Solar Irrigation in Bangladesh: Opportunities & Challenges

Nazmul Haque
Director (Investment) & Head of Advisory

31 October 2018
Present Irrigation Scenario in Bangladesh

- **Irrigation pumps run on grid electricity**
  - Number: 0.33 million pumps
  - Area coverage: 2.27 million hectares of land
  - Grid Load: 1500 MW

- **Irrigation pumps run on diesel**
  - Number: 1.28 million pumps
  - Area coverage: 3.06 million hectares of land
  - Fuel Consumption: 1 million tons of diesel per year (worth USD 900 million)
  - Subsidy from GoB: USD 280 million
Solar Irrigation: The New Prospect

<table>
<thead>
<tr>
<th>Organizations</th>
<th>No. of pumps installed</th>
<th>Implementation modalities</th>
<th>Financing type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual Trust Bank</td>
<td>53</td>
<td>Community ownership</td>
<td>100% loan financing</td>
</tr>
<tr>
<td>Rural Development Authority</td>
<td>10</td>
<td>Subsidized lease arrangement with the community</td>
<td>100% grant financing</td>
</tr>
<tr>
<td>Bangladesh Agricultural Development Corporation</td>
<td>37</td>
<td></td>
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<tr>
<td>Barind Multipurpose Development Authority</td>
<td>267</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bangladesh Rural Electricity Board (BREB)*</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infrastructure Development Company Limited (IDCOL)</td>
<td>1,007</td>
<td>Private sector led business model</td>
<td>Grant 50%, loan 35% &amp; Equity 15%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,434</strong></td>
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* BREB is currently planning to follow the IDCOL program structure with funding support from ADB
Overview of IDCOL Solar Irrigation Program

### Funding sources:
- **Grant**: BCCRF, KfW, GPOBA, USAID, ADB
- **Loan**: IDA, JICA

### Key Features

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major equipment</td>
<td>Pump, PV panel, buried pipeline</td>
</tr>
<tr>
<td>PV capacity</td>
<td>25~40 kWp</td>
</tr>
<tr>
<td>Pump capacity</td>
<td>15~18.5 kW</td>
</tr>
<tr>
<td>Total dynamic head</td>
<td>12~16 meters</td>
</tr>
<tr>
<td>Water supply</td>
<td>1.5~2 million liters/day</td>
</tr>
<tr>
<td>Major crops</td>
<td>Paddy, maze, wheat, jute, potato, mustard and vegetables</td>
</tr>
<tr>
<td>Irrigation charges</td>
<td>USD 240-300/Hectare for paddy USD 50-80/Hectare for others</td>
</tr>
<tr>
<td>Financing terms</td>
<td>6% interest rate, 10-year with 2-year grace period</td>
</tr>
</tbody>
</table>
Business Models

**Fee for Service Model**

- **Suppliers**
  - Supply Equipment
  - Pay for Equipment
  - Approves pumps

- **Sponsor**
  - Seeks system approval
  - Provides grant & loan

- **IDCOL**
  - Seeks grant & loan
  - Pays irrigation charges

- **Farmers**
  - Sells water
  - Grant & soft term credit

- **Development partners**

**Ownership Model**

- **Suppliers**
  - Supply Equipment
  - Pay for Equipment
  - Approves pumps

- **Sponsor**
  - Seeks system approval
  - Provides grant & loan

- **IDCOL**
  - Seeks grant & loan
  - Pays installments

- **Farmers**
  - Sells water
  - Grant & soft term credit

- **Development partners**
Opportunities & Challenges

**Opportunities**
- 1.28m diesel pumps that can potentially be replaced
- Proven technology with low maintenance cost, long life and long-term warranty
- Decreasing price of pumps and solar PV modules
- Adequate local capacity and quality control measures
- Availability of grant and low cost capital ensuring affordable water for farmers and acceptable return to private investors
- Grid integration policy for utilizing excess energy and ensuring better return is under process
- Policy discouragement for new grid-connected electrical pumps

**Challenges**
- Subsidized fossil fuel price
- Risk of penetration of low quality equipment in absence of a national quality standard
- Reduced demand during non-irrigation seasons resulting limited usage of generated energy
- Extensive grid expansion by BREB
- Lack of interest from large creditworthy investors
- Lack of in-house technical capacity of project sponsors
- Lack of collateral available for potential lenders
- Tall dynamic head and timely replenishment of water table
- High exit cost for project sponsors
Nazmul Haque
Director (Investment) & Head of Advisory
Email: nhaque@idcol.org
www.idcol.org