

## **Upscaling Mini Grids for Least Cost and Timely Access to Electricity Services**

### **An Action Learning Event- Field Trip to Entasopia**

The World Bank's Energy Sector Management Assistance Program (ESMAP), and The Climate Investment Funds (CIF) supported by the UK DFID Global Mini Grids facility, hosted a 5-day action learning event on May 23-27<sup>th</sup> in Nairobi, Kenya to enable the environment for the acceleration and upscaling of the deployment of green mini grid systems in rural areas of the developing countries without any access to electricity. Presently about 1.2 billion people currently lack access to electricity which will increase by an additional 40% by 2030. In order to provide electricity in a more effective and timely manner, the mini grids play a critical role in the years to come due to the recent trends in the decrease of renewable energy prices and speed in delivery making this a more viable solution.

During this event, a field trip has been conducted to provide a glimpse of how the mini grids have been operating and benefiting the rural community that once used other means of energy such as solar lanterns or diesel driven motors, etc. The field trip was conducted on May 26<sup>th</sup> with around 60 participants which visited a village called Entasopia which at the time of the field trip had been powering 60 households through a 5.6 kWp solar panel and 17.8kWh battery system that would provide backup power during the evening and night periods. The system was to be upgraded the week after the learning event week to scale up the number of households due to the growing electricity demand in the village by installing another mini grid power station similar in capacity to the original one.

The mini grid system which is currently providing electricity in Entasopia is one of the 25 mini grids operated by SteamaCo, a company which has presently installed and is operating renewable energy micro-grids in several rural communities in Kenya and Tanzania. Using the natural energy of the sun, they work like mini power stations for each village supplying enough energy to run small businesses as well as power TVs, radios and lights in the household. In fact, the viability and flexibility of these mini grid systems is that an additional mini power station of a PV panel and battery packs can be installed within weeks to meet the needs of the community i.e., when there is a requirement of increasing the capacity of the system to address the increase of electricity demand in the community. This approach is very effective since it would be able to deploy the system in a modular form where the declining trends in solar and energy storage prices would be reflected in future installations for a more cost-effective deployment of these mini grid systems.

### **SteamaCo's Business Model**

One aspect of the challenges in deploying mini grids is the fact that since we are dealing with isolated and remote areas, there are various challenges such as operation and maintenance, reliable operation of the system and collecting payments which are actually the hindering blocks for the vast deployment of these systems even though they make economic sense. Especially when the mini grid systems require frequent outside intervention such as fixing technical problems, collecting payments, disconnecting customers with pending credit etc. The innovative part of the SteamaCo mini grid system is that the micro-grids use a cloud-based remote metering and payment system that monitors energy use, lets people pay for power using their mobile phones, and quickly troubleshoot any problems. The data of each household is monitored and managed remotely where information about their credit left is being sent and notified to

the customer by SMS. The unique aspect of this mini grid system is that the software developed by SteamaCo has access to every household through a wireless meter connected to the cloud and have the ability to automatically disconnect and reconnect by controlling the meters through the software. In addition, the bitHarvester hardware developed by SteamaCo comprises of several discrete modules designed for it to be easy to install and set up, enabling the environment for easy and quick installation of the mini power stations.

### **How do the users pay?**

The tariff rate depends on the type of the users where it is classified into two main customer type: residential and business type customers. Typically the customer pay a one-time connection fee of around US \$10 and a charge of US \$1.5-4 depending on the customer type where a cheaper tariff is provided to the businesses that usually consume more electricity. The tariff rate which is at the moment more expensive when compared to the main grid, but is much cheaper than the kerosene lamps, solar lanterns and solar home systems that provide limited functionality and accessibility. The company agent meets the community on a regular basis in order to get feedback to develop a tariff structure that best suites the needs of the community.

### **Impacts**

Several positive feedback have been provided by some of the beneficiaries in Entasopia where before the arrival of the mini grid system, several business had to share their gensets to operate their business which was not only inconvenient but also expensive and hard to maintain. With the mini grid system in place, the fuel pump operator would be able to serve the customer in a more efficient manner where he wouldn't require to turn on the expensive genset whenever he would require to fuel a customer. Also, a welder wouldn't have to wait for the genset to be available to run his business.

These are some of the examples that are making a difference where mini grid systems are benefiting the community and would have immediate impacts on the potential mini grid sites in the future. Deployment of these systems would certainly require regulations and policies for upscaling these grids but would also require various proven business models for the consistent and steady deployment of these systems where this field trip provided an example of the functionality of the mini grid system to provide clean and reliable energy as well as replicability with another identical mini power station to be installed in the following week.