APPLIED ENERGY LAB BRIEF

JUNE 2020

Smart Power Myanmar

Productive Use Conversions

INSIGHT: Productive use conversions require tariff concessions and financial/technical assistance to quickly increase the utilisation, revenues and viability of mini-grids.

One of the biggest barriers to mini-grids' profitability in Myanmar is that rural customers' electricity consumption is low, resulting in low utilisation rates for mini-grids. Insufficient demand creates a very real risk for mini-grid developers seeking to grow revenues and sustain viable mini-grid operations over time in the future. With the goal of finding scalable ways to increase plant utilisation, through our Applied Energy Lab, Smart Power Myanmar is assisting developers in select locations to predict demand, optimise energy usage and promote viability through Proof of Concept testing.

Diesel-powered generators are ubiquitous and power the majority of businesses in rural Myanmar. In mini-grid programs worldwide, there is a general assumption that conversions from diesel-powered generators to mini-grid-powered electric motors represent the 'low hanging fruit' that capitalise on a business' existing skills, equipment and markets to quickly increase the revenues and utilisation of mini-grids. Smart Power Myanmar set out to test whether conversions do indeed play a significant role in increasing utilisation and whether they can become a source of stable revenue for mini-grid developers. Between January and October 2019, Smart Power Myanmar identified and assessed 23 potential conversions in eight villages across Tanintharyi, Magway and Mandalay Regions. We offered business planning and financial assistance to promote conversions while tracking mini-grid energy consumption. SPM provided MMK 14.5 million (US$ 9,700), of which 90% was direct financing support for conversions. The remaining 10% was provided in the form of contracted technical support for more complicated conversions.

FINDINGS: Conversions only had a modest impact on utilisation rates and revenues. The data we gathered reveals:

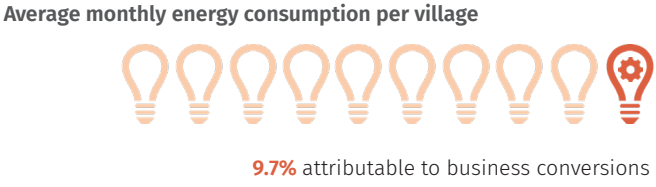
- **Converted businesses added an average of 3.3 kWh per day to the mini-grid load, around four times higher than the average daily consumption per household connection.** However, with only two to three businesses per village converting (mainly carpentry, mechanical workshops and irrigation businesses), the volume of the additional load only increased plant utilisation by 10% (Figure 1).

- Two of the eight villages had no viable businesses suitable for conversions.

- **High tariffs and upfront connection costs were the main barriers to conversion.** Analysis of business plans found that 6 of the 23 (26%) potential conversions would not deliver a return on investment - the majority were rice hullers and oil millers with the potential to convert equipment from 5-11kW. These business owners found that monthly electricity costs at the set MMK 330 to 450 (US$ 0.24 to 0.32) tariff rates would exceed their monthly diesel fuel expenses. Tariffs had to be reduced to MMK 300 (US$ 0.20) for businesses to break even in their business plans.

- **Tariff discounts, in combination with financial/technical support, incentivised conversion.** Recognizing that tariff discounts may have this impact, Smart Power Myanmar adjusted its support to include tariff negotiations and contracted technical assistance. Two larger businesses, a water distributer and rice huller, representing the largest productive use conversion opportunities in their respective villages, benefitted from this revised conversion support resulting in varying impacts on the overall daytime demand on the mini-grids. For the water

FIGURE 1: Additional load associated with converting from diesel



distributor, a tariff discount of 35% made the price of mini-grid electricity competitive with diesel fuel at the time. Conversion halved energy costs while increasing business output volume and revenue by 30%. Although beneficial for the water distributor, the conversion resulted in only a 3% increase in the village's mini-grid utilisation, resulting in an additional MMK 1,199,616 (US$ 800) per year in revenue for the developer. For the rice huller, after negotiating a tariff reduction of 33%, the mini-grid's utilisation increased 60% producing an additional MMK 1,124,640 (US$ 750) per year in revenue for the developer from this business alone. Although the rice huller's business income remained about the same, the greatest benefit to the owner was that his wife could now also easily operate the equipment.

> *The tariff rate is too high. The bill for the meter is higher than the cost of diesel. It's easy to run the rice huller using electricity from the mini-grid but, at the moment, it is not cost effective. If the mini-grid company reduced the tariff rate, then businesses could use mini-grid electricity more effectively.*
>
> *- Ko Phoe Zaw, Rice Huller*

INSIGHTS & FUTURE IMPLICATIONS

With this early data from a small number of communities, we have gained the following insights:

1 **The total number of businesses that ultimately invested in conversion was too small to significantly impact mini-grid performance.** The evidence demonstrated that the larger productive use businesses typically found in rural villages - such as hulling and pressing - chose not to convert. Special attention should be paid to the willingness and ability of businesses to convert in the absence of tariff reductions and other conversion incentives when forecasting demand.

2 **Site selection plays a critical role and a clearer, more accurate methodology needs to be developed to help determine whether or not a conversion is actually going to become a mini-grid customer load to help improve demand predictions.** Additionally, further consideration should also be given to the market linkages and value chains for the converted business in order to ensure a long term, stable load.

3 Price points are critical. **Rural businesses with larger potential loads required a tariff discount to proceed with conversion. Developers can incentivise conversions through tariff reductions or rebates that match or beat the equivalent costs for diesel power.** The cost to the developer in not doing so is a loss in revenue as well as a missed opportunity to optimise daytime loads that otherwise would be lost when batteries fill to capacity during daylight hours. There is an additional risk that, without tariff reductions, rebates or other conversion incentives, future business owners may also choose to invest in diesel generators rather than connecting to the mini-grid.

4 **All businesses converting to mini-grid electricity requested financing, demonstrating that affordable and flexible financing needs to be in place to facilitate conversions.** In addition, productive use conversions for agricultural equipment required additional investment in the electrical motor plus technical expertise to design or support the conversion, with sometimes little to no return on investment.

The Applied Energy Lab – in combination with the Energy Impact Fund for financing connections, appliances and productive use – is focused on solving some of the challenges that limit deploying mini-grids at scale in Myanmar. We hope to identify scalable prototypes and promote the sustainability and viability of mini-grid projects while increasing economic empowerment. Our market assessment suggests that the potential viable mini-grid market could be as large as 16,000 mini-grids. Future technical notes will continue to examine the impact and scalability of prototypes that optimise plant utilization and revenue.

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