PS&D
MARCH 2017

Private Sector & Development

PROPARCO'S MAGAZINE

INDEPENDENT POWER PRODUCERS: A SOLUTION FOR AFRICA?

SPECIAL ISSUE

Proparco
GROUPE AGENCE FRANÇAISE DE DÉVELOPPEMENT

PRIVATE SECTOR & DEVELOPMENT
is published by Proparco,
Agence Française
de Développement Group,
share capital of EUR 693,079,200,
151 rue Saint-Honoré, 75001 Paris - France
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Graphic design and creation
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Photo credit (front cover)
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A.D.T. International, Ros Schwartz Translations LTD
Neil O'Brien/Nollez Ink

Editorial office
(:?!;)DOUBLEPONCTUATION,
www.doubleponctuation.com
Neil O'Brien/Nollez Ink

Printing on recycled paper
Pure Impression

ISSN 2103 3315
Legal deposit at publication
23 June 2009

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The articles have been published in the *Private Sector & Development* journal number 18, in November 2013, and as part of the PS&D blog.

Independent power producers: a solution for Africa?

Grégory Clemente
Chief executive officer of Proparco

Inadequate power capacity is holding back development in sub-Saharan Africa. Is independent power production the best solution to remedy the shortfall?

Demand for electricity in sub-Saharan Africa is growing fast – driven primarily by economic growth and by policies for widening access to electricity – and yet production capacity has developed very little since the 1990s. Even today only 30% of the population has access to electricity – compared with 80% worldwide – and the economies of many African countries are severely disadvantaged by the quality and quantity of electricity at their disposal. The economies of Tanzania and Uganda, for example, lose an estimated 4% to 6% of GDP every year to power cuts. Now the international community is starting to take action to remedy this situation. Having been completely overlooked in the Millennium Development Goals, energy is now a priority for the UN and the EU, through the Sustainable Energy for All programme – which aims to increase access to energy while growing the proportion of renewable energy and improving energy efficiency.

According to estimates, production capacity would need to be boosted by around 7,000 megawatts every year from 2005 to 2015 in order to meet unsatisfied demand. This would require an annual investment of around USD 40 billion – whereas current investment is estimated at just USD 4.6 billion per year. Private investment in electricity production is one of the solutions to increase the financial resources available and improve performance in the electricity sector. Yet independent producers still represent just a tiny fraction of the players operating in this sector.

This issue of *Private Sector & Development* explores the benefits – and the requirements – of increased intervention in electricity production by the private sector. How have independent power generation projects established in Africa fared to date? What are the main obstacles in the way of their growth? Can private projects help to facilitate a shift towards renewable energies? Can decentralized means of production that are not connected to the main electricity grid ("off-grid") ease access to retail customers and SMEs? As a general rule, developing efficient public-private partnerships would seem to be the best – indeed perhaps the only – solution for confronting the major challenge of sub-Saharan Africa's energy deficit.

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Contributing elements to success of IPPs in sub-Saharan Africa

By **Anton Eberhard**, *Graduate school of business (University of Cape Town)*
Katharine Nawaal Gratwick, *Energy consultant*

Independent Power Producers (IPPs) have contributed to power generation across sub-Saharan Africa, but there is still a long way to go. An analysis of the approximately 30 medium- to large-scale independent power projects that have taken root in sub-Saharan Africa to date highlights what are the essential components to foster IPPs development in the region.

This article has been originally published in the *Private Sector & Development* journal number 18, in November 2013.

Only about 30 percent of the Sub-Saharan population has access to electricity[1]. It has been estimated that about 7,000 megawatts (MW) need to be added each year (2005-2015) to meet suppressed demand and provide additional capacity in the region. Such an investment would cost approximately USD 40 billion per year (Eberhard et al, 2011) out of which USD 27 billion would be for capital investment[2]. This latter figure is equivalent to 6.35 percent of Africa's GDP. Presently, funding for electricity capital expenditure is estimated at USD 4.6 billion a year, of which public sources contribute about 50 per cent, highlighting the urgent need for increased private investment, including public-private partnerships.

Across sub-Saharan Africa (SSA), the push towards private investment in electrical generation dates back to the early 1990s when multilateral and bilateral development institutions, which largely withdrew from funding state-owned projects, urged a number of countries to adopt plans to unbundle their power systems and introduce private participation and competition. Independent power producers (IPPs), namely, privately financed, greenfield generation, supported by non-recourse or limited recourse loans, with long-term power purchase agreements (PPA) with the state utility or another off-taker, became a priority within overall power sector reform. IPPs were considered a solution to persistent supply constraints, and could also potentially serve to benchmark state-owned supply and gradually introduce competition. Since the 1990s, approximately 30 such medium- to large-scale projects[3] have taken root across 11 countries. In total, approximately 4.7 gigawatts of IPP capacity have been added (Eberhard, A., 2013).

1 ▸ As compared to one-half in South Asia and more than four-fifths in Latin America.
2 ▸ The remainder is for operation and mfaintenance.
3 ▸ This article deals with grid-connected projects, greater than 40 MW, with a long-term PPA with the utility, which have reached financial close and are under construction, operational, complete or concluded as of the end of 2Q2013. Although not included in this analysis, there are approximately 30 IPPs, each less than 40 MW, totaling 550 MW, also grid-connected, with long-term PPAs making a considerable contribution to the energy landscape across SSA. South Africa is also in the process of procuring 3.75 GW in renewable IPPs, over 3 tender rounds (with the first two rounds resulting in 2.5 GW), encompassing 47 discrete projects, totaling approximately USD 9 billion in investment, which represents Africa's largest renewable energy program, largest IPP development, and potentially, most complex public private procurement to date. Detailed discussion is, however, beyond the scope of this paper.

However, the journey has not been smooth. The larger power sector reform programs were not far-reaching and IPPs represent only a fraction of the sector. A suite of country level and project level factors have emerged as playing a critical role in determining project success. Chief among them are: the manner in which planning, procurement and contracting are coherently linked and the role of development finance institutions along with the development origins of firms and credit enhancements. There are a number of notable success stories, including in Kenya, South Africa, and potentially Nigeria, where policy innovations have replication potential in other sub-Saharan African countries and beyond.

> "IPPs represent only a fraction of the sector."

INVESTMENT CLIMATE AND CLEAR REGULATION

IPP projects were developed in a challenging investment climate in a number of sub-Saharan countries. Less than a handful of African countries have investment grade ratings. So as to attract private investors, countries had to develop tax incentives. Currency conversion was also provided for virtually all projects. It is noteworthy, however, that although one would expect the investment incentives to drastically increase with the perceived risk (in contrast to other regions), such a pattern is not apparent. With demand for IPPs outweighing supply, it is not surprising that those countries with a better investment profile attracted more investors and ultimately were able to cement deals on terms more favorable to the host country. The key take-away is that a risk-reward balance needs to be offered to attract investors/lenders; that balance starts with a stable and predictable investment environment.

New policy frameworks and clear regulation also proved to be key elements for sustainable development of IPPs. Although most countries have introduced legislation to allow for private generation, few have actually realized a clear and coherent policy framework. Besides, the incumbent state-owned utility continues to play a key role in the sector. IPPs are gradually being introduced but nowhere in Africa is the standard reform model for power sector reform being adopted fully, namely, unbundling of generation, transmission and distribution, and the introduction of competition and private sector participation at all levels (UN-ECA/UNEP, 2007; Malgas et al., 2007; Gratwick, K.N., Eberhard, A., 2008). However, nearly all countries which have started implementing reforms have established independent regulators, which are intended to address some of the risk that IPPs face such as arbitrary changes to rules or too much regulatory discretion in price reviews. Independent regulators also contribute to increasing overall transparency in what is expected from the investors. The presence of a regulator is not in itself a defining factor in attracting IPPs but helps ensure positive outcomes for host country and investor alike. →

LINKING PLANNING, PROCUREMENT AND CONTRACTING

Intricately connected to sound policy frameworks are coherent power sector plans, which are linked to procurement and contracting. Ideally, these includes a number of core components: setting a reliability standard for energy security; completion of detailed supply and demand forecasts; a least-cost plan with alternative scenarios; clarifying how new generation production will be split between the private and public sectors; and the requisite bidding and procurement processes for new builds. Among the most important aspects of coherent power sector planning is vesting planning and procurement in one empowered agency to ensure that implementation takes place with minimal mishaps (Malgas, I., Eberhard, A., 2011). Kenya provides a good example of how responsibility for these functions may be allocated and institutionalized.

> “When IPPs use fuel that is cheaper than the incumbent fuel, they have a greater chance of success.”

However, all too often, plans do not translate into timely initiation of competitive bid processes for new plants; and often there is insufficient capacity to negotiate with winning bidders or to conclude sustainable contracts. Transaction advisers may be appointed, but often there is little continuity over the long term. Hybrid power markets, with a mixed presence of private and public sector players, give rise to these new challenges and explicit policies, governance and institutional arrangements need to be developed to assign responsibility for planning, procurement and contracting of new power generation capacity. Effective linkages between these three functions also need to be established. In evidence are examples of demand and supply not being accurately forecast due partly to extended droughts, which in turn necessitated fast-tracking IPPs. Generally, the speed has been at a cost. Although it is easy in hindsight to accuse stakeholders of acting imprudently in the face of emergencies, the actual conditions of load-shedding and shortages appear to have provided few alternatives (Eberhard et al., 2011)[4]. However, better organization and planning upstream could have limited such situations.

APPROPRIATE FUEL SUPPLY AND POWER PURCHASE AGREEMENTS (PPA)

The availability of competitively priced fuel supplies has also emerged as a key factor in how IPPs are perceived, in large part because fuel is generally a pass-through cost to the utility and in many cases to the final consumer as well. IPPs have helped countries to achieve greater fuel diversification; however, when their costs were compared with state-owned, generally amortized hydropower, they were seen to be largely more expensive, due partly to the fuel charge. The public perception is that IPPs drive prices up, which means that gaining public support for such projects is all the more challenging. When IPPs use fuel that is cheaper than the incumbent fuel, they have a greater chance of success.

The other key contract is the PPA. All the projects evaluated had long-term PPAs with the incumbent state-owned utility to secure revenue flows for debt and equity providers. The PPA has been a central document[5] and in certain cases, it has been the focal point of the discussions when deals have been considered out of balance.

4 ▸ The cost of emergency supply is indeed still less than the cost of no power. In terms of assessing the overall impact, the estimates of the value of lost load or, unserved energy, and power outages in the countries in Sub-Saharan Africa constitute an average of 2.1 percent of GDP .

5 ▸ In addition to indicating who would buy the power, the PPA details how much power capacity would be available as well as capacity and energy charges. How plants will be dispatched, fuel metering, interconnection, insurance, force majeure, transfer, termination, change of legal provisions, refinancing arrangements and dispute resolution are generally all clearly laid out as well. Risk mitigation provisions in the PPA stipulate penalties when the plants do not produce, as well as the ultimate sanctions when the plants fail, together with buy-out provisions.

FAVORABLE DEBT AND EQUITY ARRANGEMENTS

Foreign firms have been the dominant players in SSA’s IPPs. This should not be surprising, given the limited capital available. But a more revealing aspect than the nationality of the firm appears to be its prior experience in a country and the development origin of the investor. Globeleq, IPS and Aldwych International, for example, all emerged from agencies with strong commitments to social and economic development. Globeleq remains wholly owned by Actis, which originated from the private-sector promotion arm of the UK Department for International Development (DFID). IPS is the operating arm of the Aga Khan Fund for Economic Development (AKFED), investing only in projects with a high development impact. Aldwych International is an initiative of the Dutch development bank, FMO. Projects for these firms have to make commercial sense, but they must also serve a developmental function, helpful in the face of African risk. It is worth noting that almost none of the projects with involvement of firms with development origins have seen any changes in contract terms, which may signal a greater perceived balance by local stakeholders in the terms of the contracts as well as a better ability to withstand public pressure.

With debt financing often covering more than 70 per cent of total project costs, competitively-priced financing has also emerged as a key factor in successful projects. Possible approaches in the African cases lie in the involvement of development financial institutions (DFIs), credit enhancements, and some flexibility in terms and conditions that may allow for possible refinancing. The recipe for sustainability appears to be that the risk premium demanded by financiers or capped by the off-taker matches the actual country and project risks and is not inflated, viz., the investment and development outcomes are largely in balance.

DFIs funding has tended to take longer to reach financial closure but it also brings clear benefits; among others, development institutions help maintain contracts and resist renegotiation in the face of external challenges such as Kenya’s droughts when developers were pressured to reduce tariffs. The main drawback of foreign financing is that it is usually denominated in strong currencies, which imposes PPAs in the same currency with negative impacts on tariffs as local currencies devalue.

CREDIT ENHANCEMENTS AND SECURITY ARRANGEMENTS

The underlying credit risk of the projects has been largely dealt with via a suite of credit enhancements such as escrow accounts, letters of comfort, partial or sovereign risk guarantees, political insurance, etc. Of the many different credit enhancements, it is sovereign guarantees that have been most commonly employed. Support from the government is still considered by developers and multilaterals as the first level of support (World Bank, 2010), even though, in no projects have the sovereign guarantees, political risk insurance (PRI) or partial risk guarantees (PRG) been invoked. Although the absence of sovereign guarantees usually hampers the ability to raise private finance, it is noteworthy that IPPs, which by their very definition imply private investment, have had such significant public involvement. On this, there has been very little evolution since the first set of IPPs, with all projects supported by a PPA and the credit risk largely carried by a government guarantee.

In conclusion, it may be helpful to reflect on the overall application of security arrangements and credit enhancements. Efforts must continue to close the initial gap between investors and host-country governments’ perceptions and treatment of risks, or contract unraveling will continue. The means of closing the gap may not be only, or mainly, via increasing the sort of new protections, including PRGs or PRIs, and may instead lie in systematic treatment of the numerous contributing elements to success.

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An inconvenient truth

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Raising sub-Saharan Africa's electricity availability per person to the level of lower middle-income countries would potentially cost an unaffordable USD 400 billion. Private capital could help contribute to expanding the region's generation capacity cost-efficiently and rapidly. The African governments can do a lot to create a climate favourable to these private investments. One of the main measures to be taken is to strengthen their electrical sector. Charging the real price of electricity is a first step to achieve this goal.

This article has been originally published in the *Private Sector & Development* journal number 18, in November 2013.

Few things are more important for economic progress and development than access to electricity. Today, for the 80% of the world's population that has access to power, the magic of simply flicking a switch to light their houses or power their tools is long gone. But for more than 69% of sub-Saharan African citizens, some 585 million people (IEA, 2011), access to electricity is still a distant dream. Excluding South Africa, the region's total installed capacity is only 28 gigawatts (GW), the same as the Netherlands', a country of just 17 million people (Foster, V., Briceño-Garmendia, C. 2010).

> "For more than 69% of sub-Saharan African citizens [...] access to electricity is still a distant dream."

This reality elicits much hand wringing from the development community as the scale of the challenge is indeed daunting. Sub-Saharan Africa's annual electricity consumption per person stands at about 200 kilowatt hours (kWh)[2]; raising it to the level of lower middle income countries – typically about 700 kWh per year – would require at least 125 GW of additional generation capacity and the building of the associated transmission and distribution networks, at the cost of about USD 400 billion. Closing this gap in a decade would thus require investments of roughly USD 40 billion per year. As that is equivalent to 7.5–10% of the continent's GDP, such an annual investment for each of the next 10 years is, at best, unlikely.

Grants and development loans will not be enough either: total official development assistance (ODA) for infrastructure in Africa is about USD 3.5 billion per year (Foster, V., Briceño-Garmendia, C. 2010), while development banks and similar institutions provide around a further USD 30 billion[3] of loans annually. Even if a third of these flows of approximately USD 35 billion were allocated to power – an unlikely scenario – that USD 10-15 billion for power would still only be a third of what is needed.

So from where could the investment come? From the private sector naturally: in 2012, the leading 20 commercial banks arranged loans of USD 21.5 billion to power projects around the world; pre-crisis, in 2007, it was USD 45.5 billion. Closer to home, in the past year alone, the International Finance Corporation (IFC) arranged about USD 1.5 billion of financing for power projects in sub-Saharan Africa, catalyzing more than USD 3 billion of total investment, most of it jointly with Proparco, one of IFC's closest partners.

PRIVATE SECTOR: A SOURCE OF FUNDS

It is clear that private capital should be a part of the solution for Africa to improve its citizens' access to power. Private capital could predominantly be directed towards more independent power producers (IPPs) whose role is now well established.

Independent power producers are more efficient. On average thermal power plants operated by state-owned national utilities in Africa rarely exceed 65% availability[4] while IPPs often exceed 90% – as private operators have clear incentives, they relentlessly focus on operational performance. Independent power producers also save governments large upfront costs allowing precious resources to be deployed elsewhere – the price tag of a 100 MW heavy fuel oil-fired plant is the same as that of about 50 well-equipped health clinics. They also deliver adequately priced power – the average cost is less than USD 0.05 per kWh[5] for thermal plants excluding fuel – and transfer construction and financing risks away from governments.

> "IPPs deliver adequately priced power."

Yet, over the past three years, only about 10 private power projects were implemented in sub-Saharan Africa, excluding South Africa: less than one IPP per country per decade, with only nine countries out of 48 resorting to IPPs.

WHAT HOLDS PRIVATE INVESTMENT IN POWER IN SUB-SAHARAN AFRICA BACK?

While many reasons are often cited, we shall remain faithful to the principle of Occam's razor and postulate just two root causes that hold back private investment in power generation in sub-Saharan Africa, and particularly in IPPs. Firstly, governments seem reluctant to embrace the transformational impact of private investment in power generation; and, secondly, governments fail to ensure adequate cost recovery in and financial sustainability of their power sectors.

Before expanding on these two root causes, we must emphasize that good governance is a key precondition if IPPs are to thrive. By this we mean both governance in general terms – investors value visibility and clear rules – and also governance of the electricity sector. This is a complex sector in which finance, economics and social considerations mix, and for which competent management is an essential if private investment is to be attracted. Independent power producers cannot exist in a vacuum: they need favorable initial conditions.

Governments across the region remain reluctant to fully leverage the private sector's capital and capabilities for a number of reasons. In some instances, they still consider power generation a strategic sector that should remain in the state's hands. In some other countries, previous experience has led to negative perceptions of the private sector. Then, at times, governments see retaining public control of the sector as a way of postponing painful reform. And in other cases, governments are tempted by attractive concessional lending rates, grants or export credit terms, and become persuaded that IPPs could, comparatively, increase costs. →

FOCUS
IFC

IFC is the private sector arm of the World Bank Group and one of the leading multilateral financiers of power projects in Africa. IFC invests (through debt, equity and quasi-equity) across the entire power sector value chain, in transmission, generation and distribution. IFC also acts as project co-developer through its InfraVentures fund. Over its last fiscal year, IFC arranged about USD 1.5 billion of financing for Africa's power sector and catalyzed about USD 3 billion of private investment.

1 ▸ The views and judgments contained in this article should not be attributed to, and do not necessarily represent the views of, IFC or its Board of Directors, or the World Bank or its Executive Directors, or the countries they represent.
2 ▸ Excluding South Africa.
3 ▸ Authors estimate (includes development banks and leading Exim banks)
4 ▸ Authors estimate (proprietary data). 'Availability' refers to the proportion of the time when a power plant is able to generate electricity.
5 ▸ Select sample of projects from authors' data

Further, a lack of acceptance of the fact that, in essence, power is a commodity and there is nothing really special about it lies behind an unwillingness to charge the true cost of power. It should be remembered that the capital cost of a power plant is roughly the same the world over, while variable costs, mainly the cost of fuel, depend on natural endowment and national availability. It is no cheaper to build a power plant in Africa than in Asia, Europe, Latin America or North America. Rather, the opposite is the case due to factors including a lack of economies of scale and the cost of transport and finance. Thus it follows that, after discounting the differences in natural-resource endowments, the cost of generating a kilowatt hour of electricity in Africa is at least as much as one generated in richer countries.

PRICING TO MATCH INCOMES

Since income levels are not the same everywhere around the world, affordability becomes a concern. In Africa, governments have responded to this by setting low tariffs and as a result, in many countries, the power sector has rapidly become financially unviable, dependent on large government subsidies to continue operating. This story is, sadly, unfolding across the continent: a recent International Monetary Fund (IMF) report on energy subsidies indicates that in sub-Saharan Africa electricity tariffs allow the recovery of only about 70% of costs (IMF, 2013), whereas subsidies to the electricity sector represent on average 2.0% of GDP and 9.0% of total government revenues (IMF, 2013) – by contrast, spending on both health and education sectors in the region totals about 8% of GDP.

This focus on affordability, while legitimate, is too often approached narrowly and the allocation of such large subsidies to power is, simply put, questionable. Indeed, the affordability issue is fraught with misconceptions. It is worth remembering that when end-users lack electricity they resort to much more expensive alternatives such as kerosene at a cost of something in the region of USD 0.75 per kWh for lighting[6]. Or consider the considerable cost of a lack of power to the economy – that's why both businesses and private individuals that can afford it have private generators – usually producing power at a cost of more than USD 0.50 per kWh. And the price per kilowatt hour is not as relevant as many believe – yes, a kilowatt hour at USD 0.20 sounds a lot for the average African citizen, but what really matters is the total spend on electricity as a share of income. Because the average OECD citizen uses about 20 times more electricity than the average African citizen while having an income about 20 times higher, as a share of income, the two spend about the same proportion of their income on power. That is the real issue.

> "The result of government unwillingness to make people pay the true cost of power drives credible investors away."

Subsidizing power is not good policy for two main reasons. Firstly, such subsidies are inequitable and socially regressive: they overwhelmingly benefit the rich – the IMF reports that the poorest 20% of the population typically only receives 9% of total electricity subsidies (IMF, 2013). And secondly, these subsidies divert scarce budgetary resources from more pro-poor spending – money spent on subsidizing power does not go, for example, to health care or education.

AFRICA'S POWER-FAILURE TRAP

The result of government unwillingness to make people pay the true cost of power drives credible investors away, especially IPPs. Why would they invest hundreds of millions of dollars when the off-taker – the utility or the government to whom power will be sold – does not collect enough from end-users to cover costs, leaving the investor with a significant risk of not being paid?

The central role that utilities play must also be highlighted. The failing power sector across Africa is largely alike: an underperforming utility is, almost without exception, at the heart of the failure, and all too often, alas, it is state-owned. A good utility plays a central role in helping stabilize a power sector, as the examples of Compagnie Ivoirienne d'Electricité (CIE) in the Ivory Coast, Umeme in Uganda, the Kenya Power and Lighting Company (KPLC), and to some extent AES-Sonel in Cameroon demonstrate. The professional management of these companies and their relentless attempts to reduce losses, collect from end-users and advocate financial sustainability have been instrumental in keeping their respective power sectors afloat. It should not come as a surprise that these four countries have also seen significant levels of IPP activity, including a few landmark projects – the Bujagali hydropower project in Uganda, the CIPREL thermal-energy development, the Azito natural-gas plant in the Ivory Coast and the 87 megawatt Thika power plant in Kenya.

> "IPPs are, in relative terms, easy to tender and structure."

The two fundamental factors – a government's lack of a pro-private sector stance for power generation, and a financially unsustainable electricity sector – often interact to create a power-failure trap, which leads to a deteriorating quality of service, increased costs and the adverse selection of good private investors. And all start with a vulnerable utility.

THE WAY FORWARD

How can we get out of this trap? Fundamentally, by ensuring cost recovery in the sector: there is no escaping the simple but inconvenient truth that end-users should pay the real cost of power; and by recognizing that power generation is an activity best left to the private sector – just like telecommunications.

Independent power producers, by and large, hold out the best hope of expanding sub-Saharan Africa's generation capacity cost-efficiently and rapidly. They are the low hanging fruit of public-private partnerships in infrastructure as IPPs are, in relative terms, easy to tender and structure; there is an ample supply of best-practice contractual arrangements that have stood the test of time and are well understood by both investors and financiers; there is no shortage of financing for well-structured IPPs promoted by reputable sponsors; and they (usually) deliver.

All IPPs require is a welcoming host country and the reasonable certainty they will be paid. If these two conditions are met, the private sector will help power Africans – just as private mobile operators have connected them.

Examples from Cameroon, Ivory Coast, Kenya, South Africa and Uganda all illustrate this. The Ivory Coast has attracted more than USD 1 billion of investment in 18 months to increase the country's generation capacity by 30%. Uganda halved its cost of power and tripled its access to power rate thanks largely to Bujagali and Umeme, the privatized utility. Kenya is massively increasing capacity, both thermal and renewables thanks to a slew of new IPPs more than five in the past two years and South Africa leveraged IPPs to rapidly ramp-up its renewable solar and wind capacity through more than 12 IPPs. If countries build the investment fundamentals for IPPs, the investors and financiers, will come. ■

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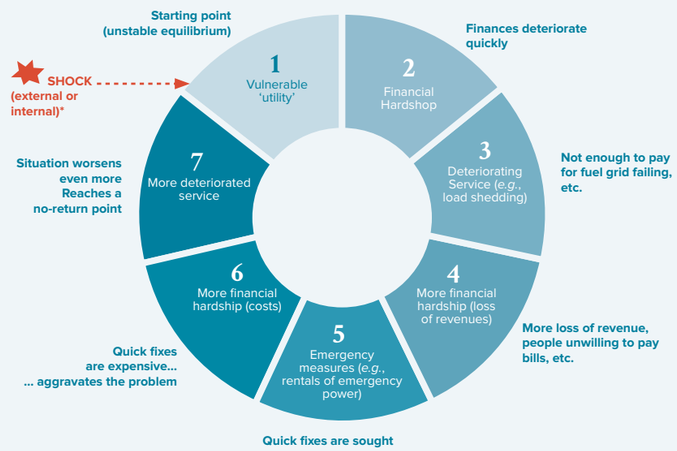
Africa's power-failure trap

* Maybe be external (e.g. oil prices) or internal (heavy, growth, failing grid, etc.) or both.

Source : Figure realized by the authors for Private Sector & Development

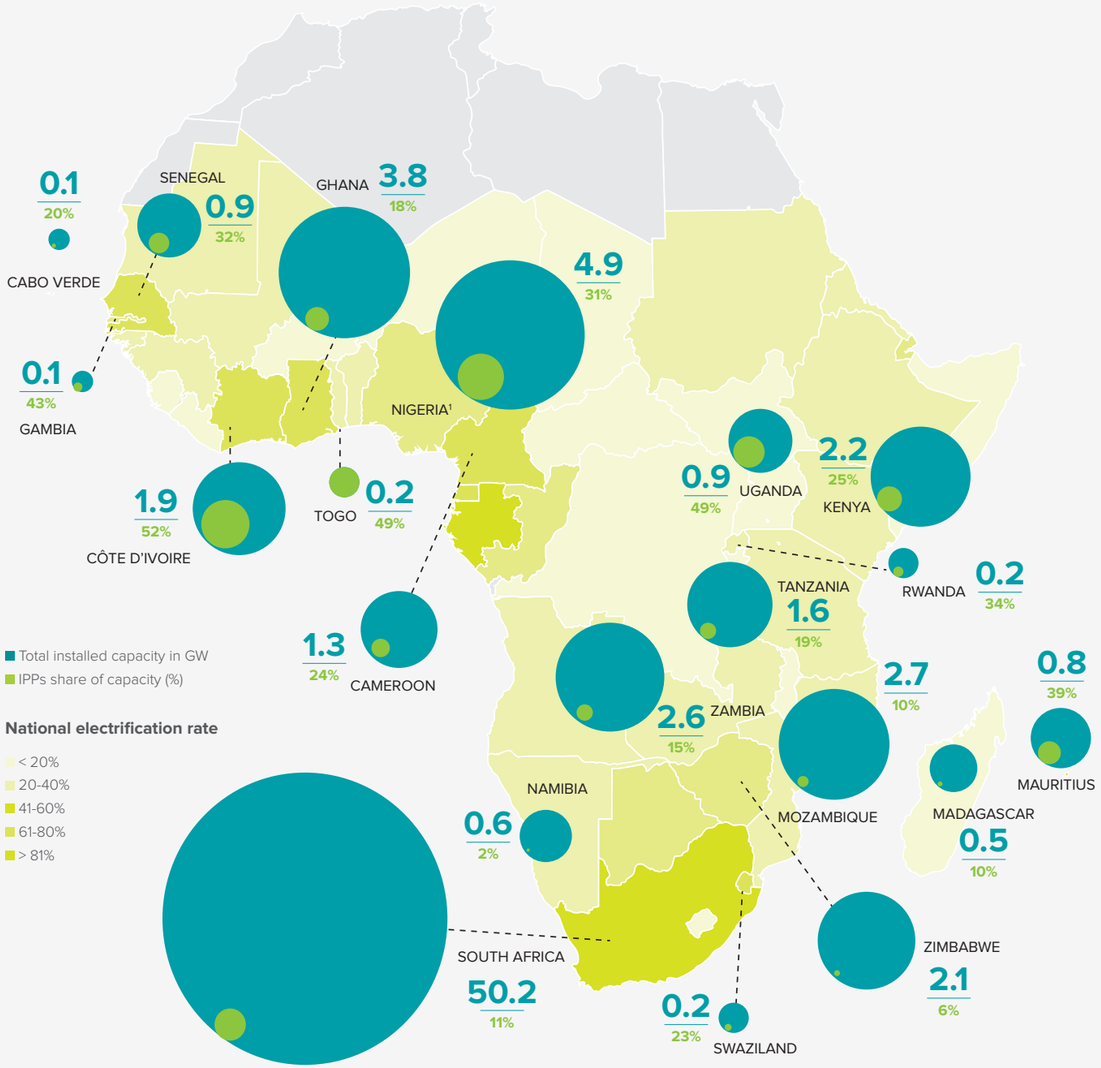


6 ▸ Authors' estimate on the basis of a liter of kerosene at USD 0.5/liter, 10 kWh/liter of kerosene of calorific content and an efficiency of about 0.1 lumens/watt.

Electricity consumption and private sector

share in electricity installed capacities in sub-Saharan Africa*

* Data based on estimates from different sources and years
Note : Emergency Power Units, production for own consumption and privatized assets are not accounted for under IPPs
Sources : IEA, World Energy Outlook 2016 – Proparco / Private Sector & Development, 2017



1 ▸ Available installed capacity

Privately-produced renewable energy in Africa: a credible alternative to traditional projects?

Hugues de La Forge, *Partner at Holman Fenwick Willan*

In Africa, many independent energy supply projects have grown up alongside state-controlled programmes. Sector-based reforms designed to boost production of renewable energies have been a boon for such projects which are aimed primarily at meeting the energy requirements of private customers. By being able to raise finance in situations where public companies struggle to do so, private sector operations are able to get around certain commonly-experienced difficulties on the African Continent. Nevertheless, Governments have a duty to both adopt and comply with best international practices.

Many African countries are struggling badly to finance their energy requirements. For example, virtually no African electricity utilities have an "investment-grade" rating which prevents them from raising debt at reasonable rates in order to finance their energy projects.

Projects backed by publicly-owned energy providers also encounter certain limits. Long development lead times together with uncertainty over government commitments to purchase volumes produced – key to any financing project – have led some African countries to entrust energy production to the private sector.

DEVELOPING IPPS IN AFRICA

In a bid to leverage the Continent's vast solar capacities, wind and water resources, many corporations are turning to IPP-type private projects ("Independent power projects", in industry jargon), primarily to meet their own needs, before transferring any energy left over to the grid. As the authorised production threshold has been raised, the number of such independent projects to produce energy for own-use has grown.

Although the situation varies by country, Africa has enacted a series of sector-based legislation over the past few years, such as Law 13-09 in Morocco[1]. This allows programmes to produce energy with an installed capacity of up to 50MW to apply for authorisation from the Moroccan Energy Ministry. Any surplus must be sold exclusively to ONEE (the national electricity and water agency), with whom the independent producer must negotiate a transport agreement and a connection agreement (for the transfer of any surplus energy produced).

Other factors have also contributed to the success of IPPs in Africa: deregulation (albeit partial) of the energy sector, increasing demand for energy and the availability of special purpose financing, all supported by government guarantees to purchase power produced. Development finance institutions (DFIs) have also played a key role alongside financing from foreign backers, →

This article was originally published on the *Private Sector & Development* blog, January 2nd, 2017.

1 ▸ Law 13-09 relating to renewable energies, amended by the Dahir.n°1 – 16-3 of the 1st Rabii II 1437 (12 January 2016) implementing Law No. 58-15, modifying and supplementing Law No. 13.09 relating to renewable energies.

especially Chinese concessional lenders and private investors. It is estimated that energy projects attracted USD 14 billion worth of financing in 2014, the bulk of which came from concessional loans put up by China Exim Bank.

VERY WELCOME STRUCTURAL REFORMS

> “Thence the African paradox: a lack of creditworthy customers alongside massive energy requirements!”

Participation in private sector financing is therefore an opportunity not to be missed. However, most African governments continue to regulate their national energy sectors via a single publicly-owned utility. This is still the case in Benin, Burkina Faso, Congo, Gabon, Equatorial Guinea, Mali and Niger, to mention but the countries belonging to the CFA franc zone. Nevertheless, beginning in the 1990s, a number of countries began to introduce structural reforms designed to partially deregulate their vertically-integrated monopolistic utilities. South Africa was the first to do so, followed by Ghana, Nigeria, Uganda and then Kenya. A third category of countries – comprising Angola, Cameroon, Côte d’Ivoire, Madagascar, Morocco, Mauritius, Senegal and Togo – have continued with their monopolies but adopted legislation conducive to IPP-type structures. Indeed, within this category of countries, publicly-owned agencies frequently acquire stakes in dedicated IPP project companies, generating a hybrid market with all sorts of complex governance-related issues. While the existence of an independent regulator may be seen as a safeguard for reassuring investors it does not appear to be an absolute imperative.

Although structural reform has undoubtedly resulted in better governance in the energy sector and an environment that is more conducive to IPPs, widespread financial mismanagement of publicly-owned bodies means that private electricity buyers are becoming more and more common in the industry. Nevertheless, there has to be sufficient industrial demand. Madagascar is a case in point. A number of hydroelectricity projects have been launched by JIRAMA, the public water and electricity utility, however, firm credible commitments to purchase power could not currently be secured for the total cumulative installed capacity of the projects due to the serious financial difficulties of the public energy body. Even by trying to sell to the private sector, there is no guarantee that the shortfall in demand could be made up. Thence the African paradox: a lack of creditworthy customers alongside massive energy requirements!

FOCUS
HOLMAN FENWICK WILLAN

Holman Fenwick Willan (HFW) leverages its vast experience of its client’s different sectors to devise pragmatic, legal solutions tailored to specific industrial and commercial challenges. The firm was established in 1883 in the United Kingdom and now has offices in South America, Europe, the Middle-East, Asia and Australia. For nearly 40 years now, HFW’s Paris Office has been advising and defending the interests of businesses in the insurance, transport (especially sea and air transport), construction, infrastructure, energy, distribution and commodities industries.

ADOPTING AND COMPLYING WITH BEST PRACTICES

Nevertheless, the success of IPPs is down to a number of best practices that include more effective coordination between the assessment of requirements and power purchase agreements (or PPAs), setting up a clear, predictable and transparent framework for transferring procurement documentation – even for private initiatives, and coherent decisions regarding project structure and power purchase tariffs.

As regards the first point, too many African countries still suffer from inadequate public policy planning tools in spite of loud media declarations concerning plans or strategies that are supposed to last for a generation. Apart from South Africa, very few governments have actually linked their energy planning requirements to energy procurement strictu sensu. Fragmented structures frequently hamper a coherent public policy capable of ensuring diversity in the energy mix, a network capable of absorbing new projects and consistent arrangements for organising and awarding tenders and concessions.

Procedures for awarding IPPs, even within a private framework, must be clear, comply with principles of equal treatment of candidates and remain constant over time. This does not mean that they have to be rigid! In a rapidly changing market where technical advances and competitive pressures are tending to push down the cost of equipment and material, investors should be able to enjoy contractual stability and the gains generated from lower market prices should also be split among the different parties. This will ultimately result in lower prices for end consumers, particularly in projects where surplus power is purchased by the national utility.

Lastly, “feed-in tariff” arrangements (FiT) do not have to be a dogma. While FiTs are attractive because they reassure investors and because they have been successfully used in countries like Kenya, Ghana and Senegal, they curb competition significantly.

> “Procedures for awarding IPPs must be clear, comply with principles of equal treatment of candidates and remain constant over time.”

The financial strength of “off-takers” (i.e., power buyers), the scalability of their industrial plan and the reliability of their power purchase commitments will all be key to the success of an IPP venture in Africa, especially where the public utility is insufficiently creditworthy to be able to purchase the energy produced over the long term. ■

Developing renewable energies in Africa: a public-private partnership

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Likewise mobile phone for telecommunication, is sub-Saharan Africa on the verge to leapfrog conventional energy and move straight to renewable energy (RE)[1] to address requirements for capacity additions? There is genuine potential for RE in Africa. Private producers can play a key role in expanding this sector. For this to happen, governments need to establish a regulatory framework and planning schedules, in co-operation with lenders and donors especially in the handling of the upstream phase of projects.

FOCUS AFD

The energy sector is a key strategic priority for the AFD group accounting for an average of EUR 1.5 billion in commitments annually since 2007. Renewable energies and energy efficiency saw the fastest rate of growth over the period 2007–2012, accounting for total commitments in excess of EUR 4.4 billion (i.e. 50% of the total).

Sub-Saharan Africa has an estimated 83 gigawatts (GW) of electricity production capacity, of which 22 GW[2] derived from renewable energy sources. Hydroelectricity, with an installed capacity of 21.6 GW, accounts for an estimated 98% of the total, wind power accounts for 120 megawatts (MW), geothermal for 210 MW and solar energy for around 10 MW (mainly not grid-connected).

> “Private developers have a key role to play in developing renewable energy (RE) projects in sub-Saharan Africa.”

While public contracting authorities have mainly focused on the traditional modes of electricity production (especially thermal energy and large-scale hydropower projects) and some power companies are sometimes reluctant to deal with intermittent energy sources, private developers have a key role to play in developing renewable energy (RE) projects in sub-Saharan Africa. These projects can be swiftly set up and are competitive compared with fossil fuels, which make them attractive over the short term.

1 ▸ The term renewable energy in this paper encompasses hydro, geo-thermal, wind and solar power.
2 ▸ Author estimates, being noted that a portion of above installed capacity is not fully operational and needs refurbishment.

THE POTENTIAL FOR RE-BASED PRODUCTION

The potential for RE in Africa is enormous; the potential for hydroelectricity, for example, is estimated at around 1,844 terawatt hours (TWh), i.e. 18 times the level of the continent's hydroelectric production in 2009. Around half of this potential is judged as economically viable (which means that there is a potential additional capacity of 100 GW to 150 GW). Wind energy resources are also very substantial and exploitable even if they are not distributed evenly across the region: 87% of the high-quality resources are located in the coastal zones of the east and south. These are among the best in the world. The solar resource is abundant in Africa and more evenly distributed across the whole of the continent. Supported by appropriate government policies and by steadily decreasing production costs, solar PV could be playing a very important role in Africa's energy supply by the year 2030, with estimates ranging from 15 GW to 62 GW (EREC/Greenpeace, 2010). Finally, geothermal energy is also promising, with a potential estimated between 7 GW and 15 GW (AU-GRP, 2010) – but this resource remains limited mainly to the Rift Valley countries. Many RE projects are currently under development, mainly by independant producers. Those are responsible for 98% of solar power plants (64% excluding South Africa) and in excess of 90% of wind farms currently under development. Yet these projects are being developed almost exclusively in countries where independent producers, or producers with an existing RE production capacity, already have an established presence.

> “The potential for RE in Africa is enormous.”

THE COMPETITIVENESS OF RENEWABLES PROJECTS

REs are often perceived as over-expensive, particularly due to the high investment costs involved. Yet in fact they are already competitive in standalone systems and in many cases have reached parity with the average cost of electricity generation across the grid as a whole. This is the case for storable energies like hydroelectricity and geothermal energy, but also for intermittent energies like wind and solar power.

The countries of sub-Saharan Africa present a wide variety of scenarios with respect to the cost of their power generation mix. Some have access to relatively inexpensive resources (hydropower capability in Ethiopia, Guinea, Cameroon, DRC ; coal reserves in South Africa) and therefore have a very competitive power generation mix. Here, the economic attractiveness of REs is low, except within an overall strategy of diversifying production – in order to offset the risk of prolonged drought periods, for example, where there is a heavy dependency on hydroelectricity. Other countries have a power generation mix based on fossil fuels, oil in particular (especially the Sahel countries). For these countries, REs represent the least costly alternative. Many countries with gas (e.g. Côte d'Ivoire) resources are in an intermediary situation. The perception that renewables are expensive is all the more misguided because fossil fuels benefit from many subsidy mechanisms that mask a much higher real cost. Moreover, the costs of electricity from fossil fuels are rising and subject to high levels of volatility – while REs are tending to cost less overall, while also helping to deliver energy security and independence. REs typically have a very capital-intensive cost structure: development costs (relating in particular to resource evaluation) and investment costs are substantial, whereas operating costs are very low. The point where these projects begin to generate a profit is delayed as a result. Any assessment of their economic attractiveness compared with fossil fuels needs to cover a long time period (15 to 20 years) and take appropriate criteria →

This article has been originally published in the *Private Sector & Development* journal number 18, in November 2013.

into account: average discounted production cost per kWh for hydroelectric or geothermal projects; variable avoided costs method[3] for intermittent energies, etc. Given its capital-intensive nature, the cost of finance (debt servicing and capital repayment) is key to the competitiveness of a RE project.

CONDITIONS SPECIFIC TO THE EMERGENCE OF RENEWABLE ENERGIES

> “Support seems particularly crucial during the upstream phase.”

In order to facilitate the emergence of these projects, the countries of sub-Saharan Africa first need to be aware of the potential, competitiveness and benefits of REs. They also need to put effective advance planning in place, incorporating REs within their master plans for the future. Most countries in sub-Saharan Africa have set targets for RE penetration rates in their energy mix 10 or 15 years down the line. This sends out a strong political signal – but it is not enough in itself: these targets need to be translated into production capacity and result in the selection of initial projects and priority sites for development. The planning also needs to take into account the technical constraints connected with integrating intermittent energy sources (wind, solar) into the power grid. For maximum effectiveness it will need to be based on mapping renewable energy sources, in order to determine not just the available potential but also the optimum scale and location of future projects. These plans will enable governments to manage the proliferation of private initiatives more effectively, moving from a supply-driven to a demand-driven approach. At present there is a distinct lack of such integrated strategies in sub-Saharan Africa – with South Africa, perhaps, as the exception. As part of this planning, governments also need to stipulate how projects will be structured (whether the prime contractor will be public or private), set the rules for competitive tendering (calls for tender, calls for project proposals, or the possibility of granting concessions by private agreement) and any mechanisms for providing support to the sector. Several countries in sub-Saharan Africa have developed specific support strategies for REs. The most advanced of these, South Africa, has set up a wide-ranging, robustly structured tender programme that has attracted many potential developers and investors. In 2008, Kenya introduced a subsidised feed-in tariff mechanism – which has proved only moderately successful as the tariff level has been too low to incentivise participation. Other countries like Uganda, Tanzania and Rwanda have followed (for hydroelectric projects) or are considering doing so (Ghana, Botswana). Mechanisms based on subsidised feed-in tariffs or calls for proposals seem attractive for countries where the potential for REs is high. They are more difficult to justify for small-scale markets: setting them up is unwieldy and it is difficult to find the optimum tariff level – one that is both attractive and remains stable over time. In order to facilitate the emergence of RE projects, some countries could put in place a transitional period (of three to five years) during which some projects could be contracted by private agreement (where the law permits), – pending the establishment of specific regulations governing independent producers and/or REs. This approach would be a way of responding to the plethora of initiatives coming from the private sector – while at the same time providing a framework for their implementation.

3 ▸ Comparing the cost per kWh of RE with variable costs (mainly the cost of fuel for thermal energy) of the plants they are replacing

THE IMPORTANCE OF UPSTREAM SUPPORT

The private developers present in Africa today do not possess specialist expertise in REs – while the specialists in this field are small-scale developers with limited financial resources and a lack of experience in this sub-region. Setting-up a financing offer dedicated to REs would be a way of enabling them to develop on a larger scale. Yet current initiatives are not explicitly targeted at private projects: they are often larger in scope (focused on climate change) and developers are often unaware of their existence. Support seems particularly crucial during the upstream phase. This is the area where development finance institutions can contribute to the emergence of RE projects – by joining forces with the African funds that are starting to develop in this sector, for example.

Specific conditions relevant to each particular kind of renewable energy also need to be taken into account in promoting their development. The exploration phase of utilising a geothermal resource, for example, is time-, cost- and risk-intensive and is traditionally financed from the developer's own capital. Whatever the qualities of this resource, this is a limiting factor. Various initiatives are seeking to promote the emergence of projects in this sector. Kenya, for example, created the Geothermal Development Company in 2009. This public organisation is charged with taking on the exploration risk – while selling the steam from the wells it has helped to establish to the operators of geothermal power plants (private or public). This enables the latter to focus on operational matters without bearing the burden of the supply risk. Independently, dedicated programmes[4] have been set up for countries which have access to this energy resource in order to establish insurance mechanisms that can partially compensate developers for projects that fail during the exploration phase.

Various avenues are available to provide upstream support for RE projects: dedicated technical support, allocation of public funding, rationalisation of the existing offer and the pooling of facilities offered by funders. Implementing solutions rapidly is critical in order to leverage the potential for REs in sub-Saharan Africa effectively. Successful initial projects will demonstrate the credibility of this model, acting as a catalyst for investment and reducing the need for such support measures further down the line. ■

4 ▸ The World Bank's African Rift Geothermal Development Program and the Geothermal Risk Mitigation Facility offered by the African Union and KfW development bank.

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Rural electrification in Africa: An economic development opportunity?

Jean-Michel Huet, *Partner at BearingPoint*
Aurélien Boiteau, *Manager at BearingPoint*[1]

Electricity is expensive and difficult to access in Sub-Saharan Africa. Improving infrastructures would accelerate the electrification of rural areas but requires a high level of funding. Decentralised power generation projects – based on renewable energies – could be the key to unlocking this high-potential market. As yet, however, these projects have not developed business models that are genuinely sustainable over the long term.

> "Electricity is a rare commodity in Africa: the electrification rate across the continent as a whole is just 42%, the lowest of all the developing regions."

Environmental sustainability is one of the eight Millenium Development Goals: giving communities access to a sustainable human environment. Access to electricity is not mentioned explicitly in this context – and yet limited access to electricity still represents a major impediment to development in many regions worldwide. In 2009, 1.4 billion people did not have access to electricity, including no less than 585 million in Sub-Saharan Africa. Electricity is a rare commodity in Africa: the electrification rate across the continent as a whole is just 42%, the lowest of all the developing regions. And this average rate does not reflect extreme regional disparities: the rate is 99% in North Africa, but just 31% in sub-Saharan Africa. The urban/rural divide is strongly pronounced, too (69% versus 25%) – with the result that less than 10% of sub-Saharan Africa's rural population has access to electricity.

Electricity also remains a costly resource for African consumers. The average tariff for individual customers is 13 US$ cents per kilowatt hour (13c$/KWh), i.e. close to that of OECD countries (14 c€/kWh in France) for a standard of living that is fifteen times lower. It is also substantially higher than the cost observed in other developing regions. Electricity supply solutions for the huge rural areas not served by the power grid are more expensive still, reaching as much as 30 to 50c$/KWh for a generator, or even 70c$/KWh for the use of a photovoltaic kit. Finally, even within electrified zones the supply is not reliable: failures and blackouts occur on nearly ten days per month, involving outages lasting an average of six hours per day. The poor quality of the electricity supply entails a significant loss of earnings for the countries of sub-Saharan Africa, assessed by the World Bank at more than two GDP percentage points (Eberhard et al., 2011).

This article was originally published on the *Private Sector & Development* blog, February 4th, 2015.

1 ▸ Aurélien Boiteau is now senior manager at Atlante & Cie.

ELECTRIFICATION – A COMPLEX ECONOMIC CHALLENGE

The electricity operators of sub-Saharan Africa face a seemingly intractable economic equation. With 70% of the population living on less than two dollars per day, the market potential is limited. Electricity suppliers also face the challenge of recovering payments due to them: some 40% of end customers do not pay their bills (the non-payment rate in France, for purposes of comparison, is below 1%).

In addition, these companies have to operate electricity infrastructures that are cumbersome, centralised, and covering vast territories. Operating costs are high, averaging 14c$/KWh, and are rarely covered by end-user tariffs. As a result, only seven countries in sub-Saharan Africa cover their historic production costs, the level of coverage rising no higher than 61% on average for the other countries. Ineffective debt recovery, combined with a limited market, drains African operators' ability to sustain their operations and maintain their power systems – further impairing their performance level. Network losses and fraud account for nearly 25% of the electricity produced. In this context, operators have limited resources, reducing their ability to invest in developing the power system.

The combined production capacity of all the countries of sub-Saharan Africa (excluding South Africa was just 34 gigawatts (GW) in 2010 – around the same level as Poland; France, by comparison, has a production capacity in excess of 120 GW. This capacity has doubled since 1980 – but the population of these countries has doubled, too, over the same period. Relative to population, the available electricity capacity has therefore been stagnating for more than 30 years. To match demographic growth and to meet the growing demand arising from ongoing economic development, the UN estimates that 7 GW of additional electrical capacity would need to be installed each year. This would represent an annual investment of US$ 41 billion. The traditional development model for power systems based on centralised production and network extensions would therefore require substantial funding – funding the African operators would find it difficult to sustain. There is no doubt that a more appropriate route for sub-Saharan Africa is to look to develop decentralised generation methods, not connected to the main electrical network (off-grid) or organised around a local mini-grid.

FOCUS
BEARINGPOINT

BearingPoint, a European company based in the Netherlands, specialises in management and technology consulting. BearingPoint covers more than 70 countries, with 140 partners, 3,350 consultants and an international network of partners; it has a long-established established presence in France, where it is one of the leading players in operational consulting. Over more than a decade, BearingPoint's clients have included CAC40-listed corporations and major administrations.

DECENTRALISED POWER GENERATION – THE BEST SOLUTION FOR THIS MARKET

Given Africa's high levels of solar irradiation, solar energy could offer a promising solution. A study undertaken by the European Commission (Monforti et al., 2011), for example, showed that over a large portion of Africa's rural areas, electricity generation via photovoltaic panels is more competitive than using a generator.

The high-power density of the solar radiation, reaching 2,000 to 2,500 kWh per square metre per year (compared with an average of 1,300 kWh in France), explains this higher level of profitability; generator-based supply, by contrast, remains dependent on road infrastructures for diesel deliveries. Moreover, the steep decline in the cost of photovoltaic panels is heightening this comparative advantage – at a time when fossil fuel prices are steadily rising and the state subsidies that keep them at an artificially low level in many African countries are being phased out, a process driven by IMF-led reforms.

The relative simplicity of solar solutions is another advantage. Yet solar and diesel are not necessarily competitors: at local level, a hybrid system supplying a mini-grid offers an attractive solution for rural electrification (Léna, 2013). Despite the downward trend in photovoltaic costs, solar-based electricity generation solutions remain expensive for local populations. Individual solar kits represent an investment of between €700 and €1,000 for a family, while solar-diesel hybrid systems supplying a village with electricity can cost several hundred thousand euros.

While microfinance can support the wider uptake of individual solar kits, solar solutions on a larger →

scale are held back by the high up-front cost of the initial installation – even though subsequent operating costs are lower. These challenges are the inverse of those relating to diesel generators and this in itself suggests the need for strategic adjustments. In order to support solar power and widen access to energy in rural zones, African governments need to opt for subsidising investments rather than operating costs, while investors need to be willing to depreciate capital expenditure over a longer period. Most African states have adapted their regulatory framework and set up dedicated organisations – rural electrification funds or agencies, for example (see box) – in order to develop power installations in their rural zones, often with the support of Western banks and development agencies. Given that 60% of the sub-Saharan population lives in rural areas, rolling out competitive off-grid power supply solutions represents both a key development vehicle and a significant market opportunity.

MATCHING BUSINESS MODELS TO MARKET PLAYERS

Nonetheless this commercial potential still needs to be unlocked, most notably by finding profitable business models appropriate for people in poverty. Since the early 2000s, Total and EDF have implemented a business model specifically tailored to rural electrification. Decentralised Service Companies (DSCs) are commercial companies governed by local law, financed by private investors and development agencies; they are awarded concessions lasting from ten to twenty years for electrifying remote geographic regions. They offer users a range of services according to the number of light bulbs and power sockets to be supplied and are paid via an initial connection tariff and a fixed monthly subscription. Although these DSCs have helped to significantly improve living standards for the populations they serve, they have had a limited impact on the local economic fabric and have failed to achieve their target performance levels. Clearly their business model requires further adjustment.

Looking beyond the concession model[2], some business models are more oriented towards small-scale markets and the least advantaged populations. In 2009, for example, Schneider Electric launched a programme called "BipBop" for developing technologies suited to rural electrification, investing in local businesses (such as One Degree in Kenya with its Brightbox solar kit, or Fenix in Uganda with its ReadySet kit), and training up local energy professionals. Yet energy operators are not alone in taking an interest in rural electrification.

Telecoms operators, with a strong presence in Africa where the mobile telephony market has seen dynamic growth (+20% annually), are proving very active in this sector. These players – less trammelled by the regulatory framework – can make their investments pay via their telephony offering, enabling them to offer an electricity supply service at marginal cost. The Green Power for Mobile programme, for example, launched by the GSM Association in 2008 and active in more than 20 African countries, aims to develop mobile networks in rural areas by rolling out local mini-grids fully or partially supplied by renewable energies (mainly solar). Orange, present in 16 African countries, has installed 1,300 solar base stations in rural areas – enabling users to charge their phones but also to generate electricity for basic services. This offer is not as yet part of an integrated strategy and is not as yet competing with the activities of the energy operators[3]. All of these "grassroots" strategies implement pragmatic supplementary power supply solutions in areas beyond the standard power grid. They may well spread steadily across the whole continent.

Electricity demand in sub-Saharan Africa is steadily growing. The future of rural electrification is clearly less likely to be found in centralised production than in more local, flexible and innovative solutions. Financing these solutions often remains challenging, yet many projects based on a "grassroots" approach are emerging – raising hopes that that the electrification process could gather pace in the future. It is notable that companies from other economic sectors – telephony operators, for example – are on the way to becoming key players in this sector. All the players involved, whether traditional energy operators or telecoms specialists, are looking to develop a business model answering the needs of a vast potential market: 585 million consumers. ■

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2 ▸ DSCs are of course not the only business model based on awarding concessions. Independent power generation unit projects, for example, are backed by private operators via power generation licenses.
3 ▸ It does compete with power generators and photovoltaic kits at local level, however.

Decentralised electrification: the solar revolution

Mathilde Bord-Laurans, *Investment officer, Energy and Infrastructures department, Proparco*

"Base-of-the-pyramid" approaches are in the process of revolutionising the future of rural electrification in Africa. With more effective use of scalable solutions and lower prices for solar technology, sales of solar power equipment are booming. Since mid-2010, direct sales of solar lanterns and solar kits (used to power radios, ventilators or TVs) have exceeded 23 million units, mainly in Africa and India. It is estimated that 93 million people now benefit from improved access to power thanks to this technology.

The vast majority of these sales (75%) comprise small-scale equipment (pico solar < 3 Wp), however, this figure is tending to decrease with the advent of new "Pay-as-you-go" business models that provide financing for larger-scale solar power kits. 750,000 Sub-Saharan African households have now invested in this type of solution. The businesses active in this rapidly-expanding sector attract most of their investment in the form of equity financing and over USD 223 million was raised in 2016. They are yet to achieve profitability and still need to secure a sustainable financing model, notably by raising debt. The market is already well established in East Africa and is beginning to expand to Western and Southern Africa.

Mini-grids are also booming. These comprise an electricity generation facility (i.e., solar, wind, diesel hybrid) hooked up to a distribution grid covering one or several villages. Because the development costs are higher and there are greater regulatory constraints involved, mini-grids have not yet reached the same stage of development, however the prospects are attractive. Aside from these models, solar energy can be used to power a whole range of emerging applications in Africa (solar-powered pumps, solar kiosks, etc.) that could pave the way for a revolution similar to that triggered by mobile phones.

With the help of the EU, European DFIs are partnering development in this highly promising sector, notably by supporting two initiatives. The first is ElectriFI, created to fill a void in electricity sector financing, boost the private sector and mobilise financial backers. ElectriFI's mission is to partner viable businesses and projects that help create new energy connections in emerging and developing countries. It provides financial support mainly in the form of private equity and is funded by the European Commission and Power Africa with an initial amount of €115 million. The second initiative is called Africa Renewable Energy Scale up Guarantee Facility. Proparco intends to make use of a €10 million backstop facility provided by the EU to invest €20 million in between five and ten equity or quasi-equity investments through 2020. This initiative should benefit around a million households.

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Sub-Saharan Africa's power-capacity shortfall limits local peoples' access to basic services and is a major obstacle to the region's economic development. Expanding installed capacity, however, requires substantial funding - funding that cannot be delivered by governments alone. The private sector could play a significant role in meeting this finance gap – and yet its share of electricity production remains marginal. Many countries have not been able – or willing – to embark on the necessary reforms to enable the private sector to contribute significantly in an industry often viewed as strategic and socially sensitive. For its part, private business remains reluctant to invest in environments it sees as lacking transparency and in which the only direct clients are national electricity companies that are often barely solvent, or worse.

The private sector can contribute not just financially but by providing genuine technical expertise and by helping to diversify the energy mix. The private sector can out-perform the public sector, too. Although its production costs may appear higher, they are not necessarily higher than the costs of the new public-sector power stations. Besides, various studies show that, from an economic perspective, producing expensively is always preferable to not producing at all. The few successful examples in sub-Saharan Africa seem to confirm that while planning in this industry is the public sector's responsibility, production can, at least in part, be managed by the private sector.

A priority for national governments is to restore their national electricity companies to financial health – and a key step in this is to price their electricity properly. These companies' difficulties come, in the main, from the public authorities' reluctance to sell electricity at its real price – primarily for social reasons. Although this approach may seem legitimate, it does not necessarily achieve its aim, as subsidies do not always benefit those most in need. Moreover, subsidies are not viable over the long term: a public operator that does not cover its costs cannot have the resources to expand its production capacity – which means that it has to resort to expensive emergency generators, further aggravating its financial situation.

Public authorities also need to ensure that they possess the human and organisational resources necessary to create a clear, transparent and competitive contractual environment. In particular this means establishing an independent regulator, setting up clear processes for awarding contracts and separating the functions of distribution, transmission and production. These measures will reassure investors and are crucial to ensure a balance between profitability for private operators, and the economic and developmental impact for the state.

Governments also need to elaborate and consistently implement a least-cost development plan. Independent power producers' production costs are reputed to be comparatively high – and this is exacerbated when projects are developed as a matter of urgency, to remedy unanticipated capacity deficits. Yet when independent power projects are integrated within long-term development plans, and are not used as substitutes for less expensive public ones, their impact can be wholly positive. Planning also enables states to invest in long-term options such as renewable-energy sources that have the advantage of improving a country's energy independence but require substantial front-end investments.

The private sector is now grappling directly with the whole issue of electricity access by developing a plethora of business models and applications based mainly around decentralised solar power. Is Africa on the cusp of its own energy revolution? Growing these businesses is very capital intensive and here again DFIs can play a key role in partnering development and helping to create financing solutions in local country currencies. Governments also need to factor these new rural electrification strategies into their investment programmes and provide suitable incentives (i.e., tax breaks, appropriate regulations, technical standards, etc.).

There is still a long way to go and fostering awareness of the benefits offered by the private sector will take time. As such, financial backers have a vital role to play in supporting private-sector projects and helping governments to create an environment that is conducive to the development of independent power producers and off-grid suppliers.

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