Session 2: Offgrid Business Models

Tuesday, June 9, 2009

Many national utilities in SSA are unable to expand their grid fast enough, due to financial, technical and capacity constraints. Even where this is not an issue, social fairness requires solutions for remote regions with dispersed users who cannot be connected to the national power grid at reasonable costs (only 7% of SSA's rural population has access to electricity today, compared to 23% overall access rate in the region). For such cases, offgrid options - such as village hydro power, diesel generators or solar home systems (SHS) - are an important alternative for providing basic electricity access at relatively low cost.

As offgrid technologies are mature and costs are coming down, the interest of public and private players across SSA in offgrid electrification is growing. However, past offgrid electrification efforts have often been slower and less sustainable than expected. This is because they require appropriate (private sector) business models and (public sector) market development schemes which differ from traditional grid extension approaches. National utilities and governments are often unfamiliar with these alternative business approaches. Session Two presented examples of successful (often public-private) business models for the most important offgrid market segments: (i) solar home systems and battery charging for dispersed households, and (ii) diesel and hydro power for village grids and productive uses. The growing interest in offgrid options for SSA was confirmed by the AEI workshop, where offgrid electrification was rated the issue of highest import by the participating practitioners.

The appropriate business models for electrification vary with technology, user segment and market stage. Table 1 presents the most relevant offgrid technologies and the corresponding presentations of Session Two. Table 2 gives and idea of the vast diversity of business models which have been applied for electrification to date (with varying success).

Table 1: Prevalent offgrid technologies and presentations of Session Two.

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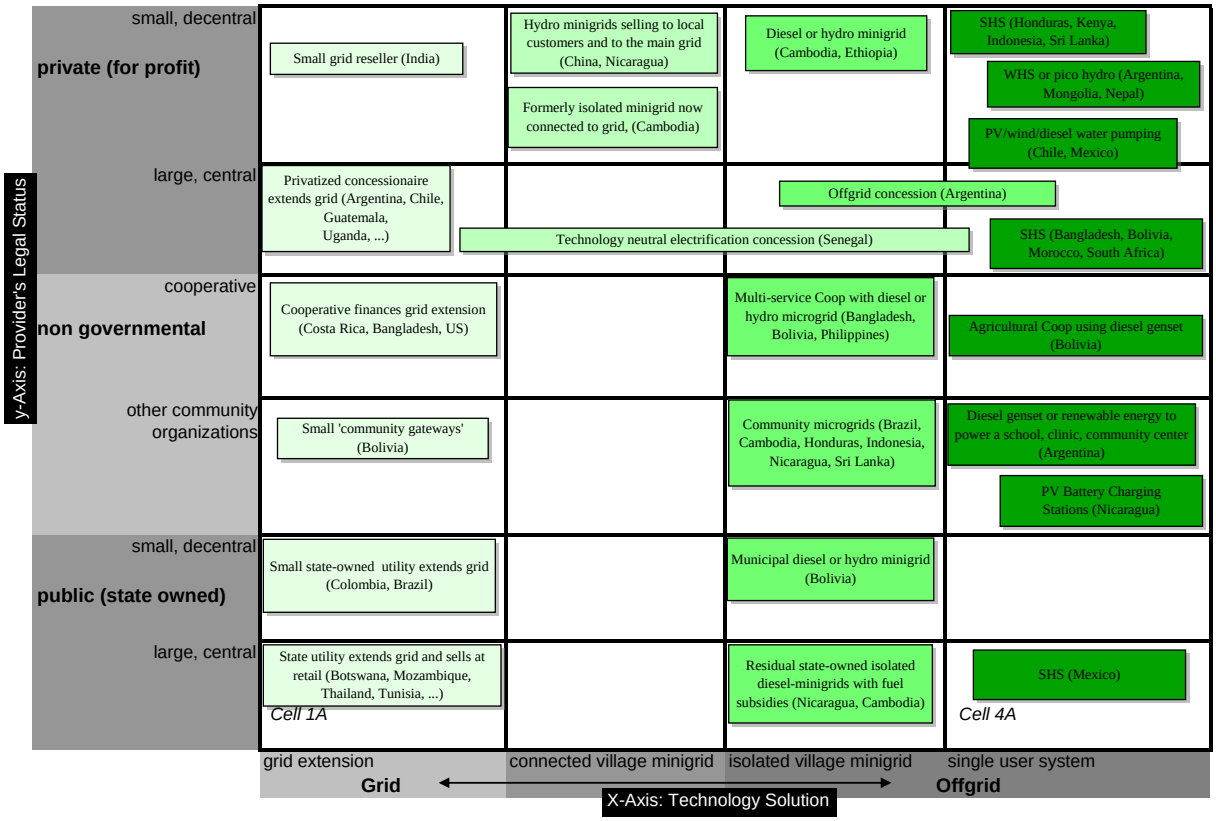
OFFGRID OPTIONS	*Energy Source:* **Diesel**	**Water**	**Sun**	**Wind**
Typical User: a **person**			**Battery charging & Pico PV**: Mr. Sow	
a **household**			**SHS**: Mr. Adelmann	
a **village and/or SME**	**Diesel Grids**: Mr. Touré	**Village Hydro**: Mr. Raats		

Table 2: Overview of electrification business models.



Diesel Generators are the most widely spread offgrid technology in use today. They are easy to install, have low investment costs and are often the quickest solution for providing villages with 4-6 hours of lighting or powering productive uses such as water pumps for irrigation. However, due to volatile and increasing fuel prices, their operation in rural areas is often unreliable in the long run or requires ongoing subsidies. Besides, the potential of diesel village grids can be hampered by the fact that the (often informal) operators lack financing and/or technical capacity, and are inadequately regulated. In Guinea, the national electrification strategy supports both diesel and renewable-energy based village power by creating "mini concessions" and strengthening local operators via training and partial investment subsidies (30% in the case of diesel). The program has created about 30 new village power operators to date and has reached over 6,000 new households with diesel grids (at about 150US$ investment cost per household), pico hydro grids (at about 900US$) and small solar home systems (about 300$ per household).

Hydro Power is the best way to power village grids and/or productive uses in cases where local hydro power supply (i.e., the potential of a river nearby) meets local power demand of a similar magnitude. In such cases, local generation costs can be lower than for the national grid. Therefore, it is advisable to develop all good rural hydro sites as a core element of electrification strategies, even though only a relatively small number of appropriate sites may exist, compared to the enormous total of un-electrified households. Keeping regulatory burdens low and helping private sector developers and (community-based or private sector) operators with training, technology transfer and access to financing (as done by the DGIS/BMZ-funded EnDev projects in Indonesia and Rwanda) are necessary conditions in order to unlock this potential. In sites where the hydro potential is larger than local demand, economic viability can sometimes be reached by charging batteries for dispersed users (in micro and mini hydro plants) and/or by combining feed-in to the grid with access for local villages. Often, the viability of a hydro development hinges on a few local productive uses with regular daytime energy needs. In such cases the typically high commercial risk of rural productive SME directly translates into a cost recovery risk for the local energy provider.

Solar Home Systems are the most universally applicable renewable energy solution for dispersed users, as they are less site-specific than hydro or wind. A typical SHS of 20-100 Wp can power 2-6 lights, radio, TV, cell phone batteries and small fans. There are some 3M SHS installed worldwide, mostly in Asia. Prices in SSA (typically 600-1000 US$ for a medium sized system) are much higher than in other regions (Asian SHS of the same size cost about 300-500 US$). Several promising new business models may be well suited to change this situation and allow for faster scale-up of the SSA solar market. They include (i) the down-sizing of systems towards sizes under 20Wp (which is possible due to significant efficiency increases and price drops of LEDs and may allow SHS end-user prices well under 200 US$ in SSA), (ii) modular SHS (which can be bought step by step, allowing clients to adapt payments to their typically small and seasonal savings) and (iii) fee-for service models using pre-paid meters or battery charging stations.

Battery Charging and solar lanterns are the logical complement for SHS at the low-cost end of the market. Most of the households without electricity belong to the lowest income strata – they are part of the “bottom of the (income) pyramid” and can not afford traditional offgrid systems even where governments decide to subsidize those in part. For these households, battery charging stations (powered by grid, diesel, hydro or solar) and low-cost solar lanterns are affordable alternatives to wick lamps, candles and kerosene – for which even the poorest households often spend 2 to 5$ per month. The rapidly falling prices for LED and intelligent battery charging circuits will soon allow for end-user sales prices of high quality solar lanterns (also called “PicoPV” in two recent World Bank and GTZ pilots) well under US$50. At this point such small systems would beat the specific lighting cost of most traditional devices and become affordable for a large part of the poorest segment of the “access market” (possibly in combination with small microcredits). A business model from Burkina Faso starts with energy kiosks in which users can charge batteries and lamps instead of buying kerosene – and after a while some of the clients can afford their own module for charging it at home. However, there are many low-quality PV lamps on the market in SSA today,so that quality control as well as market development support will be needed to protect customers.

Presentations:

Offgrid Introduction - Issues and Options. Kilian Reiche, Senior World Bank Consultant:

Africa SHS Markets.Prof. Peter Adelmann, University for Applied Science, Ulm:

Battery Charging and Pico PV: Local View. Souleymane Sow – SEED Winner 2009.

Hydro Village Grids. Marcel Raats, SenterNovem.

Village grid – Local View: Design and Implementation Challenges. Nava Toure, Director of Decentralized Rural Electrification Office (BERD), Guinea.