Solar Irrigation in Bangladesh: Current Situation and Future Prospect

Presented by:
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Sustainable & Renewable Energy Development Authority

- Promote Renewable Energy
- Climate Change Issues
- Adopt Energy Efficiency Measures
Background: Solar Irrigation

➢ Agricultural sector is a vital contributor to Bangladesh’s economy for employment, food security and economic growth;
➢ Efficient water management is an important factor for agricultural productivity;
➢ Alternative energy is required for food and energy security, to address climate change impact and to mitigate risk of price hike of petroleum products;
➢ It has huge scaling up potential provided a business model is in place;
➢ Reduction of greenhouse gas emission is possible.
GoB’s outlook: SIP Implementation

- **NDC**
  Goals are achievable by maximizing the use of renewable energy;

- **7th FYP**
  Emphasizes expansion of irrigation and farm mechanization with appropriate technology including better using renewable energy along with the private sector investment;

- **Minor Irrigation Policy, 2017**
  Encourages the use of renewable energy for irrigation;

- **Bangladesh Delta Plan**
  Emphasizes on developing long term RE and harnessing the potential of RE;

- **National Agricultural Policy, 2018**
  Encourages the use of solar irrigation pump;

- **National Agricultural Mechanization Policy, 2019**
  Encourages the use of solar irrigation for crop cultivation.
Draft SIP Roadmap 2021-2030

➢ **Component A**
  - Standalone SIP systems 45,000nos;
  - Install Solar Capacity (ISC) 1,000MWp;
  - Replace 320000nos. diesel pumps;
  - Irrigate 690,000 hectares land;
  - Serving 2,500,000 farmers;
  - Reduce 300,000 tonnes diesel use annually.

➢ **Component B**
  - Hybridization/solarization piloting 1,250nos. GC-SIP
  - ISC 25 MWp by 2023

➢ **Component C**
  - Small decentralized ground mounted GC SPV piloting 25 MWp by 2023
## Irrigation Equipment Used in 2018-19

<table>
<thead>
<tr>
<th>Type of Equipment</th>
<th>Operated by Electricity (Unit)</th>
<th>Operated by Diesel (Unit)</th>
<th>Total</th>
<th>Area Irrigated (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTW</td>
<td>BREB 32,565 + BPDB 2,865 = 35,430</td>
<td>2,204</td>
<td>37,634</td>
<td>1,076,141</td>
</tr>
<tr>
<td>STW</td>
<td>BREB 2,53,864 + BPDB 35,570 = 2,89,434</td>
<td>10,68,098</td>
<td>13,57,532</td>
<td>2,994,466</td>
</tr>
<tr>
<td>LLP</td>
<td>BREB 12,965 + BPDB 1,018 = 13,983</td>
<td>1,73,205</td>
<td>1,87,188</td>
<td>1,248,616</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>3,38,847</td>
<td><strong>12,43,507</strong></td>
<td><strong>15,82,354</strong></td>
<td><strong>5,319,223</strong></td>
</tr>
</tbody>
</table>

## Diesel Consumption in Irrigation

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<table>
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<tbody>
<tr>
<td><strong>Total Number of Diesel Pumps</strong></td>
<td><strong>12.43 lac pumps</strong></td>
</tr>
<tr>
<td><strong>Fuel consumption per pump per year</strong></td>
<td><strong>1200 liters</strong></td>
</tr>
<tr>
<td><strong>Total Fuel Consumption in a Year</strong></td>
<td><strong>14,916 lac liters</strong></td>
</tr>
<tr>
<td></td>
<td><strong>= 14.916 lac kilo-liters</strong></td>
</tr>
<tr>
<td><strong>Import cost of Per Ton Diesel (BPC Website)</strong></td>
<td><strong>BDT 36,622</strong></td>
</tr>
<tr>
<td><strong>Total Import Cost of Diesel in a Year</strong></td>
<td><strong>BDT 4,578 Crore</strong></td>
</tr>
<tr>
<td></td>
<td><strong>= 12.5 lac tons</strong></td>
</tr>
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</table>
Present Status of SIP

**Existing Financing Structure**

Sponsor’s Equity: 15%

Concessionary Loan (for 10 years): 35%

Grant: 50%

<table>
<thead>
<tr>
<th>Organization</th>
<th>Quantity</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDCOL</td>
<td>1523</td>
<td>41.05 MW</td>
</tr>
<tr>
<td>BREB</td>
<td>40</td>
<td>0.24 MW</td>
</tr>
<tr>
<td>BADC</td>
<td>243</td>
<td>2.61 MW</td>
</tr>
<tr>
<td>BMDA</td>
<td>327</td>
<td>1.79 MW</td>
</tr>
<tr>
<td>RDA</td>
<td>18</td>
<td>0.24 MW</td>
</tr>
<tr>
<td>Total</td>
<td>2151</td>
<td>45.93 MW</td>
</tr>
</tbody>
</table>

Rangpur: 60%

Khulna: 29%

Rajshahi: 10%

Dhaka: 1%

Chittagong: 1%
SIP Projects

➢ BREB has taken 2000 SIP projects
   - Target to complete: 355 nos. by March, 350nos. By July, 2021 and rest 1295 projects are currently under approval process for 32 PBS

➢ BARD will soon start 11 SIP projects

➢ BARI has taken 8 SIP research projects at costal areas:

<table>
<thead>
<tr>
<th>District</th>
<th>Upazila</th>
<th>No. of projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patuakhali</td>
<td>Kuakata</td>
<td>3</td>
</tr>
<tr>
<td>Borguna</td>
<td>Amtoli</td>
<td>1</td>
</tr>
<tr>
<td>Vhola</td>
<td>Charfeshion</td>
<td>3</td>
</tr>
<tr>
<td>Noakhali</td>
<td>sadar</td>
<td>1</td>
</tr>
</tbody>
</table>

These SIP systems are being used portably for watermelon irrigation and for other season, utilization of them are lights and fans with a battery.

**Pump capacity: 280/375W, Panel capacity: 350-375/1300W.**
Challenges

- Excess Energy Utilization
- Rapid grid expansion
- Policy level interventions
- Subsidized tariff
- Business model
Stand Alone SIP

VFD: Variable Frequency Drive or VSD: Variable Speed Drive
SIP Grid Integration

- SIP operator will be like a small IPP
- They will submit bill every month to distribution utility @ Bulk tariff
- They can not get electricity to operate load, only kW AC ins.Cap equivalent kWh/month import is allowed for system operation only
- Utility meter will be a bi-directional meter to calculate energy export and import for self consumption
Net Metering Guideline

- **Monthly Billing Unit (BU)**: \( I - E - C \)

Where,
- \( I \): Electricity Import
- \( E \): Electricity Export
- \( C \): Credit Amount

- **Settlement Period**: Fiscal Year (July – June)

- Utility will pay to consumer @ 33 kV Bulk rate, if \( C > 0 \)

- All 3 phase consumer classes of LT, MT and HT except temporary and construction

- Applicable only for RE sources

- After self consumption, surplus electricity can be exported to the grid

- Up to 70% of sanctioned load; but not exceeding 10 MW

RE Generation Meter and Self Consumption Meter

optional for CAPEX model

but

mandatory for OPEX Model
Thank you