

A Tale of Two Workshops

The so-called aught decade (2000 to 2010) was anything but “naught” when it came to recognition of the unmet demand for access to adequate, reliable electricity service by urban and peri-urban poor communities in developing countries. By 2009, a body of literature (see Appendix) based on international research, workshops of practitioners and policy makers, and pilot projects provided numerous examples of successful solutions underway. Results showed dramatic increases in the numbers of such communities reliably and safely electrified (i.e., millions of households) along with significant reductions in losses of distribution companies (40 to 60% or more) and resulting benefits to other service recipients and other electricity consumers from the dramatic reductions in usage (on the order of 40%) in the many communities where theft of power and/or non-payment was formerly the only answer to access to basic energy services.

The decade culminated in 2009 with two Africa-oriented events, one in Mozambique (the African Electrification Initiative of World Bank et al.) in June and the other in Nairobi (the kick off meeting of the urban electrification component of the UN Habitat’s Global Energy Network for the Urban Settlements or GENUS) in October. These events brought together practitioners, government officials and development organizations (i.e., donors and NGOs) for ample discussion of issues and solutions as they have developed in different contexts around the world.

The concentration on the African situation – particularly sub-Saharan Africa – brought out significant differences between the approaches taken in Africa vs. other regions and in the results achieved. In other regions, the emphasis is firmly placed on “non-technical loss reduction” which is “industry-speak” for elimination of theft, graft and corruption as well as improving commercial reconnaissance practices. There is a further recognition that low income consumers comprise a “base-of-the-pyramid” (economically) that represents a market segment that can be “tapped” and that efforts to make electricity more affordable to this segment can not only reduce theft but improve socio-economic conditions (thus turning a vicious circle into a virtuous one).

In contrast, prepayment electricity metering and collection systems dominate African electrification efforts in urban, peri-urban and rural areas in most cases regardless of income levels of the communities served. In fact, African distribution companies have adopted prepayment to an extent that is unprecedented in other regions. Despite its high initial costs, prepayment is popular in Africa because it vastly reduces the opportunities for internal corruption and the costs of billing, collections and disconnections and virtually eliminates the sizeable problem of non-payment regardless of the income level for which it is made available but only as long as theft does not become rampant.

Mostly positive experiences with prepayment are reported throughout Africa, depending on when the systems were adopted and what type of technology was selected. In other regions, prepayment is becoming recognized for these same benefits but also for the additional feature that prepayment allows customers to control use of electricity to meet their budget limitations (reducing the temptation to steal instead). In addition,

distribution companies in concert with regulators and the meter suppliers have evolved the design of prepayment meters to make them far more theft proof and even to use them to deliver social welfare payments or limit the current (amperage) or watts delivered (e.g., so that the customer can qualify for a more affordable tariff).

The variations in approach seem to arise from differences in “starting conditions.” While slums are common to almost all developing countries, in Africa urban in-migration is just picking up steam while Latin America and Asia have far greater proportions of their populations in cities (on the order of 70 to 90%, depending on the country). Electrification of informal areas is lagging in Africa while other regions have “been there; done that.” Of course much was learned from the many failures along the way. Problems were redressed and much more integrated approaches were instituted. These are based on four basic concepts: 1) a social compact (consumers promise to pay their bills and the distribution company will deliver high quality, reliable power and vice versa); 2) affordability for low income consumers (so that they do not have to resort to theft or doing without); 3) anti-theft practices and technologies (just in case); and 4) staying in the community for the “long haul.” Prepayment is seen as a tool to help low income customers with affordability (and controllability of consumption so that available budgets are not exceeded).

Meanwhile, Africa’s starting reality is that in most regions it is still facing major electricity supply shortages, low connectivity (access) in both urban and rural areas, poor commercial systems within the electricity distribution companies, and inadequate cost recovery. In tandem, government ministries and the newly instituted regulators have focused on rural electrification (RE) as their near- to mid-term priority, leaving efforts to “infill” electricity supply in slums and peri-urban areas to the distribution companies without giving them incentives or actionable directives to do so. Losses comprise a range of problems, including the corruption mentioned above. A large source of loss is theft by illegally connected consumers and meter bypass by legally connected customers. Theft and non-payment occurs in all customer classes (industrial, government, commercial, and residential including the poorest families) to some extent. Many African distribution companies experience extensive losses due to theft, including from informal or illegal settlements in urban and peri-urban areas. Yet, to date, efforts to stem these losses have not been effective. Safety issues due to poor internal wiring and illegal connections are another major issue to be addressed when starting to improve access to safe, reliable and legal sources of electricity.

The past focus of donors and governments has largely been on RE because of the extremely poor access outside major cities. As a result, RE programs are much more advanced. In fact, the trend has been to set up separate systems for promotion of RE (with a rural electrification agency having separate funds and authority from the regulator and distribution companies). RE is seen as a social development “program” while urban electrification (UE) is considered “business.” Recognition of the problems faced by informal settlements and the resulting havoc to the rest of the urban supply system is only just beginning. An effort similar to that used to improve RE is needed to resolve the barriers to sustainable UE.

Major issues of overall viability of the electric sector still loom large in many countries. The most notable are technical losses (indicating poor infrastructure) and commercial losses (indicating poor commercial systems and theft). Poorer cost recovery in general, whether from unrealistic return on investment reflected in tariffs, is also still a barrier to investment in many African countries. It is unrealistic to expect major investments in such low income environments without adequate regulatory structures and incentives and some assurance that the investment will lead to increased net revenues for the company.

Before African electricity-distribution companies can move on to the four concepts above, there is a need for government and regulators to 1) recognize that they have an urban/peri-urban problem that can be solved, 2) overcome the limitations of power supply, inadequate infrastructure and commercial systems and practices, and cost recovery, and 3) build proper incentives and cost recovery mechanisms into concession contracts to deal with non-technical losses. The strong base already gained in prepayment systems can be put to better use in urban and peri-urban electrification. The example of South Africa's adoption of prepayment and anti-theft actions illustrates how the problem might be attacked. See Box below.

South African Example: Improved Access, Loss Reduction and Safety

South Africa is no exception to the widespread use of prepayment and reports an overall reduction in non-payment to virtually zero where prepayment has been implemented, bringing overall non-payment to around 15% (still unacceptably high but politically hard to reduce further). In fact, ESKOM of SA is the largest global user of prepayment and has become the "standard" setter for such systems worldwide. Where ESKOM (and some of the municipal distribution companies) differs markedly from other African countries is in its extensive use of anti-theft technology and techniques throughout its system. It has upgraded its commercial systems and implemented data mining, monitoring and check metering to identify and eliminate theft as soon as possible after it begins to occur.

In addition, on the consumer side, Eskom has made access to electricity easier. Tariff revisions provide an alternative for low income families to connect without having to pay a connection fee by rolling the cost into the tariff. Ready boards (an integral electrical panel containing outlets, a light, and a circuit breaker for safety) are made also made available to circumvent structural problems encountered in the structures of very low income families. These investments and actions have made it possible to keep ESKOM's total losses stable at an impressive 6.6% (of which 2.2 percentage points are non-technical losses) instead of the 50% increase that was occurring over the 5 years prior to implementing comprehensive measures. ESKOM's overall theft reduction strategy parallels those taken by distribution companies in Latin America (LA) that have been highly successful in reducing non-technical losses dramatically.

Prepayment can be an effective component in a larger program to improve access and collections while keeping non-technical losses down. Newer features, such as the split prepayment meter, can reduce theft while also improving collections and reducing O&M cost and thus improving the overall financial position of the company.

Starting with simple – and possibly temporary solutions – may be a necessity when converting large informal slums from illegal to controlled access to control theft. The first step might be as simple as locating meters where they are easily visible and enclosing them in plastic to reduce likelihood of meter tampering. A variety of approaches has proven effective in other regions and could be adapted to the SSA environment. But, without adequate regulatory frameworks and incentives for distribution companies to address their loss problems, their use may just lead to more “failed” attempts and add to the impression that slum electrification is a non-starter.

Finance for necessary investments is a crucial issue for getting started. Companies can start like EDM in Mozambique did: self financing a pilot to prove effectiveness and sustainability and then resorting to commercial finance. If they lack the initial resources, development loans (sectoral and others) could include finance and technical assistance for urban “infill.” Combinations of World Bank GPOBA, PPIAF and other technical assistance funds from donors might also be drawn upon to prove concept and approach. Carbon credit for the substantial energy savings can also be justified in cases where theft was rampant.

If new distribution systems are necessary, this is the time for decisions on anti-theft technology in addition to prepayment systems. Companies might decide to go the extra mile to get anti-theft protection, adopting designs tested elsewhere such as Latin America. Drawing on their experience will help to match the level of technology (and cost) to the level of expected theft and non-payment.

All of the above must be fit into the context of the particular country, i.e., the starting conditions referred to above, before a robust and actionable plan for tackling urban and peri-urban electrification can be implemented. There is much to do and the benefits from tackling this gap in electrification will be great. The “teen” decade should be dedicated to filling the urban electrification gap for the long term.

Appendix

URBAN and PERI-URBAN ELECTRIFICATION PROCEEDINGS, REPORTS and STUDIES

- 1) Slum electrification report: Innovative Solutions to Slum Electrification in 2004. The report is available for download at http://pdf.usaid.gov/pdf_docs/PNADB219.pdf
- 2) First practitioners' workshop: Proceedings from September 2005 workshop in Salvador, Brazil. Meeting the Energy Needs of the Urban Poor: The Case of Electrification. The report is available at http://esmap.org/filez/pubs/1252007111830_ESMAPMeetingTheEnergyNeeds.pdf
- 3) Second practitioners' workshop:
 - a) Proceedings: Improving Electricity Service for the Urban Poor, workshop was held in São Paulo, Brazil from December 4-7, 2007 The Proceedings can be found at:
http://www.usaid.gov/our_work/economic_growth_and_trade/energy/publications/EGAT0001.PDF
 - b) Presentations from the 2007 workshop can be viewed and downloaded from the Procobre website using the following URL:
http://www.procobre.org/procobre/cobre_para_especialistas/improving_electricity.html
- 4) United States Agency for International Development, Transforming Electricity Consumers into Customers: Case Study of a Slum Electrification and Loss Reduction Project in São Paulo, Brazil, Washington, DC, February, 2009 <http://www.leonardo-energy.org/transforming-electricity-consumers-customers-case-study-slum-electrification-and-loss-reduction>
- 5) Patricia Márquez and Carlos Rufín (eds.), Utilities at the Base of the Pyramid (Cheltenham, England, and Northampton, Massachusetts: Edward Elgar Publishing, **forthcoming 2010**). See Chapter 10: "Challenges and Opportunities in Electricity Service Provision for Urban BOP Communities," Lawaetz, Simone and Connie Smyser.
- 6) World Bank Africa Electrification Initiative (AEI)
 - a) AEI Website (a resource for scaling up access to electricity in Africa):
<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/EXTAFRREGTOPENERGY/0,,contentMDK:22404873~menuPK:6613283~pagePK:34004173~piPK:34003707~theSitePK:717306.00.html>
 - b) AEI Workshop, Maputo, June 2009. See Session 5 on Grid Intensification.
<http://www.fema-africa.net/en/news-&-events/workshop-of-african-electrification-practitioners-2009-maputo-june-9>.

7) United States Agency for International Development, [“Optimal Feeder Level Connection Training and Field Support Toolkit,”](#) November 2009
www.energytoolbox.org *This covers the technologies used to reduce theft and improve access and payment performance and is in the form of technology overviews, 5 case studies (Ampla and Eletropaulo (Brazil), DESCO (Bangladesh), ESKOM (South Africa), UEDC (Georgia), and Reliance (Mumbai), and PPT presentations covering the whole topic.*

8) UN Habitat, GENUS, [“Promoting Energy Access for the Urban Poor in Africa. Approaches and Challenges in Slum Electrification”](#), 26-28 October 2009, Nairobi, Kenya. *Workshop report and presentations*
[\[http://www.unhabitat.org/list.asp?typeid=3&catid=631\]](http://www.unhabitat.org/list.asp?typeid=3&catid=631)

9) UN Habitat, GENUS, [Slum Electrification Programmes: An Overview of Global versus African Experience](#), Report by Connie Smyser. March, 2010.
[\[http://www.unhabitat.org/downloads/docs/7803_91408_Overview%20of%20Slum%20Electrification%20in%20Africa.Final%20report.pdf\]](http://www.unhabitat.org/downloads/docs/7803_91408_Overview%20of%20Slum%20Electrification%20in%20Africa.Final%20report.pdf)