“Creating a Sustainable Environment through Transitioning to Clean Energy”
About ENERGY EFFICIENCY SERVICES LIMITED (EESL)

- Energy Efficiency Services Limited (EESL) is a joint venture company of four Public Sector Enterprises of Ministry of Power, Govt. of India

- NTPC Limited (India’s Largest Power Generating Company) Share Capital : 36.36%
- Rural Electrification Corporation Limited (Leading Infrastructure Finance Company) Share Capital : 21.70%
- Power Finance Corporation Limited (Leading Non-Banking Financial Corporation) Share Capital : 36.36%
- Power Grid Corporation of India Limited (India’s Largest Power Transmission Company) Share Capital : 5.58%

- Established in the year 2009

- A Super ESCO that seeks to unlock energy efficiency market in India, estimated to be at 9 billion Euro (12 billion US $), by way of innovative business and implementation models
EESL’s Footprint in India

- **36 States & UTs**
  - UJALA
  - AgDSM

- **28 States & UTs**
  - SLNP
  - e-Vehicle

- **7 States & UTs**
  - BEEP
  - Smart Meters

- **25 States & UTs**
  - MEEP
  - AJAY

- **2 States**
  - 4 States & UTs
  - 3 States & UTs
  - 5 States
#1: Solarization of Agricultural Feeders

- Small solar power plants are being set up on open / unused / vacant lands of Maharashtra DISCOMs sub-stations with size varying from approx. 0.25 MW to 2 MW

<table>
<thead>
<tr>
<th>Project Period</th>
<th>Scale (MWp)</th>
<th>Annual reduction in Co2 emissions in MT</th>
<th>Total reduction in Co2 emissions during Project life (in MT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>200</td>
<td>0.246</td>
<td>6.15</td>
</tr>
</tbody>
</table>

- Benefits
  - Reduction in transmission losses of approximate 5%
  - Further, if farmer’s existing pump sets to be replaced by BEE 5 star rated energy efficient pump set on the feeder, 30% energy savings can be achieved.
#2: Solar PV mini grids – Agriculture Pump Sets

- Solar PV mini grid with EE pump set and a Controller will be provided by EESL
- EESL shall finance, design, install, own and operate a solar PV pumping solution at the site of the farmer
- Solar PV pump sets can irrigate the farms during the day time by eliminating dependencies on DISCOM or DGs
- Excess energy generated from mini grid can be exported to the DISCOMs grid
- DISCOM avoids
  - procuring marginal power for meeting agriculture demand
  - T&D losses & network augmentation, since generation is at the tail End of the distribution network
- A cash incentive payment shall be made to the farmer for the net injection into the DISCOM grid

<table>
<thead>
<tr>
<th>Pump capacity (hp)</th>
<th>Approx. Solar PV (kWp/pump)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>7.5</td>
<td>20</td>
</tr>
</tbody>
</table>

Total no. of Billing Meters = Billing meter A + Billing meter B + …… + Billing meter N
Where N is the total no. of farmers
Grid Connected Agriculture Pump Sets

7.5 HP Pump set

**Illustrative case**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Details</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Generation</td>
<td>31,536 kWh</td>
<td></td>
</tr>
<tr>
<td>Total consumption by pump sets</td>
<td>14,250 kWh</td>
<td>Paid @ Rs 3.8/kWh</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Benchmark consumption = 1900 kWh/HP/Yr</td>
</tr>
<tr>
<td>Net Export</td>
<td>17,286 kWh</td>
<td>Paid @ Rs 3.8/kWh</td>
</tr>
<tr>
<td>Revenue to farmers</td>
<td>9587 Rs* + 2705 Rs**</td>
<td>Rs 12,292 /year</td>
</tr>
</tbody>
</table>

* 8% of 31536 kWh = 2523 Units @ Rs 3.8/unit ~ **9587 Rs**

**if farmer saves 25% of Year marked quota i.e. 14,250 ~ 3562 units
20% of Energy saved i.e. 3562 Units ~ 712 units @ Rs. 3.8/unit ~ **2705 Rs**

Total Incentive to farmer/Year = 9587 + 2705 ~ **12,292 Rs/Year**
Benefits of grid connected solar pumping programme

Farmer
- Increase crop yield due to sufficient irrigation
- Convenience to farmers due to reliable power supply in day-time
- Additional revenue source for savings below benchmark consumption
- Every farmer will receive a star rated pump set with VFD/Controller
- Free repair and maintenance for the contract period

Government
- Promote social welfare by encouraging agriculture sector
- Provide good quality day time power supply to farmers
- Farmer gets an opportunity to earn additional income
- Encourages energy and water conservation

DISCOM
- Fulfilment of RPO
- Savings due to reduction in AT&C losses
- No upfront cost for the transmission / distribution network
- Reduction in expensive power purchase
- No additional subsidy support required
Few Challenges with Renewables (Solar)

• **Low voltage distribution grid:**
  - voltage levels, power factor, higher wear and tear of equipment, etc. from high penetration of a large number of distributed solar generators.

• **Transaction Costs:** Another logistical worry for utilities is the significantly higher transaction effort in terms of metering, inspection and certifications.

• **Incase of large Solar Power Plants where connectivity to be done at high voltage distribution grid**
  - land acquisition, necessary approvals for underground wiring, forest department approvals for tree cutting
  - security of the system, water availability for cleaning of solar PV modules.
  - Off taker payment risk
THANK YOU

Rajneesh Rana
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