- As most rural users don't have bank accounts or a regular income, payment collection can be a hard task. In this case, the agent in charge of the mini-grid or Community Information Centre has to recover the payments and establish a trusted relationship with the community. The use of mobile payment for charging services could also ease the transaction
- Strong training and education are needed for the Community Information Centre agents. As they operate these centres, they need basic technical skills to ensure maintenance of the centres, but also ensure a good ongoing relationship with the community.
- The operation and maintenance of mini-grid system has to be carefully performed, to avoid power outages to ensure that customers are receiving the power they are paying for. In rural areas, a disruption in such services could trigger backlashes from community.

Next Steps

The next phase would be to provide enough power to supply the entire market, the school, the local college, a future health facility and preferably all the households in the village. Grameenphone is also thinking of expanding the mini-grid from solar use only (as the payback time is very long), to the use of a biomass plant.

Appendix 2

The Ecology Foundation Model

By Declan Murphy, CEO of The Ecology Foundation

Description

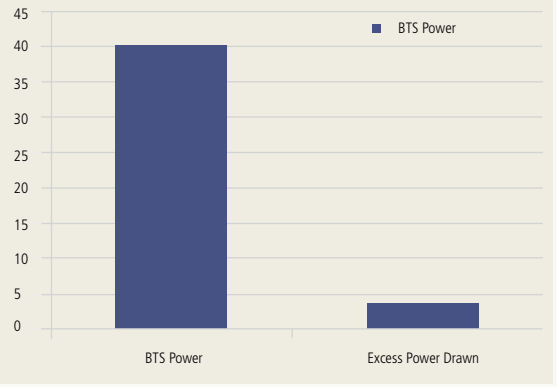
The Ecology Foundation (TEF) has been developing models for sustainable and affordable micro power since 2008 and has partnered with GSMA to pilot systems in 2011. TEF is planning on the installation of a standardised base station interface unit at each BTS site that will be operated by a local Energy Agent, running this charging station. Site selection will be performed with the operators support according to the availability of excess power, the proximity of community and the teledensity.

2 models are being investigated based on the community proximity:

- The charging shop is located at the BTS site (distance below 2km)
- The charging shop is located in the community village (distance over 2 km). In this case, the agent in charge of the services would charge batteries at the BTS site and then deliver it to the village

The business case implemented by TEF is planning on extracting 10% excess generation capacity at existing operator base stations and deliver this direct to off-grid communities. With daily average BTS generated power, the power drawn from the BTS would be up to 4kWh per day. The system would be based on the use of mobile money where a centralised system is granting a certain power amount to the agent.

Figure 29: Excess Power Drawn from BTS



Source: The Ecology Foundation

The community's first usage for power is cell phone charging, domestic lighting and micro business, all of which in turn support the usage of local base station communications traffic.

As the current cost of energy in off-grid areas is very high (from US$0.25 to US0.$75), the goal is to be able to provide affordable cell phone charging services from US$0.15-US$0.20 or even free of charge with airtime purchase.[43]

43. This model is already in use in countries such as Cambodia, where battery charging is free when purchasing airtime

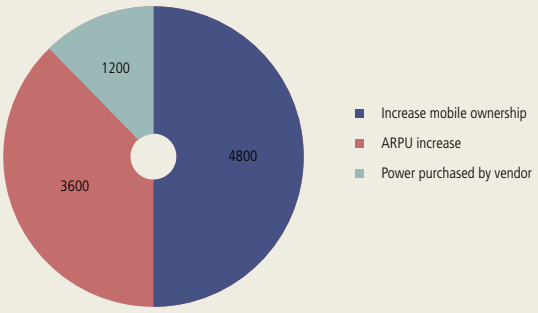
Benefits from CPM

Mobile Operators

The cost to operators is minimal, with minimum installation time required. The incentives of TEF are put on a minimum risk or operational impact on the base stations, and an improved community support to protect base stations. In return, the revenues of operators would rise thanks to 3 factors:

- 20% increase community mobile ownership
- 10 to 20% ARPU increase due to the availability of charging solutions
- Revenue from the power purchased by the charging station owner (0.40 kwh)

Figure 30: Revenue Increase from Charging Services Per BTS site (US$)



Source: The Ecology Foundation

This could led to a US$9,600 revenues per BTS, scalable across multiple operators site. Scaling across the operators country BTS and assuming 200 BTS deploying charging stations, this amounts to US$1.8 Million.

Vendors

Vendors have multiple sources of income:

- Sales of the BTS Installation Kit
- Margins on products sales (batteries, lamps)
- Revenues from the power the agent buys to the vendor (US$2-3 per kwh)

Table 11: The Steps to the Implementation of Charging Services

Step 1.	TEF and Operator select suitable off-grid (or sometimes grid connected) base station sites.
Step 2.	TEF appoints and trains a local "Energy Agent"
Step 3.	Operator installs the TEF standardised base station interface unit.
	This is a sealed access unit, which is mounted on the inside of the base station perimeter wall/fence. There is a single contact engaged at the BTS electrical distribution board. TEF monitors power usage at interface unit and man in BTS, with auto shut down if the BTS power requirement becomes critical. This ensures the BTS power usage always takes priority.
Step 4.	TEF delivers community energy sales kiosk, (approx. 6m^2 with devices for multiple phone & other battery charges)
Step 5.	TEF delivers energy services to community as follows…
	Individual/multiple phone charging. (from $0,15 to $0.00 fee) Airtime sales (charging free if bundled with airtime) Household electric lantern & battery exchange service ($3 per month, 10+ charges)
Step 6.	Community airtime usage and mobile handset penetration increases by 10-20%

Source: The Ecology Foundation

Schedule

The Ecology Foundation is conducting pilots in 2011 with an expected mass rollout in 2012. It is hoped that most off-grid base stations will have the standardised community power module fitted within a short period.

Appendix 3

Healthcare Opportunity from Community Power from Mobile

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The Idea

We have all heard statistics concerning vaccine-preventable deaths – over two million each year – in developing countries. Although shortage of vaccines may be one key reason, another is that many vaccines must be kept at a prescribed temperature to maintain their potency. Typical distribution models have relied on delivering vaccines to remote destinations in insulated cold-boxes. An efficient "cold chain" normally ensures that temperature-sensitive vaccines remain effective, and any disruption of the cold chain severely impairs these prevention efforts.