Concept Note

Improving Energy Efficiency of Rural Enterprises to drive adoption of DRE technologies

Overview: There are over 63 million+ micro, small and medium enterprises (MSMEs) in Rural India, out of which ~35% (~20 million) are highly dependent on electricity to operate their daily businesses. These rural MSMEs operate across sectors such as food & beverage, agri-processing, textile, auto ancillary, cold storage & warehousing, metal forming, etc.

Problem Statement: Millions of productive use enterprises (MSMEs) in rural India use various types of motors to run their equipment and machinery that are inefficient. Some challenges they face:

- High load enterprises (5kw+) and dependent on expensive fuel such as diesel to meet their electricity needs, either due to non-availability of grid connection or unreliable grid (outages, low voltage etc.)
- The energy efficiency of the appliances and motors used by these MSMEs is poor, resulting in high consumption of diesel or grid electricity (their grid tariff is highest across customer categories) - this results in electricity cost being up to 80% of their total operating costs – making their businesses vulnerable to rising energy costs.
- Given the poor energy efficiency, these enterprises are forced to oversize their electricity generation sources (diesel genset, batteries, solar rooftops, grid contracted load, mini-grid contracted load etc.), significantly increasing initial capex and operating costs over the years
- Moreover, the poor electrical windings, design and bad maintenance practices over the years, leads to high maintenance cost of the motors and mechanical equipment they are driving
- ***Low efficiency and other technical issues (such as inrush current) make it difficult for them to connect to reliable mini-grid power (a big revenue loss for mini-grid operator as well)***
- ***For enterprises, wanting to switch to other DRE solutions (such as rooftop solar) to save diesel/grid costs, it becomes difficult due to either loss of motor power or need for oversizing the DRE solution to be able to run in-efficient motors (with high surge, low PF etc.)***

Hypothesis of Impact: Large scale program for replacement of inefficient motors and power tools across energy intensive rural enterprises in India can have large scale impact including:

1. Save millions of liters of diesel fuel and reduce carbon emissions
2. Save millions of units of thermal-powered grid electricity
3. Reduce losses of state grid (enhance overall power factor)
4. Enhance business profitability of rural enterprises
5. **Promote adoption of DRE technologies such as mini-grids, SHS and rooftop solar.**

What can be done?: Large-scale replacement of inefficient motors and appliances that are widely used in rural MSMEs, with cost-effective and super-efficient motor technologies (and/or motor control equipment)

This solution will entail the following steps (not limited to):

- Conduct a detailed technology benchmarking of different types (and size) of motors and power tools used by major energy consuming sectors in rural MSMEs
- Shortlisting the top 5 to 10 uses cases (such as agri mills, carpenters, etc) that are most inefficient, widely used, and have the highest scope of improvement and impact

- Detailing the type of improvements possible (motor replacement, motor repair, adding control devices such as VFDs, or others) with cost benefit analysis
- Shortlisting appropriate super-efficient motor technologies, benchmarking their performance against existing technologies used
- Creating a techno-commercial business case (with ROI) for rural MSMEs to replace the motors (or add control equipment, others etc.)
- Defining a realistic strategy for deployment keeping rural dynamics and nuances in mind (such as affordability, high TAT, maintenance issues, reliance on alternate sources such as DRE, Diesel, rechargeable batteries, etc.)
- Mapping the supply side landscape (global, regional, local technology providers), their product offerings and ability to service the rural market
- Conducting on-ground pilots to prove the techno-commercial feasibility of proposed solutions (and tweak the hypothesis if required) at mini-grid and non-mini-grid villages
- Creating a large-scale phase-wise deployment plan with role of key market enablers such as government agencies, DFIs, financing companies, technology companies with their roles and responsibilities, key risks & challenges, etc.
- Identifying credible ecosystem partners (financiers, govt. agencies, technology providers, DFIs, etc) that can support in scaling up this program aligned to a similar mandate
- Any other critical step missing and necessary as project progresses….

Out of the box thinking

- Assessing the potential to work with end product manufacturers (flour mill, oil expeller mfgs., etc) to improve the design of the productive-use equipment itself (including mechanical and electrical design)
- Creating a marketplace (online/offline) that can bridge the gap between technology mfg. and end users
- Bulk procurement strategies of procurement and deployment across in partnership with technology mfgs. and DRE companies (such as ESCOs)