Advanced Technologies for Distribution Utilities’ Business Transformation

South Asia Regional Energy Partnership (SAREP)
February 21, 2023
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3. How adoption of advanced technologies impacts utilities transition

4. Advanced Technologies for Power Distribution Utilities
What are advanced technologies?

- Technologies which can transform the grid operation and consumer interactions

- Benefits are determined not just by their direct use, but also by the functionality they provide for the grid or for a consumer’s ability to control the energy consumption and communicate with the system.

- These technologies have the potential to act as a platform or an enabling technology with indirect benefits now or in the future

Advanced Technologies for Distribution Utilities

Distribution Automation, IoT, SCADA, DMS, OMS, GIS, MDM, EV, DER, DR, AMI Data Analytics, Drone Applications etc.

Building blocks

Communication
PLCC, Fibre Network, RF, Cellular etc.

Information Technology
hardware, software, databases

AI/ML and Blockchain

Advanced Technologies for Distribution Utilities

Distribution Automation, IoT, SCADA, DMS, OMS, GIS, MDM, EV, DER, DR, AMI Data Analytics, Drone Applications etc.
Utilities in transition (1/3)

Trend 1: Digitizing assets for intelligent monitoring

### IoT sensors and applications

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
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<td>31%</td>
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### AI and advanced analytics applications

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</table>

### Core performers

Utilities that perform better than their peers in core reliability, resilience, and profitability metrics and, they're moving steadily toward a more sustainable energy future; top 50 utilities are considered as core performers out of 240 utilities surveyed.

### All other utilities

Note:
1. Basis survey of 240 electric power utilities of 17 countries across major geographics.
2. Core performers – Utilities that perform better than their peers in core reliability, resilience, and profitability metrics and, they're moving steadily toward a more sustainable energy future; top 50 utilities are considered as core performers out of 240 utilities surveyed.

Utilities in transition (2/3)

Trend 2: Digitizing grid operations and integrating DERs

<table>
<thead>
<tr>
<th>IoT sensors and applications</th>
<th>transformer resilience</th>
<th>grid resilience and cybersecurity</th>
<th>EV charging equipment</th>
<th>fuel cell stationary/distributed generation</th>
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<th>smart grid</th>
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<td></td>
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<td>38%</td>
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<td>60%</td>
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</table>

Core performers
All other utilities

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Utilities in transition (3/3)

Trend 3: Digitizing interactions for stakeholders

<table>
<thead>
<tr>
<th>IoT sensors and applications</th>
<th>Al and advanced analytics applications</th>
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<tbody>
<tr>
<td><strong>Core performers</strong></td>
<td><strong>All other utilities</strong></td>
</tr>
<tr>
<td>meter readings</td>
<td>inventory and material tracking</td>
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<tr>
<td>employee, vendor, or visitor monitoring</td>
<td>consumer analytics and recommendations</td>
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<tr>
<td>inventory and material tracking</td>
<td>workflow automation</td>
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<td>logistics and workflow optimization</td>
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</table>

Core performers

All other utilities

**Note:**
1. Basis survey of 240 electric power utilities of 17 countries across major geographics
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How adoption of advanced technologies impacts utilities transition

Core performers are more than twice as profitable as other electric power utilities

<table>
<thead>
<tr>
<th>Gross margin</th>
<th>Cost per employee (‘1000 US$)</th>
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<tbody>
<tr>
<td>25% higher</td>
<td>25% lower</td>
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<tr>
<td></td>
<td>10%</td>
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<tr>
<td></td>
<td>288</td>
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<td></td>
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</table>

Core performers
All other utilities

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Advanced technologies for distribution utilities

Mitigation Approach
- Asset health management using AI/ML, Drones etc.
- Automation, ADMS
- Smart meters data analytics
- Capacity building
- Enhanced models
- Grid integration and accurate accounting for DER
- Advanced technology and models
- Advanced components, system & processes
- AI/ML
- Blockchain

Benefits
- Increased sustainability
- Enhanced flexibility
- Affordability
- Increased automation
- Reduced losses
- Improved workforce and security
- Improved asset health and resilience
- Improved reliability
- Reduced consumer tariff
- Value added services
- Improved consumer experience

Network asset, monitoring and operations
- Integration of digital & communication technology
- Transition to low emission technologies
- High power procurement cost
- Extreme weather
- Manual operations, lack of data insights
- Asset health
- AT&C loss
- Cybersecurity

Consumer
- Rapid electrification of transportation and buildings
- Demand forecasting
- Vehicle to Grid
- Consumer tariff rates
- Increased consumer participation in grid
- Grid resilience
- Cybersecurity

Distribution utility concerns/trends
- Integration of digital & communication technology
- Transition to low emission technologies
- High power procurement cost
- Extreme weather
- Manual operations, lack of data insights
- Asset health
- AT&C loss
- Cybersecurity
Advanced technologies for distribution utilities

**DISCOM Business functions**

**Network asset, monitoring and operations**
- SCADA, DMS, GIS, OMS etc.
- Distribution automation
- Feeder fault detection
- Asset health monitoring using data analytics
- Asset health monitoring using Drone applications
- Theft detection
- Distribution network analytics and near real time network energy balancing

**Consumer**
- Demand (consumption) forecasting
- Demand response
- TOD/TOU application
- Chat-bots for consumer engagement/grievance
- P2P transactions among prosumers
- Grid-interactive buildings
- Real-time analytics and insights

**Benefits**
- Increased sustainability
- Enhanced flexibility
- Affordability
- Increased automation
- Reduced losses
- Improved workforce and security
- Improved asset health and resilience
- Improved reliability
- Reduced consumer tariff
- Value added services
- Improved consumer experience
THANK YOU

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