Presented By
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DPDC, Bangladesh

Distribution Utility of Future-
Advance Technology for
Business Transformation

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Challenges of existing power distribution utility

Some challenges for existing Power Distribution Utility

- Demand side management is not fully automated
- Issues of voltage imbalance, transients, and harmonics.
- Poor power factor, revenue pilferage, improper asset management etc.
- Impact of RE Injection and EV penetration.
- Lack of real time monitoring system
- Tariff governed by Regulators.

A look into future

- Flexible and efficient operation of network
- Application of modern technology
- High penetration of RE and EV
- Use of sensors throughout the network
- Diversified ways of revenue collection for profit maximization
- Customer-centric business
- Real time monitoring and decision making application

!!! Change needed !!!
Existing Distribution Utility vs Future Utility

- **Unidirectional power distribution from centralized bulk generation**
  - Self-managing, demand responsive smart buildings
- **Distributed, variable, sustainable resources**
  - Secure, self-healing, self-optimizing grid
- **Clean transportation, leveraging clean generation and storage of energy**
  - Consumers/businesses are both users and creators of energy (bi-directional power distribution)
  - Energy-efficient, self-managing homes driven by consumer choice
Key areas of attention for Utilities of Future

1. **Seamless renewables and DER integration**
   - In future, utilities will engage predictive analytics, information rich dashboard and quick decision making tools for seamless integration of renewables and DER.

2. **Improved reliability of power supply**
   - IoT combined with the Machine Learning and data-analytics will provide future utilities with accurate assessment on asset health to enable improved reliability of power supply.

3. **Cost efficiency**
   - The utilities of the future would have unprecedented competition, not only from other utilities but from the consumer as well and would need to improve their cost efficiencies.

4. **Consumer centric business models**
   - The utilities of future will ensure that their business models revolve around the needs of the consumer such that the consumer would be a partner in their journey.

5. **Digital interaction with customers**
   - Digital interaction with the consumers will become prominent. Digital technologies like blockchain and cryptocurrency etc. will be used to achieve customer satisfaction.

6. **Cyber security**
   - The utilities of the future will pay extensive attention towards enhancing the cyber security and information security protocols in order to protect IT and OT environments.
Groundbreaking Technologies on the horizon for Future Utility

- Distributed Generation (DG)
- Cloud Computing for analytics
- Artificial Intelligence & Machine Learning
- Sensor technology, IoT and smart Grid
- 4IR, Block Chain and Big data Platform
- Smart Surveillance using Drone
- Networking, connectivity and cyber security
- Plug-in Electric Vehicles (PHEV)
- Energy Storage System (ESS)
- Cloud Computing for analytics
- Artificial Intelligence & Machine Learning
- Sensor technology, IoT and smart Grid
- 4IR, Block Chain and Big data Platform
- Smart Surveillance using Drone
- Networking, connectivity and cyber security
- Distributed Generation (DG)
- Plug-in Electric Vehicles (PHEV)
- Energy Storage System (ESS)
How to become Digital Utility of Future?

- Becoming a digital utility is neither an instantaneous job nor something that can be achieved in a few steps.

- It is a continuous process of making a series of business transformations aimed at digitization with customer centricity as a guiding philosophy.

- For utility of future, it would also be important to identify innovative business models that not only provide new revenue streams, but also help in creating value to the consumers, enterprise and all the other key stakeholders in the power value chain.

- The most important aspect for any firm in this journey would be to develop paradigm shift in mindset.

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**Plan**
- Identify future business challenges through consumers, assets and workforce lenses
- Ignite the digital mind-set across the organization

**Execution**
- Execute the digital transformation roadmap
- Execute processes in order to cater to the changing needs of the future consumers

**Sustain**
- Realign organization structure with digital vision
- Bring in the culture of innovation within the organization
Steps to be followed for digitalization – New rule of the game for future business

1. **STEP ONE**
   Assess how digital are we today?

2. **STEP TWO**
   Identify how digital do we need to become?

3. **STEP THREE**
   Plan how do we get there?

4. **STEP FOUR**
   Determine the blocking or enabling factor

5. **STEP FIVE**
   Execute strategy and policy and monitor the progress

5 steps
The expectation of customers regarding electricity would not be the same after one decade as it is today. Interruption of electricity even for a minute may change the mind of the customer to switch to the competitor.

Customers’ increasing expectation for comfort, convenience, and speed; and their insatiable appetite for use of more electrical gadgets and appliances would mean that future utility will have to tune itself to the changing needs of the customers.

Electricity customers will be becoming more informed, connected, and demanding in the coming years.

The future utility must be customer-centric and shall address all the needs of customers’ at the earliest.
Utility Business- The New Way Forward

Bangladesh’s Perspective
Bangladesh Power Sector at a Glance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generation Capacity</td>
<td>26,700 MW</td>
</tr>
<tr>
<td>Highest Generation</td>
<td>14,782 MW (April, 2022)</td>
</tr>
<tr>
<td>Total Consumers</td>
<td>44.3 Million</td>
</tr>
<tr>
<td>Transmission Line</td>
<td>14,531 km</td>
</tr>
<tr>
<td>Grid Sub-station Capacity</td>
<td>58,076 MVA</td>
</tr>
<tr>
<td>Distribution Line</td>
<td>6,69,000 km</td>
</tr>
<tr>
<td>Distribution Loss</td>
<td>7.74%</td>
</tr>
<tr>
<td>Per Capita Generation</td>
<td>609 KWh (Aug 2020)</td>
</tr>
<tr>
<td>Access to Electricity</td>
<td>100%</td>
</tr>
</tbody>
</table>
• Under the leadership of Honorable Prime Minister Sheikh Hasina, access to electricity to 100% citizen of the country has been ensured.
• She has set up a vision to turn Bangladesh into a developed country by 2041.
• Energy is a precondition for the socio-economic development of a country. Without energy, not even a single organ of the country can grow – be it industry, trade & investment or health and education.
• Power generation target is 40,000 MW within 2030 and 60,000 MW within 2041 to achieve vision 2041.
### Present status of Electricity Generation Mix

<table>
<thead>
<tr>
<th>Fuel/Resource</th>
<th>Installed Capacity</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal</td>
<td>1768 MW</td>
<td>6.86 %</td>
</tr>
<tr>
<td>Gas</td>
<td>11476 MW</td>
<td>44.53 %</td>
</tr>
<tr>
<td>HFO</td>
<td>6278 MW</td>
<td>24.36 %</td>
</tr>
<tr>
<td>HSD</td>
<td>1341 MW</td>
<td>5.2 %</td>
</tr>
<tr>
<td>Imported</td>
<td>1160 MW</td>
<td>4.5 %</td>
</tr>
<tr>
<td>Renewable</td>
<td>950.92 MW</td>
<td>3.69 %</td>
</tr>
<tr>
<td>Captive</td>
<td>2800 MW</td>
<td>10.86 %</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>25774 MW</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Electricity Generation Mix**

- Coal
- Gas
- HFO
- HSD
- Imported
- Renewable
- Captive
### Present status of RE in Bangladesh

<table>
<thead>
<tr>
<th>Technology</th>
<th>Off-grid (MW)</th>
<th>On-grid (MW)</th>
<th>Total (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solar</td>
<td>356.55</td>
<td>360.3</td>
<td>716.85</td>
</tr>
<tr>
<td>Wind</td>
<td>2</td>
<td>0.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Hydro</td>
<td>0</td>
<td>230</td>
<td>230</td>
</tr>
<tr>
<td>Biogas to Electricity</td>
<td>0.69</td>
<td>0</td>
<td>0.69</td>
</tr>
<tr>
<td>Biomass to Electricity</td>
<td>0.4</td>
<td>0</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>359.64</strong></td>
<td><strong>591.2</strong></td>
<td><strong>950.84</strong></td>
</tr>
</tbody>
</table>

![Renewable Energy Share](image.png)
Share of Solar Technologies

No. of Solar Home System: 6037689

Share of Solar Technologies (MW)

- Solar Park: 36.4%
- Rooftop Solar Except NEM: 36.8%
- Net Metering Rooftop Solar: 7%
- Solar Irrigation: 7.4%
- Solar Home System: 8%
- Solar Minigrid: 7%
- Solar Street Light: 7%
- Solar Powered Telecom BTS: 7%
- Other: 7%
Net meter installation Statistics

The utility credits customer for energy send into the grid. Utility will pay to customer @33 kV Bulk rate.

<table>
<thead>
<tr>
<th>Utility Name</th>
<th>Installed Capacity</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPDB</td>
<td>16.194 MWp</td>
<td>377</td>
</tr>
<tr>
<td>BREB</td>
<td>28.728 MWp</td>
<td>332</td>
</tr>
<tr>
<td>DPDC</td>
<td>3.011 MWp</td>
<td>318</td>
</tr>
<tr>
<td>DESCO</td>
<td>2.597 MWp</td>
<td>410</td>
</tr>
<tr>
<td>WZPDCL</td>
<td>1.235 MWp</td>
<td>278</td>
</tr>
<tr>
<td>NESCO</td>
<td>1.763 MWp</td>
<td>73</td>
</tr>
<tr>
<td>TOTAL</td>
<td>53.528 MWp</td>
<td>1788</td>
</tr>
</tbody>
</table>

No. of Net Metering system: 1788
**DPDC Profile**

<table>
<thead>
<tr>
<th>DPDC Serviced Area</th>
<th>225 Sq. Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>132 kv Distribution Line</td>
<td>238.38 km</td>
</tr>
<tr>
<td>33 kv Distribution Line</td>
<td>481.66 km</td>
</tr>
<tr>
<td>0.4 kv, 11 kv and 11/0.4 kv Distribution Line</td>
<td>5088.348 km</td>
</tr>
<tr>
<td>132/33 kv Grid Substation</td>
<td>14 Nos.</td>
</tr>
<tr>
<td>132/11 kv Grid Substation</td>
<td>01 No.</td>
</tr>
<tr>
<td>33/11 kv Substation</td>
<td>59 Nos.</td>
</tr>
<tr>
<td>Capacity of Grid Substation (132/33 &amp; 132/11)</td>
<td>3078 MVA</td>
</tr>
<tr>
<td>Capacity of 33/11 Substation</td>
<td>3829 MVA</td>
</tr>
<tr>
<td>Maximum Demand</td>
<td>1670.5 MW</td>
</tr>
<tr>
<td>Number of 11 kv Feeder</td>
<td>697 Nos.</td>
</tr>
<tr>
<td>Distribution Transformer</td>
<td>20,543 Nos.</td>
</tr>
<tr>
<td>Total Customer (Nov 2020)</td>
<td>1,417,261</td>
</tr>
<tr>
<td>System Loss (FY 2019-20)</td>
<td>6.58</td>
</tr>
<tr>
<td>Population Serviced in Network Area (approx)</td>
<td>9 Million</td>
</tr>
<tr>
<td>Monthly Average Consumption per customer</td>
<td>562 kwh</td>
</tr>
<tr>
<td>Number of employees</td>
<td>5,265</td>
</tr>
</tbody>
</table>
## Statistics of Prepayment Meter and Solar system

<table>
<thead>
<tr>
<th>Item</th>
<th>Number / Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Prepayment &amp; Smart Meter</td>
<td>More than 6.5 Lac</td>
</tr>
<tr>
<td>No. of solar system</td>
<td>More Than 40,000</td>
</tr>
<tr>
<td>Total capacity of Roof Top solar</td>
<td>Approx. 28 MWp</td>
</tr>
<tr>
<td>No. of Net Meter</td>
<td>318</td>
</tr>
<tr>
<td>Capacity of Net Meter</td>
<td>3.01 MWp</td>
</tr>
</tbody>
</table>

Transforming DPDC into a digital distribution enterprise will not only increase transparency and accountability, but also reduce cost, increase profit & efficiency and bring excellence in customer service.
Some initiatives of DPDC
Existing Utility vs Future Utility

Under Ground Substation with GIT

First ever UGSS project in Bangladesh

First ever use of GIT in Bangladesh

An innovative solution to a land hungry country
GIS based Planning and ETAP simulation
DPDC AMI & Smart Metering System

- Establishment of RF Based Network
- Configure Head-End System & MDM
- Install at customer premises Smart Meter
Some initiatives of DPDC

1. Establish Smart Grid with ADMS
2. Setup Data Center
3. Substation Automation
4. Control Center
5. GIS System

Overall Project Objectives

Smart Grid and Capacitor Bank installation - Technology adaptation for better management and to improve system efficiency

Cyber security

5S – For Better Efficiency and Productivity of Human resource

DPDC Call Center 16116 - Single Point Solution for Customer

NIFPS for safety of asset
Future initiatives of DPDC

- Battery Storage System
- EV charging station
- DER Integration
- Integrated solutions
SMART GOALS OF DPDC

**Specific**
Automation in network operation

**Measurable**
Enhance network capacity to ensure reliable supply of power

**Actionable**
IT, OT integration and implementation of cyber security

**Realistic**
Customer centric business operation.

**Timebound**
Be a true digital utility in next 5 years
Innovating a fresh business approach for DPDC

To match with the vision of the Govt. for developing Digital Bangladesh.

To achieve satisfaction of the customers by providing better services.

To be a profitable enterprise.

Tap the DER Potential, making the network more interactive.

To be the best power distribution service operator in Bangladesh.

The aim is to transform DPDC into a Modern and Digital Distribution Enterprise.
Looking into future- Modernization of DPDC’s Distribution System

- Modernization of distribution network
- Establishment of Core communication backbone
- Green power generation
- DER Integration EV Charging station
- Construction of indoor substation instead of outdoor type substation
- AMI Block chain based digital security system
- Smart Grid, Cyber Security
- Underground Distribution System
- Modern SCADA
Key Take Away

- Activities of Power Distribution Utility will significantly evolve by next decade. New requirement of customers and regulators will expedite the need for new business models for future utilities.

- DER Policy, Network strengthening for EV Charging infrastructure, BESS integration etc. shall be of utmost priority.

- Traditional boundaries will become blur. Operational complexity will cause a transition to increased automation and integrated controls between transmission and distribution network as well as with customers – there will no longer be clear demarcation points.

- Technology adoption risk is rise highly. Managing different technologies, integration among them and transition of technology will become a critical consideration along with cyber security threat.