Powering Up Tripura: TSECL’s Journey to Grid Stability and Smart Energy

By Mr. Debashis Sarkar, MD, TSECL
Agenda

- About Tripura and its Power Sector
- Challenges and Issues
- ADB and Tripura Power Sector Partnership
- New Age Interventions in TSECL
- Other interventions
- Expected Outcomes of interventions
- TSCEL’s Future Outlook
1. Largest bamboo producing hub in India
- Tripura is endowed with rich and diverse bamboo resources. It is home to 21 species of bamboo. The state has an area of 7,195 hectares to produce bamboo.

2. Strong natural rubber production base
- Tripura is the second largest natural rubber producer in the country, after Kerala. The state has got 85,000 hectare land area under rubber cultivation, out of which 65,000 hectare plantation area is currently mature for harvesting and produces 75,000 ton rubber.

3. Fifth largest tea producing state
- Tripura holds a strong tea plantation base in India, with 58 tea gardens covering an area of >6,885 hectares, as of February 2020.

4. Unique Cultural mix in handicraft art
- A unique harmonious blend of 3 traditions (tribal, Bengali and Manipuri weaving) can be seen in Tripura’s handicrafts. The state is known for its unique cane & bamboo handicrafts.

5. Food Processing Hub in Northeast
- The state has favourable climatic conditions for cultivation of various fruit and horticultural crops. The state’s pineapples and oranges are known for their unique flavours and organic nature. It has set up a modern food park near Agartala to boost growth in the food processing sector & an agri export zone for pineapples. The state also has potential in the meat processing sector.

6. Treasure to Natural Medicine
- Tripura has about 266 medicinal plants, 379 species of trees, 581 herbs, 320 shrubs, 165 climbers, 16 climbing shrubs, 35 ferns and 45 epiphytes. The pertinent tropical climatic conditions in the state supports the flourishing growth of various types of the medicinal plant & other forest resources scattered all over the state.
## Tripura Power Sector at glance

### Operational Overview (FY 2023-24)

<table>
<thead>
<tr>
<th>Parameters</th>
<th>UoM</th>
<th>FY 2023-2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Input</td>
<td>MU</td>
<td>1625.77</td>
</tr>
<tr>
<td>Energy Billed</td>
<td>MU</td>
<td>1,235.62</td>
</tr>
<tr>
<td>Billing Efficiency</td>
<td>%</td>
<td>76.00%</td>
</tr>
<tr>
<td>Collection Efficiency</td>
<td>%</td>
<td>102.86%</td>
</tr>
<tr>
<td>AT&amp;C Loss</td>
<td>%</td>
<td>22.00%</td>
</tr>
</tbody>
</table>

### Consumer Profile (FY 2023-24)

<table>
<thead>
<tr>
<th>Category</th>
<th>MU Consumed</th>
<th>Number of Consumers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic</td>
<td>859.4 K</td>
<td>89%</td>
</tr>
<tr>
<td>Commercial</td>
<td>73.1 K</td>
<td>8%</td>
</tr>
<tr>
<td>Irrigation</td>
<td>8.1 K</td>
<td>1%</td>
</tr>
<tr>
<td>Water Works</td>
<td>11.6 K</td>
<td>1%</td>
</tr>
<tr>
<td>Industrial</td>
<td>6.4 K</td>
<td>1%</td>
</tr>
<tr>
<td>Others</td>
<td>6.3 K</td>
<td>1%</td>
</tr>
</tbody>
</table>

### Power Supply Position (FY 2023-24)

- Peak Demand: 490 MW
- State: 490 MW
- Inter-State: 0 MW
- Cross Border: 0 MW

- Peak Availability: 490 MW
### Challenges in operations

| **Difficult Terrain and weather conditions** | Tripura, with 70% forest coverage, is highly susceptible to thunderstorms and lightning, which often cause trees to uproot, resulting into feeder breakdowns and tripping for longer durations. |
| **Dilapidated and aging infrastructure** | The aging of distribution components such as current transformers (CT), potential transformers (PT), distribution transformers, overhead lines, and circuit breakers. |
| **Poor Billing Efficiency** | Poor Billing Efficiency leading to elevated AT&C losses. SAIFI and SAIDI figures significantly below industry benchmarks. |

To alleviate the situation, assistance from ADB, RDSS, World Bank in funding projects have been taken to enhance supply reliability, increase redundancy and reduce AT&C loss, ultimately ensuring greater convenience for consumers.
Asian Development Bank (ADB) approved to fund $220 million for a “Tripura Power Distribution Strengthening and Generation Efficiency Improvement Project” in Tripura which is the largest approved project by ADB in the State.

The objective is to support the efforts of Tripura in improvement of energy security, quality of supply, efficiency, and prepare the State for the integration of future renewable energy capacity.
## New Age Interventions to improve grid stability

*Projects implemented under different packages within ADB assistance to improve grid reliability and stability*

<table>
<thead>
<tr>
<th>Package 1</th>
<th>Package 2 &amp; 3</th>
<th>Package 4, 5, 6</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Salient Features</strong></td>
<td><strong>Salient Features</strong></td>
<td><strong>Salient Features</strong></td>
</tr>
<tr>
<td>• Commissioning of 14.59ckm HT UG Cables within State.</td>
<td>• Commissioning of 461.46ckm 11KV and 33KV UG Cables.</td>
<td>• Installation of 1,50,000 Smart Metering in Agartala Area.</td>
</tr>
<tr>
<td>• Replacement of 33KV and 11KV VCBs at 27 Sub-stations.</td>
<td>• Commissioning of 1589ckm 11KV and 33KV Covered Conductors in lieu of the existing bare conductors.</td>
<td>• Commissioning of NABL accredited Transformer Testing Lab.</td>
</tr>
<tr>
<td>• Installation of 28nos 33KV Control and Relay Panel.</td>
<td>• Commissioning of 689ckm LTAB Cables in lieu of the existing bare conductors.</td>
<td>• Commissioning of HVDS network in specific pilfer prone areas.</td>
</tr>
<tr>
<td>• Installation of 3600 sets of Fault Passage Indicator.</td>
<td>• Installation of 33KV/11KV Lightening Arresters.</td>
<td></td>
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<tr>
<td>• Installation of 2395 nos. 33KV/11KV Lightening Arresters.</td>
<td>• Installation of 11KV Auto-reclosures and sectionalizers.</td>
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</tr>
<tr>
<td>• Extension of 33KV Bays from existing sub-station.</td>
<td>• Availability of 24X&amp; Fault locator Test Van.</td>
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</table>
**Other Interventions to improve operational efficiency through World Bank and RDSS**

- **System Augmentation through World Bank Assistance**
  - EHV Sub-station augmentation and EHV Line augmentation
  - Upgradation of Transmission System voltage level from 66kV to 132 kV for reducing transmission losses

- **Initiatives under Revamped Distribution Sector Scheme (RDSS)**
  - Conversion of Bare LT Conductors into LT AB Cable.
  - 1,00,000 normal Pre-paid meters, 4,47,489 Smart Meters and 14,908 Smart DT Meters are to be installed through RDSS Project.
  - Revenue Management System (Unified Billing Software), Centralized Customer Care in OPEX Mode, upgradation of ERP module is taken under IT/OT related works of RDSS Project.
  - Online transformer monitoring of Distribution Transformer.
  - Commissioning of HVDS network in specific pilfer prone areas.
Expected Outcome after Completion of the Projects

Reliability of Supply
- Reduction in fault after the commissioning of UG Cables by replacing the existing overhead lines
- Ring main isolator unit in a strategic location to help in improvement in system reliability
- Online Monitoring of Transformer health and Testing Lab facility to reduce DT failure rates thus improving reliability

Reduction in Losses
- Conversion of Bare Conductor into LT AB Cables to reduce pilferage
- Installation of Smart DT Meters will help in Energy Auditing of the DISCOM

Operational Efficiency
- Online Monitoring of Transformer health can help us to detect the development of fault and anticipate preventive maintenance
- Easy restoration of power supply in case of faults with help of Auto reclosures and sectionalizers

Financial Sustainability
- Improvement in Billing and Collection efficiency after the installation of Smart Meters and Pre-paid Meters.
Conversion of Conventional Meters to Smart Meters to reduce AT&C Losses from 26% to 19% in upcoming 2 years.

Extending implementation of Smart Meters within Franchise Areas

Digitalization of Office, TSECL is moving for e-filing. Implementation of ERP for include HRMS, Material Management System (MMS) and Financial Management System

GIS mapping of entire asset and consumer indexing.

Implementation of SCADA up to 11kV level

Conversion of AIS Substations to GIS Substation at 132kV level as well as 33 kV Level

Adding 100-150 MW Renewable Energy to the existing generation kitty to meet RPO Obligation and balance the conventional and Renewable Energy.

TSECL will go for Energy Auditing after completion of metering of all DTs and Feeders.
Thank You

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