Nature of India’s Evolving Electricity System – Role of Mini Grids

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Complementary role rather than competition
About CLEAN

CLEAN is a Network of Decentralized Clean Energy Enterprises and organizations

- Unserved and underserved
- Rural and urban
- Electrical, thermal and motive power
- Technology, scale and resources agnostic
- Solar, Biomass, Biogas, Pico hydro, Small Wind etc
- Across business models: Small portable units, Stand alone systems, Micro and Mini grids
- 123 members across the country

Focus Areas:
1. Policy Advocacy
2. Access to finance- for End users and Entrepreneurs
3. Skills and Training
4. Technology and Innovation
5. Networking and Information
6. Markets
7. Measurements, verification, monitoring and evaluation (to be added)
Dynamics of Indian Electricity system

Definition of Rural Electrification?

T&D losses in India are highest in world 26.67 %

Voltage regulation

Quality of power supply and life

DISCOMs ?????/ freebies
Challenges and Opportunities
1. Ageing Infrastructure
2. End user attitude – No more freebees
3. DISCOMs and SERC needs to be pro-active and sense the pulse of people
4. Aspiration of young generation
5. Technology connect for rural livelihood enhancement
Can Sate DISCOMs and Mini Grid players play complimentary role in taking India forward
National Mini Grid policy (Paper Tiger)
UP and Bihar Big Test for electricity access

National Level Mini Grid Policy

1. Lesser chances of clearing - Notion that by 2019 April all villages will be electrified. But we are still optimistic and lobby for same and pushing MNRE to clear it.
2. We had discussion with Secretary MNRE for inclusion of Mini Grids for benchmark cost of rupees 239 per watt. Combine effort of CLEAN, Shakti founda

### Standalone Solar Power Plants/Packs

<table>
<thead>
<tr>
<th>Capacity (kW)</th>
<th>Battery back-up (hrs)</th>
<th>Benchmark Costs (Rs./Wp)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>General Category States</td>
</tr>
<tr>
<td>Up to 10</td>
<td>6</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>Above 10 and</td>
<td>6</td>
<td>90</td>
</tr>
<tr>
<td>up to 25</td>
<td>3</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>61</td>
</tr>
</tbody>
</table>
Mini Grid outreach pan India

CLEAN Mini Grid Players

- 24 Mini Grid players (AC-DC players)
- 1700+ installations
- 5-70kW size
- 70-80 % Utilization factor
- 1+ millions lives impacted
- 50k Commercial users and shops
- Better billing efficiency
Grid Single Phase Ext. vs Off-grid – Bihar
2016-17

Assumption
1. 11kV feeder
2. Serving load of 200-500 watts per household
3. Operation for period of 20 years
4. 4.45 INR cost for electricity
Mini Grid Models in India
Boosting rural economy

Courtesy @OMC power
Only couple of players able to raise some debt or equity by investor

Bankers awareness for mobilising funds in RE technologies?? – CLEAN attempt of having financial literacy program for Bankers cum enterprises

Villages are not listed in Census??

Revenue collection model??

Battery technology Fintech model??

Anchor load philosophy won’t work but need deep dive in Micro Enterprise through grids

Rural Transportation key avenue for exploration with government pushing heavily for E-mobility policies
### MSMEs for the state of Uttar Pradesh

<table>
<thead>
<tr>
<th>Location</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agra</td>
<td>Foundry, Leather Footwear, Mechanical Engineering Equipment</td>
</tr>
<tr>
<td>Aligarh</td>
<td>Brass &amp; Gunmetal Statues, Locks, Building Hardware</td>
</tr>
<tr>
<td>Mau</td>
<td>Power loom, Leather Products</td>
</tr>
<tr>
<td>Banda</td>
<td>Power loom</td>
</tr>
<tr>
<td>Khurja</td>
<td>Ceramics</td>
</tr>
<tr>
<td>Firozabad</td>
<td>Glass Products</td>
</tr>
<tr>
<td>Ghaziabad</td>
<td>Chemicals, Mechanical Engineering Equipment, Packaging Material</td>
</tr>
<tr>
<td>Gorakhpur</td>
<td>Power loom</td>
</tr>
<tr>
<td>Hathras</td>
<td>Sheet work (Globe, Lamp)</td>
</tr>
<tr>
<td>Jhansi</td>
<td>Power loom</td>
</tr>
<tr>
<td>Kannauj</td>
<td>Perfumery &amp; Essential Oils</td>
</tr>
<tr>
<td>Kanpur</td>
<td>Saddlery, Cotton Hosiery, Leather Products</td>
</tr>
<tr>
<td>Meerut</td>
<td>Sports Goods, Scissors</td>
</tr>
<tr>
<td>Moradabad</td>
<td>Brassware</td>
</tr>
<tr>
<td>Muzaffarnagar</td>
<td>Rice Mills</td>
</tr>
<tr>
<td>Saharanpur</td>
<td>Rice Mills, Woodwork</td>
</tr>
<tr>
<td>Varanasi</td>
<td>Sheet work (Globe, Lamp), Power loom, Agricultural Implements, Electric Fan</td>
</tr>
</tbody>
</table>

**Identification of upcoming cold storage through District Association chamber?**

**Capitalising on the KUSUM scheme**

**Market Development Agency for high cash crop value**

**Water heating and cooling for small industries need.**