

Output-Based Aid in Ethiopia Dealing with the “Last Mile” Paradox in Rural Electrification

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Providing electricity to poor households in rural areas in Ethiopia is critical to improving the health and living conditions of the population, reducing poverty, and stimulating growth. A project supported by the Global Partnership on Output-Based Aid (GPOBA) is accelerating the pace of connections in electrified areas and fostering energy efficiency. The scheme provides a performance-based subsidy to the state-owned utility in Ethiopia linked to the delivery of pre-agreed outputs, including the connection and provision of services on a sustainable basis. As part of the connection package, poor households receive two compact fluorescent lamps (CFLs). The project has potential for scaling up with a future International Development Association (IDA) loan to the utility.



Photo courtesy of the World Bank

Overview of the Power Sector in Ethiopia

Ethiopia has one of the lowest electrification rates in Sub-Saharan Africa. Only 17–18 percent of the nation’s 8,000 towns and villages are electrified, and only about 7 percent of households have metered connections. About 1.6 million customers are served by the Ethiopian Electric Power Corporation (EEPCo), a well-run, technically competent utility that is state-owned and vertically integrated. EEPCo is the primary vehicle for grid-based electrification and also serves some isolated areas with diesel generators.

The Government of Ethiopia (GoE) recognizes the importance of rural electrification to reduce poverty and stimulate growth. A few years ago, the GoE launched an ambitious rural electrification program with the objective of providing access to half of rural communities in five years, to be expanded to full coverage in ten years. EEPCo has been selected as the implementation agency, and has put in place the necessary organization and processes to deal with this challenge competently. The GoE is working with other partners, including the World Bank,

the African Development Bank, and the Governments of India and Kuwait, which together are contributing approximately US\$1.2 billion.

The “Last Mile” Paradox

The current gap between the connection and access rates stems from the fact that many customers cannot afford to pay the cost of a connection. Compared to the upstream cost of providing electricity services (generation, transmission, and distribution), the cost of connecting households to the grid—the “last mile”—represents a small fraction of the utility’s total investment (only 3 percent). However, for poor households, the connection cost constitutes a significant barrier to access. The average connection cost for customers living near the grid (usually less than 150 feet) ranges from US\$50 to US\$100 per household. In those areas where the annual income is less than US\$500 per household, a connection costing US\$75

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represents 15 percent of the average annual income per household.

At the same time, metered grid-based electricity is a more affordable energy source than other sources used by the poor. By and large, kerosene is the fuel of choice in rural areas, used by 96 percent of households, which spend US\$1.60 per month on average on kerosene. Firewood and dry-cell batteries are also used to provide lighting services in some cases. The price that rural people routinely pay for these alternative fuels is more than the average price of electricity that EEPCo charges rural customers. Other households obtain electricity by stringing wires to their nearest neighbors, with the neighbor charging them for their electricity consumption. EEPCo does not consider this practice theft, since energy is being metered and billed to the neighbor. However, this situation is far from ideal, as neighbors charge on a per lamp basis, resulting in an average equivalent tariff of about 30 US cents per kWh—ten times higher than the lifeline rate that EEPCo charges its metered customers.

The “last mile” is thus a dual paradox. First, the cost of connecting households represents only 3 percent of the total investment necessary to deliver electricity to the customer. Second, while the connection cost is a barrier for poor households, they can afford to pay for electricity once they are connected. Even the poorest households, with an ability to pay of US\$1/month, could afford the cost of the typical electricity bill. A modest household with a consumption of 15 kWh/month would spend about US\$8–10 per year at prevailing rates. In sum, people can afford to pay for a much higher value added service such as electric lighting, with the benefits of more light, less pollution, and more convenience.

Because of the last mile effect, the connection rate has grown very slowly. After electricity becomes available in an area, only about 20 percent of customers get metered connections in the first year. This percentage grows very slowly, at a rate of about 10 percent per year. It takes three years for half the households of an electrified town to have access to a metered connection.

One way to address the last mile paradox is to provide people with the necessary microcredit to pay for the cost of connection. EEPCo has carried out trials that reveal that granting concessional loans to customers has made the connection more affordable and thus has increased the pace of connection. A few years ago, EEPCo offered five-year, interest-free loans, later reduced to two-year loans. The pace of electrification accelerated. Unfortunately, the concession of those loans consumed considerable amounts of the utility’s working capital, which needed to be channeled to the backbone of the rural electrification program.

The GPOBA Intervention to Address the Last Mile Paradox

The GPOBA project was designed to deal with the last mile paradox and to reduce the cost of electricity for poor customers. Its main objective is to accelerate the pace of connections in rural towns and villages with grid access, by assisting EEPCo in its program to finance the cost of the connection fee.¹ A grant from GPOBA covers EEPCo’s costs of financing the loans extended to poor household customers. In addition, the GPOBA grant will finance the cost of providing two energy-efficient CFLs free to poor households. Those CFLs will be delivered as part of the connection package, both to ensure an affordable bill for

Table 1. Electricity Usage With and Without CFLs

Appliance	kW installed	# of units	% frequency	Hours per day	Monthly consumption (Wh)	% Usage without CFLs	With CFLs	Savings
Lighting	40	2.6	0.97	3.5	10,920	73.51%	18.38%	55.13%
Torch	10	1.2	0.53	0.1	36	0.24%	0.24%	
Radio Cassette	20	1.0	0.37	1.0	600	4.04%	4.04%	
TV	80	1.0	0.02	1.0	2,400	16.15%	16.15%	
Small Radio	10	1.0	0.41	3.0	900	6.06%	6.06%	
Total	NA	NA	NA	NA	14,856	100.00%	44.87%	55.13%

households and to promote energy efficiency. Energy efficiency helps poor customers lower their electricity bill, while reducing the utility’s financial losses in serving the poorest customers (since lifeline rates are below the cost-to-serve). If customers use efficient lamps, such as CFLs, their total bill may decrease by 55 percent, as shown in table 1. This makes energy more affordable to the poor and reduces the subsidies EEPCo currently provides to sell energy to those customers at lifeline rates: a win-win situation for both parties. Moreover, it creates some leeway for the utility to increase tariff rates and break even when serving rural customers.

The GPOBA intervention was originally designed as part of the World Bank’s Second Electricity Access Rural Expansion Project (EAREP II), which benefits from a US\$130 million loan from IDA. However, subsidies are being made available in all of EEPCo’s grid-electrified area, not only in the EAREP II project area. Within this framework, GPOBA is providing a US\$8 million grant,² which will enable EEPCo to connect and provide loans to 229,000 customers, representing a population of 1.1 million people. Every time EEPCo provides a metered connection to a household customer, including two CFLs, and provides a five-year loan, it is entitled to receive a payment of US\$35 from GPOBA; upon verification of and opinion on,

outputs and service delivered, by an Independent Verification Agent. The loan to be granted by EEPCo will be 80 percent of the estimated cost of connection. Customers will pay a 20 percent upfront fee when applying for the connection. The balance of the loan will be divided into 60 equal monthly installments of US\$1. Repayment of the loan will be rolled into the electricity bill.

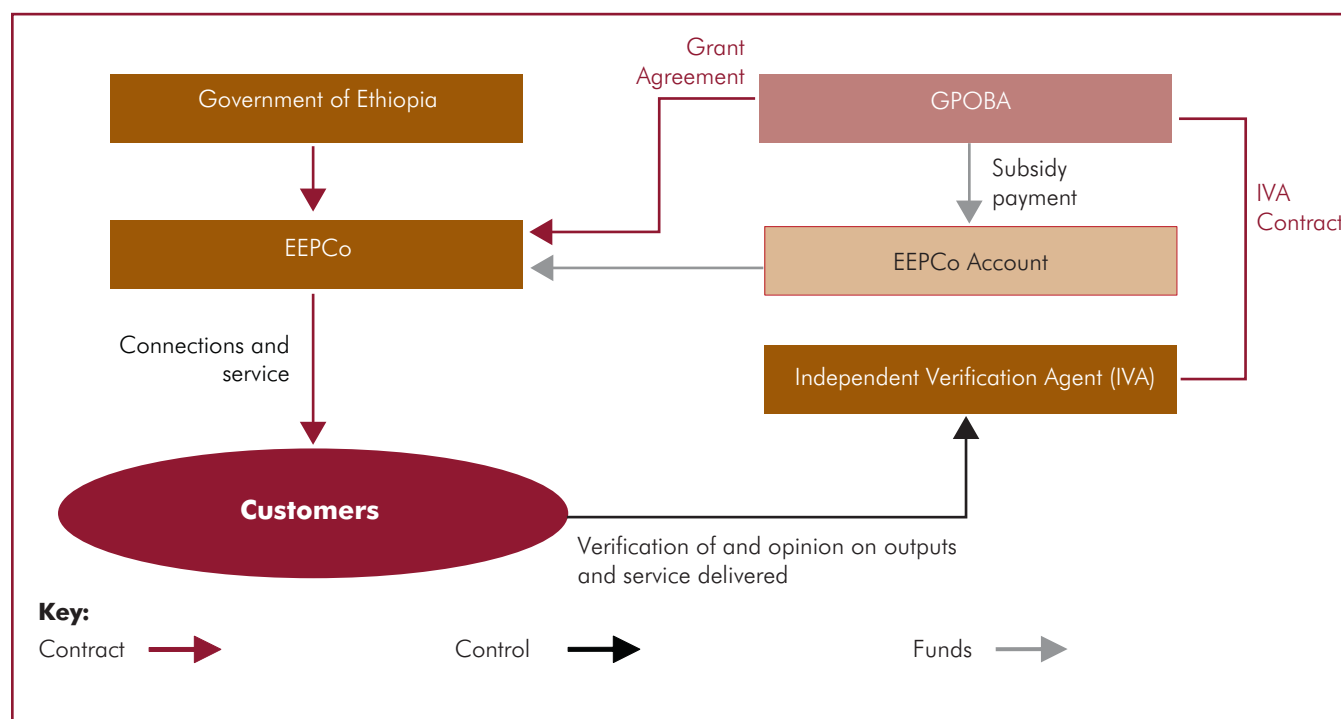
In the absence of reliable means-based poverty tests, all customers would be eligible to receive the loan. However, to provide some form of targeting, it was agreed that the connection with concessional financing would only be available one year after the village had been electrified. The assumption is that customers who could afford to connect would have requested the connection in the first 12 months, before concessional funding was made available.

The Road Ahead

This GPOBA project is about to go into effect, thereby triggering disbursements. Some lessons learned and considerations for future interventions include the following:

- Enhance research on willingness to pay for the connection and desired terms and conditions

Figure 1. Project Arrangements



of the loan. GPOBA used a five-year loan tenor, based on the utility's previous experience. However, if the loan duration could be reduced, more customers could be connected with the same amount of resources. Field surveys are being carried out to determine the most convenient terms of the loans that are able to attract new customers. To better address the nature of the financial incentives, an experimental approach is now being conducted. It consists of a series of voucher-led experiments at the household level, to evaluate the feasibility and the effectiveness of subsidies for connection fees and the purchase of CFLs. Vouchers are distributed through a "lottery" system. A survey of the same households will be implemented a few months later to measure differences in the pick-up rates between households that have received vouchers and those that have not. The survey will assess the extent to which households are responsive to different levels of financial incentives for their decision to connect to the grid or to buy CFLs.

- Increase the performance-based funds, along the lines of the GPOBA approach, to speed up the pace of connection. Despite its considerable size, the GPOBA grant alone will not provide enough funds for the utility to connect all the customers who cannot afford the connection fee. GPOBA will support about 75,000 households per year,

for the first three years only. EEPCo is connecting about 300,000 to 400,000 customers per year. Assuming that half of these will still need some financial support, the funding for connections must be tripled, at minimum. This could be achieved by using concessional funds from new projects funded by IDA to top up the GPOBA resources, for example. In the design of future electrification interventions in rural Ethiopia, the possibility of creating a performance-based mechanism similar to the one currently funded by GPOBA is also being considered. GPOBA has a key demonstration effect role to play, paving the way for larger accelerated connection programs in Ethiopia and in other countries.

- ¹ The cost of connection is defined as the costs of a drop wire, an additional pole (if necessary), a meter, circuit breakers, and two energy-efficient bulbs, as well as installation costs and administrative expenses. What is being called connection cost, for purposes of the OBA intervention, excludes any upstream investment in the expansion of subtransmission or transmission networks.
- ² The GPOBA grant draws on funds from the United Kingdom's Department for International Development and a Multi-Donor Trust Fund funded by the Swedish International Development Cooperation Agency and the Australian Agency for International Development (AusAID).

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