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THE BOTTOM LINE

The record of concession arrangements in stimulating faster and more effective rural electrification in Sub-Saharan Africa is mixed at best: More concessions have failed than have been implemented—and among concessions that have been implemented, none can be considered an unequivocal success. Still, properly structured agreements can expand electrification by connecting more households to the national grid or to mini-grids. Lessons from case studies shed light on the circumstances under which concessions work best.



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Increasing the Potential of Concessions to Expand Rural Electrification in Sub-Saharan Africa

How big a problem is lack of access to electricity in Africa?

The overall rate of access to electricity in Sub-Saharan Africa is just 35 percent; the rural rate is considerably lower

Of the more than 1.1 billion people in the world living without access to modern energy sources, roughly 630 million live in Sub-Saharan Africa (World Bank and IEA 2015). In several countries, more than four out of five rural households lack electrical power at home.

At its founding in 2013, Sustainable Energy for All (SE4All)—a partnership of the United Nations, the World Bank, and the International Energy Agency—announced the goal of achieving universal access to electricity by 2030. Progress toward that goal has been slow in Sub-Saharan Africa: Between 2000 and 2012, only 14 of the 49 countries in the region increased the number of electricity connections by more than 1 percent a year. At current rates of progress, it will take more than 50 years for the subcontinent to achieve universal access.

Electrification in Sub-Saharan Africa is not keeping up with population growth. As governments and the international community strive to achieve universal electrification, and given the massive investments the power sector requires, pressure will grow to find ways to tap private investment and expertise to meet the challenge.

Can concessioning increase rural electrification?

Although none of the concession agreements in Africa's power sector can be considered an unequivocal success, certain characteristics, approaches, and conditions are associated with better outcomes

Concessions—agreements in which the government grants a private company the right to extend a specific service under conditions of significant market power—are one of many forms of private sector engagement in infrastructure.[1] A 2015 review by the World Bank (2017) identified nearly 200 electricity concessions in Sub-Saharan Africa. Many are small operations connecting as few as 100 customers. Others are national utility concessions that focus less on expanding service to rural households than on improving the technical and financial management of the electricity sector as a whole.[2]

About 15 African countries host one or more active concessions. Another six countries adopted electrification concessions at some

[1] A concession is thus a device that can be used to "create competition for a market, when competition in the market is not operating" (Kerf and others 1998).

[2] The World Bank survey included a desk review of nearly all electricity sector concessions in Sub-Saharan Africa from the late 1990s until 2015, when the review was conducted. In-depth, field-based case studies were done for six countries: Cameroon, Madagascar, Mali, Senegal, South Africa, and Uganda. In addition, a brief review was done on the case of Burkina Faso, where the concession arrangement is unique, as the concessionaires are cooperatives rather than private companies.

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The fundamental challenge in using public-private partnerships is that rural electrification is not profitable within the time frames normally considered attractive to the private sector.

point in the past 25 years but later abandoned them. Six or seven others gave serious consideration to implementing a form of concession before calling off the idea.

Three of the 12 African countries that increased access to electricity most between 2000 and 2012 (Gabon, Senegal, and South Africa) had concessions in place in 2015 (table 1). In neither Senegal nor South Africa can the relatively rapid increase in electrification be attributed to the concessions, however; in both countries, the national utility was responsible for the significant surge in electricity connections. In Gabon the government and the concessionaire cooperated to expand access, but population growth outpaced their efforts. In four other countries for which case studies were done in the recent World Bank survey—Cameroon, Madagascar, Mali, and Uganda—the concession programs resulted in electrification growth of less than 1 percent a year.

The fundamental challenge in using public-private partnerships is that rural electrification is not profitable within the time frames normally considered attractive to the private sector. Partly because of household budget constraints and partly because of their lack of electrical appliances, rural residents initially consume only small amounts of electricity, frequently falling within the subsidized segment of the tariff structure (often referred to as the "lifeline" tariff),

Table 1. Improvement access to electricity in selected Sub-Saharan countries (2000–12)

Access growth rank (#)	Country	2000		2012		Changes between 2000 and 2012		2012
		Population	National electrification rate (percent)	Population	National electrification rate (percent)	Percentage increase in the national electrification rate (percent)	Average annual percentage growth in electrification rate	Annual population growth rate (percent)
1	**Senegal**	9,860,578	37	13,780,108	57	20	1.67	3.12
2	**South Africa**	44,000,000	66	52,341,695	85	19	1.58	1.55
3	Ghana	18,824,994	45	25,544,565	64	19	1.58	2.44
4	**Gabon**	1,231,548	74	1,613,489	89	16	1.33	2.27
5	Lesotho	1,856,225	5	2,057,331	21	16	1.33	1.19
6	**Togo**	4,874,735	17	6,745,581	31	14	1.17	2.70
7	Ethiopia	66,443,603	13	92,191,211	27	14	1.17	2.56
8	Botswana	1,736,579	40	2,132,822	53	14	1.17	2.04
9	Mozambique	18,264,536	7	25,732,928	20	13	1.08	2.82
10	Benin	6,949,366	25	10,049,792	38	13	1.08	2.73
11	**Cabo Verde**	438,737	59	500,870	71	12	1.00	1.15
12	Rwanda	8,021,875	6	10,817,350	18	12	1.00	2.44
20	**Uganda**	23,757,636	9	35,400,620	18	10	0.83	3.27
22	**Mali**	11,046,926	17	16,112,333	26	9	0.75	2.98
26	**Cameroon**	15,927,713	46	21,659,488	54	8	0.67	2.53
43	**Madagascar**	15,744,811	11	22,293,720	15	4	0.33	2.80

Source: World Bank and IEA (2015) as reported in World Bank (2017).

Note: Highlighted countries are those that had a concession in place during part of the period from 2000 to 2012. The concessions in Togo and Cabo Verde were terminated in 2006.

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which does not begin to meet the capital costs of establishing new connections and supplying electricity in rural areas. These features of the rural electricity market in developing countries have limited the scope of concession arrangements and the potential of private sector participation.

Because rural electrification has usually been inconsistent with the investment requirements of private investors, many concessionaires demand public grants or cost-sharing to meet the financing gap associated with building and operating new rural electrification lines. But as small-scale renewable energy technologies become a common part of the toolkit, so does the potential to reduce the capital costs and payback period of electrification. The maturation of geographic information systems (GIS) also promises to elicit greater interest from private parties by lowering various types of risk.

In Africa, only South Africa has tried to concession solar home systems. Its experience was not a success, and the model is being abandoned. Solar home systems will certainly play an increasing role in rural energy provision, but South Africa's experience suggests that they will do so outside the bounds of a concession framework.

What kinds of electricity concessions have worked?

Concessions of mini-grids and of national utility functions have worked best in Africa

Concessions fall into four types: mini-grids, solar home systems, rural zonal, and national utilities.

Mini-grid concessions have shown themselves to be successful at engaging local investors and increasing the number of rural customers served (table 2). In none of the countries case-studied, however, did these arrangements attract large international investors or significantly increase overall national electrification. Mali may have implemented the most successful mini-grid program, which has brought access to electricity to more than 70,000 people.

In Africa, only South Africa has tried to concession solar home systems. Its experience was not a success, and the model is being abandoned. Given the absence of natural monopolies and the rapid

Table 2. Sub-Saharan African countries with mini-grid concessions

Country	Mini-grid program name	Years in operation	Number of mini-grid concessionaires and mini-grids in operation	Total number of connections made through mini-grid concessions	Average number of connections per mini-grid
Burkina Faso	Electricity Cooperatives (Coopels)	2003–present	Concessionaires = 92 Mini-grids = 92	14,250	155
Guinea	Decentralized Rural Electrification (PERD) Project	2006–present	Concessionaires = 26 Mini-grids = 26	8,248	317
Madagascar	Mini-grid concessions	2005–present	Concessionaires = 30 Mini-grids = 30[a]	7,100	237
Mali	Projets de Candidatures Spontanées d'Electrification Rurale (PCASER)	2003–present	Concessionaires = 68 Mini-grids = 250	78,000	312
Senegal	Projets d'Electrification Rurale d'Initiative Locale (ERIL)	2003–present	Concessionaires = 4 Mini-grids = 4	500	125
Uganda	West Nile Rural Electrification Project	2003–present	Concessionaires = 1 Mini-grids = 1	6,800	6,800
	Small grid extension concessions	2006–present	Concessionaires = 5 Mini-grids = 5	31,600	6,320

a. In Madagascar, 200 villages are provided with service by the remaining 30 operators, but the exact number of mini-grids is not known (some mini-grids serve multiple villages).

and serendipitous innovations in solar technology, this model holds little promise for replication. Solar home systems will certainly play an increasing role in rural energy provision, but South Africa's experience suggests that they will do so outside the bounds of a concession framework.

Senegal is the only country in Africa to grant rural zonal concessions, under which governments concede the rights to electrify a large area or zone. Progress has been painfully slow: Eleven years after work on the program began (in 2004), only 3,760 connections have been provided, two-thirds of them through solar home systems. The Senegalese experience suggests that this type of concession is not an attractive model.

A national utility concession may cover a vertically integrated utility that operates the country's entire electricity system (generation, transmission, and distribution), or it may encompass only the distribution network in an unbundled system. The primary aim of most such concessions has been to improve utility performance; historically, rural electrification has not been one of their primary objectives. However, when governments have encouraged such concessions to help expand access to electricity, concessionaires have responded favorably, with positive results.

National utility concessions have been successfully implemented in four countries of the region (Cameroon, Côte d'Ivoire, Gabon, and Uganda), where they increased the density of electrification, improved sector performance, and maintained fiscal sustainability. Three of the four also increased access to electricity.

In Cameroon, ENEO (and its predecessors) added an average of about 40,000 connections a year and increased the number of grid connections by 570,000, including 190,000 in rural areas. In Gabon, SEEG added roughly 10,000 new connections a year, raising the national access rate to 89 percent and the rural access rate to 45 percent. In Uganda, Umeme averaged 30,000 new connections annually from 2005 to 2014, adding 78,000 in 2014. It increased the total number of connections by 360,000, about a third of which are in rural areas. CIE, in Côte d'Ivoire, is the only one of the four utility concessions that has not yet achieved significant increases in rural access.

Concessions work well as partnerships between private and public parties only when the rights and responsibilities of each are clearly defined, agreed upon, and adhered to. Achieving this clarity depends largely on the existence of an adequate regulatory and legal framework.

What conditions affect success?

The context of a country's power sector is crucial in determining the success of a concession

Particularly important is commitment by the government and major power sector institutions. Concessions are conceived, designed, and implemented within the context of a country's power sector, and that context is crucial in determining their success. If the institutions that manage the power sector are working well, other things being equal, it is more likely that concessions will be successful in achieving their aims. Particularly important is commitment by the government and major power sector institutions.

Concessions must also meet six financial and regulatory conditions:

Financial viability. Investments in large-scale expansion of the grid to rural areas generate economic benefits over the long term, but for the most part they are not financially viable in the short to medium term. For this reason, the public sector typically bears the capital expenditures required to connect rural consumers. The government and regulators must ensure a balance between adequate financial returns for the concessionaire and affordability and inclusiveness for users for the duration of the concession. Achieving that balance typically requires subsidies and a well-designed tariff regime.

Pre-investment support. The public sector needs to actively engage with and support private firms considering becoming concessionaires. Regulators (or other relevant government authorities) need to formulate comprehensive investment prospectuses based on high-quality sector data to help prospective concessionaires make informed decisions. The government should assume some of the costs of gathering information useful for prospective concessionaires in meeting their due diligence responsibilities and provide timely responses to requests for additional information.

Clarity regarding rights and responsibilities. Concessions work well as partnerships between private and public parties only when the rights and responsibilities of each are clearly defined, agreed upon, and adhered to. Achieving this clarity depends largely on the existence of an adequate regulatory and legal framework—one that encompasses public-private partnership laws or a dedicated law on concessions.

Concessions can potentially accelerate rural electrification in ways that neither the public nor the private partner can accomplish on its own.

Detailed contracts with built-in flexibility. Legally binding contracts should define the rules of the game and key operating parameters. Regulatory or legal processes for changing contractually defined terms and parameters in response to evolving economic, technological, or legal conditions should be clearly defined. Protecting contracts from unexpected or arbitrary changes increases concessionaires' willingness to invest; the possibility of renegotiation under specified conditions enables mutually agreeable and optimal adaptation to new circumstances.

Reasonable costs of compliance. The costs of compliance should be matched to the nature and size of the concessions being implemented.

Timely payments and predictable cash flows. Public sector payments to the concessionaire—in the form of initial capital cost subsidies, recurrent subsidies, or reimbursements—must be budgeted for and disbursed in a timely manner. Large or repeated deviations from expected cash flows will sap the confidence of private partners and discourage further investment.

What role can concessions play in the future?

If properly structured and incentivized, concessions can provide a legal structure for effective public-private partnerships in the electricity sector

When supported by the government, properly incentivized, and placed within an appropriate legal framework, concessions can be a useful tool for attracting private resources, managerial expertise, and technical know-how to address the enormous challenge of rural electrification. Indeed, concessions can potentially accelerate rural electrification in ways that neither the public nor the private partner can accomplish on its own.

Given an enabling regulatory and policy environment, *mini-grid concessions* can provide affordable electricity services to households not yet reached by the national grid. Two developments are likely to increase the scope for such concessions. First, the shift from diesel fuel to renewable energy promises to reduce the cost of operating a mini-grid. Second, new technology—such as pay-as-you-go mechanisms, smart meters, and remote control—should improve their financial viability. Rapid technological innovation can quickly make unattractive installations more appealing and sustainable. Advances in renewable energy technology—especially solar photovoltaics—have already expanded the options for generating power in rural areas. GIS technology will increase the economies of scale of mini-grid concessions, making it increasingly possible to charge cost-recovery tariffs. GIS, stand-alone solar home systems, and cost-reducing hybridization of mini-grid generation are making it easier to plan and manage successful concessions.

The experience in Sub-Saharan Africa yields several lessons that can help policy makers improve the design and implementation of mini-grid concessions:

- Improve access to outside financing, particularly longer-term financing, to provide start-up operators or concessionaires with sufficient working capital to maintain affordable tariffs.
- Provide significant subsidies to overcome the lack of ready financing and the limited willingness and ability of many rural residents to pay.
- Implement tariffs that promote financial viability and allow mini-grid operators to adjust prices as needed, through tariff hikes or recurrent subsidies, to ensure that concessions meet the risk-reward requirements of potential investors.
- Develop a regulatory transition path for mini-grids to reach utility scale and connect to the national grid.
- Encourage common ownership/management of several mini-grids, in order to help operators take advantage of economies of scope and reap savings in administrative functions, engineering design, and repetition.

In national utility concessions, countries need to reach agreements that expand rural access without compromising the primary goal of improving utility performance. To accomplish this, they can stipulate agreements or clauses covering potential cost-sharing arrangements between the government and concessionaires within the overall concession framework. Alternatively, the government can guarantee loans to the concessionaires for grid extensions not expected to immediately contribute to the concessionaire's short-term balance sheet.

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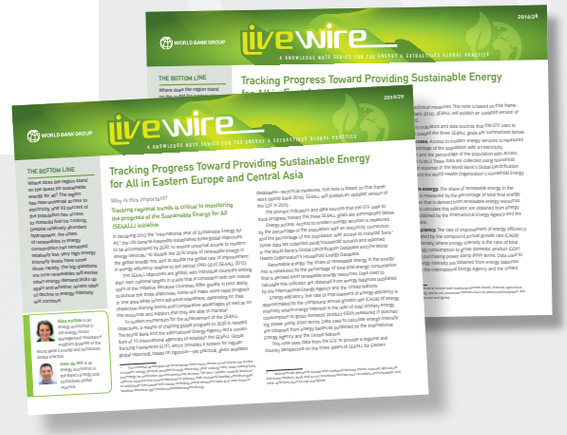
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