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OBA in Senegal – Designing Technology-Neutral Concessions for Rural Electrification

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Senegal has sustained historically high GDP growth of 5 percent a year, and real GDP per capita growth of 2.5 percent a year, since 1994. Yet the country faces big economic and social challenges. The economic growth over the past decade has had only a small impact on poverty reduction, especially in rural areas. In 2001 an estimated 57 percent of the national—and 65.2 percent of the rural—population was considered to be below the poverty line.[1]

Nationwide, only 30 percent of households in Senegal have access to electricity. Rural electrification is even lower at 12.5 percent of households, and limited to areas around large population centers and some tertiary centers. Once connected, most rural households would likely be willing and able to pay for their electricity use: most already spend $2–24 per month on kerosene and dry cell batteries to meet their lighting and small power needs. But the up-front investment and connection costs are out of reach for the typical household.

The government has made rural electrification a priority, recognizing its importance in reducing poverty and redressing development imbalances. Early efforts achieved limited results. A new program that combines output-based aid (OBA) subsidies with technology-neutral competitive bidding is seen as more promising. This program has the potential to align private incentives with public sector objectives of maximizing the number of rural households served under a sustainable commercial scheme.

Public-private partnership

Seeking to bridge the rural-urban energy divide, the government launched pilot projects in the 1990s to develop decentralized, renewable energy systems. Despite some positive results, these limited pilots were not scaled up. The country lacked the legal and institutional setup for large-scale rural electrification programs. And with public resources in short supply, the government concluded that private participation would be key.

To support private participation, the government undertook comprehensive power sector reform in 1997. It broke the nationwide monopoly of Senelec (Société Nationale d'Electricité du Sénégal), allowing private producers to generate and distribute electricity in rural areas not served by the national utility. It also established an independent regulatory authority, CRSE (Commission de Regulation du Secteur Electricité), and an autonomous agency with sole responsibility for managing rural electrification programs, ASER (Agence Sénégalaise d'Electrification Rurale). Under this new regulatory regime CRSE sets maximum tariffs for rural areas, and ASER develops minimum service standards.

New rural electrification strategy

The traditional approach to rural electrification in Africa, including Senegal, has entailed public utilities preparing technical feasibility studies for conventional grid extension for a preset number of connections and then procuring equipment and works. Customers are required to pay both high connection fees and internal installation costs. This approach has often failed because of public utilities' inadequate financial capacity and potential customers' limited ability to pay.

In 2003, assisted by the World Bank, the government adopted the Rural Electrification Priority Program (PPER) to address the challenges posed by the traditional approach. PPER combines privately operated concessions with output-based subsidies to leverage private financial resources and overcome the barrier of high up-front connection costs, while ensuring quality connections.

[1] Senegal, Ministry of the Economy and Finance, "Poverty Reduction Strategy Paper: Second Annual Progress Report" (Dakar, 2006).

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Under PPER, the country is divided into 18 rural electrification concessions.[2] These concessions are designed to be compact and yet large enough to attract large private players. Each concession has a potential of at least 30,000 connections—the estimated number of non-electrified rural households. The concession agreement gives the concessionaire the right to generate and distribute electricity throughout the concession area for 25 years. This right is exclusive when the concessionaire chooses grid extension technology, but not otherwise.

In addition to the 18 primary concessions, the program includes multisector energy projects (Programmes Energétiques Multisectoriels, or PREM) aimed at improving small business productivity and social service delivery. These PREMs link PPER with other sector programs whose results have been limited due to lack of access to electricity.

Tariff Regime

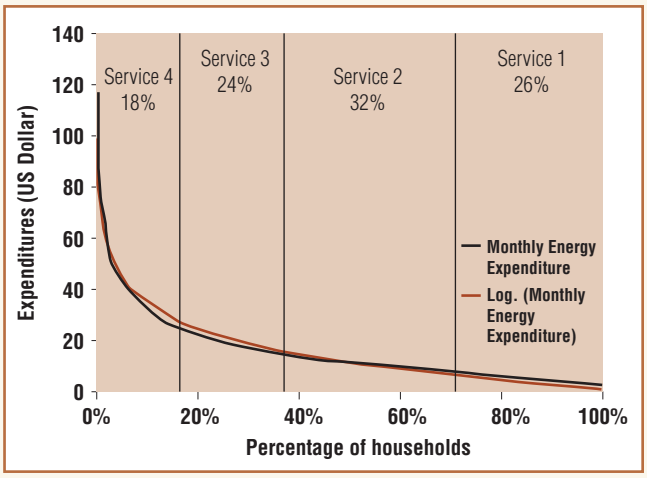
CRSE introduced a new tariff schedule for the concessions based on a "fee for service"[3] approach that incorporates a prefinancing mechanism aimed at easing the burden of connection and installation costs and ensuring consistency with rural households' ability to pay. Based on a detailed demand analysis (figure 1), CRSE defined four levels of electricity service and corresponding flat-fee monthly tariffs for three of them (table 1). Besides the tariff, the monthly customer bill includes a "payment facility" for spreading out the capital costs of connection, internal wiring, and efficient fluorescent lamps—making these far more affordable for even the poorest.

The model business plan developed for the concessions shows that customers' monthly payments will cover not only the costs of operation and maintenance, service delivery, and system replacement, but also at least 20 percent of initial investment costs. The concession agreement therefore requires the concessionaire to contribute the commensurate initial investment costs as would be recovered through the tariff. This financial commitment will ensure service delivery throughout the term of the concession because the concessionaire earns a return on its investment only through customers' monthly payments over the concession period.

The OBA subsidy design

Although the payment facility included in the tariff covers some of the connection costs, operators cannot recover their full investment through tariffs over time.

Figure 1. Monthly substitutable energy expenditures in rural Senegal (2002)



Note: Based on survey results for 860 households in the Dagana-Podor, Mbour, and Kolda-Velingara concession areas.
Source: World Bank 2004.

There is therefore a need for subsidies. OBA-type capital subsidies offer an effective way to connect households that otherwise would not be.[4]

To avoid the high up-front capital financing requirement that private operators would not be willing to accept without a much larger subsidy, the program will disburse the OBA subsidy in tranches as the service provider reaches milestones (table 2). To ensure completion of the project, the program will pay the final 40 percent of the subsidy only after the connections—including internal installations—are made. If the service provider should fail to meet the targets set out in the contract after 36 months, the final tranche will be reduced accordingly. In addition, the service provider is required to submit a performance guarantee that will be forfeited if it fails to meet its obligations.

The OBA subsidy is targeted at all households in the concession area since two thirds of the rural

[2] In addition, some small-scale, village-based electrification projects will be implemented in parallel. This second track, called ERIL, gives dynamic, fast-developing communities reluctant to wait for the PPER a faster route to electrification.
[3] "Fee for service" is the traditional utility approach to providing service whereby customers pay against the delivery of a service rather than to acquire equipment.
[4] The 18 rural concessions are output based, but other components of the program, ERIL and PREM, are not.

Table 1. Tariffs set by CRSE for Dagana-Podor concession

	Flat-fee clients			Non-flat-fee clients
Service level	Service 1	Service 2	Service 3	Service 4
Power available, or P (watts)	$P \leq 50$	$50 < P \leq 90$	$90 < P \leq 180$	$P > 180$
Maximum tariff (US$)				
Per month	3.90	7.20	13.50	n.a.
Per kilowatt-hour	n.a.	n.a.	n.a.	0.20
Maximum payment facility (US$/month)	3.10	3.90	6.20	8.00

n.a. Not applicable.

population is considered below the absolute poverty threshold of 2,400 calories per adult equivalent (per day). Further, to ensure electrification of more remote households, which are typically the poorest, the concessionaire is required to make a minimum number of connections beyond 20 kilometers from the grid.

The bidding process

Chosen through two-stage international competitive bidding, the winning bidder for each concession will be the firm offering to provide the most connections in the first three years given the predetermined subsidy. This criterion for awarding the concessions maximizes private investment and efficiency. Bidders are motivated to both increase their contribution and seek lower unit costs so as to serve more customers—because more customers mean greater returns.

Winning bidders are free to choose any technology to achieve the quantitative goals they propose in their bids. This technology neutrality allows bidders to fully exploit any comparative advantage they may have in a particular technology and thus ensures fair competition among technical options. However, to level the playing field for renewable technologies, the government is using a grant from the Global Environment Facility (GEF) to subsidize these technologies.

Funding sources

The total estimated cost of Senegal's PPER is $300 million. The World Bank, through the International Development Association (IDA), will provide support through a $100 million Adaptable Program Credit to be distributed in three phases spanning 12 years.

IDA Phase I will finance three concessions—Dagana-Podor, Mbour, and Kolda-Velingara—along with a few PREMs. This phase also focuses on institutional strengthening, capacity building, and technical assistance for the institutions involved in rural electrification—ASER, CRSE, and the Ministry of Energy. IDA phases II and III will finance six more concessions.

Out of the total Phase I cost of $50 million, IDA will contribute $29.9 million ($15 million as subsidy), while GEF will give a $5 million grant ($3 million as subsidy). The government is required to contribute counterpart funds for Phase I estimated at $10.3 million.

Table 2. Schedule for disbursing the subsidy

Milestone	Share of subsidy to be paid (percent)
A commercial bank certifies that the capital has been deposited in full and against the provision of a bank guarantee covering the same amount. The guarantee will be released only when 50% of households are electrified.	30
An independent body certifies the integrity of the equipment and its conformance with specifications.	30[a]
The rural electrification agency (ASER) verifies the number of customers connected and certifies that minimum technical standards as stipulated in the contract have been met.	40[b]

[a] To be paid progressively upon verification that corresponding share of villages have been connected.
[b] Adjusted to percentage of contractual targets achieved.
Source: World Bank 2004.

For the IDA-funded concessions, a rural electrification fund has been established to channel the subsidies from the donors and the national budget. The fund's management is hosted in ASER and overseen by an independent board.

Results so far and next steps

The bidding process for the first concession, Dagana-Podor, was launched in early June 2006 by ASER. IDA will provide a $5.58 million subsidy, including $350,000 for PREMs, and GEF will provide a $1.1 million subsidy. The tender generated substantial interest. Eight firms (four local and four international) applied for prequalification on their own or as part of a consortium, resulting in four formal applications. Two of the four applications were prequalified and final bids were received from both—(i) Office National de l'Electricité or ONE (Morocco) and (ii) the consortium of Electricité de France (France) and Total Energie Développement (France), and CSI-Matforce (Senegal). ONE made the winning bid with 21,800 connections. Contract negotiations between ONE and ASER are currently underway and are expected to be completed soon.

The winning bidder has proposed to more than double the minimum number of connections set in the tender—from 8,500 to 21,800. To achieve this, the winner is bringing in $9.6 million in private financing, which constitutes about 60 percent of the total financing. This is far larger than the 20 percent minimum private financing requirement under the tender. The average cost for a connection is estimated at $725, and the average subsidy at around $286. Around a fourth of all connections are expected to be made through individual photovoltaic systems which is far more than expected and could lower the incremental GEF subsidy to only $1.03 per watt peak.[5] These results show that combining technology neutral competitive bidding with OBA can leverage significant private resources and potentially deliver far better results than the traditional approach to rural electrification.

PPER has also generated significant donor interest. The African Development Bank (AfDB) and the German Development Bank (KfW) have committed 14 million euros and 6 million euros respectively, to finance two additional concessions each.

Senegal's PPER aims to improve access to electricity in rural areas from the 2003 level of 12.5 percent of households to 62 percent by 2022. It is too early to know how far PPER will go towards achieving this ambitious goal. But results so far have been very promising: the first concession could increase access to electricity from around 4 percent of rural households in the concession area to around 40 percent in three years.

References

World Bank. 2004. "Project Appraisal Document for Electricity Services for Rural Areas Project, First Phase of the Electricity Services for Rural Areas Program, in the Republic of Senegal." Report 29769-SN. Washington, D.C.

[5] The following subsidy ceilings were applied for renewables: $2.60 per watt peak for photovoltaic, $0.65 per watt for micro-hydro and biomass, and $1.30 per watt for windmills. Watt peak is the direct current (DC) watt output of a solar module as measured by an industry standard light test.

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