Alternative sources of power would be especially useful in areas where there is no electricity grid. But they are not cheap. A joint report by the UN Industrial Development Organization (UNIDO) and the UN Economic Commission for Africa (ECA) found that $4 bn would be needed annually to raise household access to electricity in sub-Saharan Africa to 35 per cent by 2015 through methods, such as solar power, that do not require connection to a grid.

Mr. Babu notes that the ADB is trying to raise funds to help countries research and install alternative forms of energy, including solar. But such alternatives will be insufficient on their own, argue UNIDO and ECA. They estimate that even if Africa could spend $4 bn annually until 2030, that would only achieve an overall household electrification rate of 47 per cent. Getting to self-sufficiency in power, with clean energy, says Mr. Babu, will require a combination of donor aid, private investment, greater regional integration and more reforms in the management of power utilities.

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