



Valley-Wide LPC Capability Assessment

DRAFT



Contents

Assessment Landing Page.....	1
Assessment Questions.....	2
Customer Engagement (10 questions)	2
Grid Operations (13 questions).....	6
System Planning (8 questions).....	10
Glossary	13



Assessment Landing Page

Thank you for your participation in this Valley wide local power company (LPC) capability assessment. TVA and the TVPPA R&D committee are working together to better understand each LPC's plans for modernizing their electric system. Your contribution and the contributions of the other local power companies across the Valley will guide the timing of grid system investments as well as help prioritize future R&D initiatives that support LPCs in the Valley.

Your responses will also help refine a **Grid Modernization Roadmap** being developed as part of a TVA Regional Grid Transformation (RGT) initiative. This roadmap, once published, will help inform each individual LPC on how the region-wide electric system is being transformed to support resiliency, operational and customer needs of the future.

Following your participation in this assessment, your utility will receive a summary view of all LPC responses and where your specific utility lies within that spectrum of results. **Your individual responses** will be kept confidential, shared with TVA and a small team of TVPPA R&D committee members who are supporting the roadmapping initiative. In reporting results, assessment responses or findings will not be attributed to specific individuals or LPCs.

Taking this Assessment

This assessment consists of three sections, each with approximately 10 detailed questions. Utilities participating in similar surveys found that survey completion is most effective when delegating entire sections or sets of questions to handful of individuals knowledgeable in the following functional areas:

- Customer Engagement (Customer Offerings & Engagement Tools)
- Grid Operations (Systems, Practices and Data)
- System Planning (Standards, Practices and Data)

Note that when assessment completion is divided between multiple respondents, each contributor can submit a partially completed assessment (i.e., can respond to only the questions assigned to them) using the assessment link provided to your utility. All partially completed assessments received from your utility will be compiled into a single assessment response and processed.

In total, this assessment should take **no more than 30 minutes** for any single individual to complete (far less time if assessment questions are delegated to multiple individuals).

Thank you for your organization's participation in this assessment.

Assessment Questions

CUSTOMER ENGAGEMENT (10 questions)

1) In regard to **Customer Insights**, does your organization collect following types of customer data?

	Yes- Commercial and/or industrial (a)	Yes- Residential (b)	No, but plan to in the next 3 years (c)	No, but plan to in the next 4-10 years (d)	Not planning on it at all (e)
1. Customer demographics (e.g., industry classification data, housing type, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Actual monthly peak demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Projected energy consumption and/or peak demand	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Distributed energy resource (DER) generated and consumed (i.e., solar, wind, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2) In regard to **Customer Offerings**, does your organization provide its residential customers with the following tools or data?

	Yes (a)	No, but plan to in the next 3 years (b)	No, but plan to in the next 4-10 years (c)	Not planning on it at all (d)
1. Online portal or mobile app to access account data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Energy usage or energy cost data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Customer reliability statistical data (e.g., reported outages, Estimated Time of Restoration (ETRs), etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Home energy management tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Outage notifications (text or mobile app)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



3) Does your organization provide its commercial and industrial customers with the following tools or data?

	Yes (a)	No, but plan to in the next 3 years (b)	No, but plan to in the next 4-10 years (c)	Not planning on it at all (d)
1. Online portal or mobile app to access account data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Energy usage or energy cost data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Customer reliability statistical data (e.g., reported outages, Estimated Time of Restoration (ETRs), etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Home energy management tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Outage notifications (text or mobile app)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4) Do you offer any of the following programs to your residential customers?

	Yes, full program (a)	Yes, pilot program (b)	No, but plan to in the next 3 years (c)	No, but plan to in the next 4- 10 years (d)	Not planning on it at all (e)
1. Community-based solar programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Residential solar programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Energy storage programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Solar plus storage programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Energy efficiency programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Demand response programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Electric vehicle charging programs or rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Time-of-use or other variable pricing programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

5) Do you offer any of the following programs to your commercial and/or industrial customers?

	Yes, full program (a)	Yes, pilot program (b)	No, but plan to in the next 3 years (c)	No, but plan to in the next 4-10 years (d)	Not planning on it at all (e)
1. Community-based solar programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Commercial and/or industrial solar programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Energy storage programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Solar plus storage programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Energy efficiency programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Demand response programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Electric vehicle charging programs or rates	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Time-of-use or other variable pricing programs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6) Does your organization provide **broadband service** to utility customers?

- a. Yes
- b. No, but plan to in the next 3 years
- c. No, but plan to in the next 4-10 years
- d. Not planning on it at all

7) Is your organization engaged in any **grid-edge technology initiatives** (e.g., Connected Communities, Building-to-Grid, etc.) to integrate solar, storage, electric vehicles, smart meters, and other distributed devices?

- a. Yes
- b. No, but plan to have a strategy in the next 3 years
- c. No, but plan to have a strategy in the next 4-10 years
- d. Not planning on it at all

8) In regard to **Customer Insights**, does your organization track ALL customer interactions recorded in a Customer Information System (CIS)

- a. Yes, all customer interactions are tracked in CIS
- b. No, but plan to have track all customer interactions in CIS in the next 3 years
- c. No, but plan to have track all customer interactions in CIS in the next 4-10 years
- d. No. Do not have a CIS or no plans to track all customer interactions in CIS (or do not have a CIS)

- 9) In regard to **Customer Engagement**, does your organization have a customer engagement or customer channel strategy? ("customer channels" include broadcast media, web, mobile, social media, etc.)
- Yes
 - No, but plan to have a strategy in the next 3 years
 - No, but plan to have a strategy in the next 4-10 years
 - Not planning on it at all
- 10) In regard to **Customer Engagement**, does your organization interface with any 3rd party behind-the-meter devices (NEST, Ecobee, etc.) as part of any energy efficiency/demand response (EE/DR) programs?
- Yes
 - No, but plan to in the next 3 years
 - No, but plan to in the next 4-10 years
 - Not planning on it at all

GRID OPERATIONS (13 questions)

11) In regard to **Grid Operations**, does your organization use the following operational technology (OT) systems?

Management Systems	Yes (a)	No, but plan to in the next 3 years (b)	No, but plan to in the next 4- 10 years (c)	Not planning on it at all (d)
1. Geographic Information Systems (GIS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Supervisory Control and Data Acquisition SCADA system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Distribution Management System (DMS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Demand Response Management System (DRMS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Distributed Energy Resources Management System (DERMS)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12) [SKIP if Question 11-1 is d] In regard to the use of **GIS**, does your organization use GIS in any of the following ways?

	Yes (a)	No, but plan to have in the next 3 years (b)	No, but plan to have in the next 4-10 years (c)	Not planning on it at all (d)
1. To store all grid devices, conductors, and structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. To store DER location, type, size, and ownership data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. As the source of <i>system of record</i> (e.g., for outage management or planning)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. To track interconnected distributed energy resources (DER)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Integrated with other operational technology systems (e.g., OMS, DMS, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

13) To what degree has your organization deployed the following?

	0% but planning (a)	Up to 50% deployed (b)	50% to 90% deployed (c)	Greater than 90% deployed (d)	Not planning on it at all (e)
1. AMI deployed to its customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Fiber optics deployed to its substations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 14) [SKIP if Question 13-1 is e] When does your organization anticipate a full deployment of AMI?
- a. Within 1 year
 - b. Within 2-3 years
 - c. Within 3-4 years
 - d. Beyond 4 years

- 15) [SKIP if Question 13-1 is e] Does your organization use AMI data in the following ways?

	Yes (a)	No, but plan to have in the next 3 years (b)	No, but plan to have in the next 4-10 years (c)	Not planning on it at all (d)
1. Normal (blue sky) operations (e.g., ping/poll, equipment health)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. During outage restoration (e.g., last gasp)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. For grid planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. For revenue protection	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 16) [SKIP if Question 13-1 is e] Does your organization share AMI data across operational systems (DMS, OMS, etc.)?
- a. Yes, fully deployed
 - b. Yes, targeted areas
 - c. No, but plan to in the next 3 years
 - d. No, but plan to in the next 4-10 years
 - e. Not planning on it at all

- 17) Does your organization have a proactive vegetation management program?
- a. Yes, fully deployed
 - b. Yes, targeted areas
 - c. No, but plan to in the next 3 years
 - d. No, but plan to in the next 4-10 years
 - e. Not planning on it at all

- 18) Do you perform proactive pre-storm resource staging and optimization?
- a. Yes
 - b. No, but plan to in the next 3 years
 - c. No, but plan to in the next 4-10 years
 - d. Not planning on it at all

19) Regarding **asset management** practices, does your organization incorporate any of the following?

	Yes (a)	No, but plan to have in next 3 years (b)	No, but plan to have in next 4-10 years (c)	Not planning on it at all (d)
1. Collection and storage of asset data	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Basic assessment of asset data trends (e.g., health monitoring)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Advanced analytics of asset data (e.g., predictive maintenance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

20) In regard to **Grid Operations**, does your organization have the following grid automation capabilities:

	Yes (a)	No, but plan to in the next 3 years (b)	No, but plan to in the next 4- 10 years (c)	Not planning on it at all (d)
1. Targeted grid automation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. System-wide grid automation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Substation Automation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Distribution (feeder) automation for reliability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Grid automation for voltage optimization	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

21) In regard to **Grid Operations**, does your organization operate (actively or passively “set and forget” operate) any 3rd party distributed energy resources (DER)?

- a. Yes
- b. No, but plan to in the next 3 years
- c. No, but plan to in the next 4-10 years
- d. Not planning on it at all

22) In regard to **Grid Operations**, does your organization have a distribution control center that meet your present and future needs?

- a. Yes
- b. No, but plan to in the next 3 years
- c. No, but plan to in the next 4-10 years
- d. Not planning on it at all



23) In regard to **your organization's workforce**, does your organization have the following?

	Yes (a)	No, but have a well-defined plan for this (b)	No, but beginning to plan for this (c)	No, not a priority at this time (d)
1. A sufficiently trained workforce to meet operational needs of today	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. A sufficient number of staff to support the deployment of new systems or technologies				
3. A trainable workforce to meet operational needs of tomorrow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Access to workforce resources to meet operational needs of tomorrow	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Access to workforce development tools or programs for building skills needed for grid operations in the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SYSTEM PLANNING (8 questions)

24) In regard to **System Planning**, does your organization observe the following *basic* planning practices?

	Yes (a)	No, but plan to have in the next 3 years (b)	No, but plan to have in the next 4-10 years (c)	Not planning on it at all (d)
1. Maintain a current model of the entire system	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Apply a consistent set of planning criteria and objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Track reliability metrics (e.g., reliability performance indicators.) at the system-wide level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Track reliability metrics or KPIs at a subsystem level (e.g., feeder or substation level)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Collect data about critical loads by location/feeder (e.g., to support community resiliency or critical return-to-service insights)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Apply a consistent set of planning criteria and objectives	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25) In regard to **System Planning**, does your organization observe the following *advanced* planning practices?

	Yes (a)	No, but plan to have in the next 3 years (b)	No, but plan to have in the next 4-10 years (c)	Not planning on it at all (d)
1. Conduct system-wide analysis for different scenarios (load, DER, etc..)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Conduct system-wide hosting capacity assessments (for load or generation)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Evaluate different mitigation options (e.g., reconductor/transformer compared to non-wires alternatives)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Consider resilience (storm hardening) into feeder/substation/structure design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

26) [SKIP if Question 24-1 is d] How frequently does your organization update its system planning model?

- a. Annually or more frequently
- b. Every 1 to 3 years
- c. Every 3 to 5 years
- d. Every 5 to 10 years
- e. Every 10 years or less frequently (as needed)

27) In regard to **Forecasting**, does your organization develop the following types of forecasts?

	Yes (a)	No, but plan to have in the next 3 years (b)	No, but plan to have in the next 4-10 years (c)	Not planning on it at all (d)
1. Load forecasts at a system-wide level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Load forecast at a sub-system level (e.g., by feeder or zone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. DER adoption forecasts at a system wide level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. DER adoption forecasts at a sub-system level (e.g., by feeder or zone)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Hourly (8760) load forecasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Hourly (8760) DER production forecasts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

28) In regard to **System Planning Data**, does your organization observe the following practices?

	Yes (a)	No, but plan to have in the next 3 years (b)	No, but plan to have in the next 4-10 years (c)	Not planning on it at all (d)
1. Share distribution system data, periodically or upon request, with TVA (e.g., for bulk power system planning or resource planning)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Maintain a plan for data exchange with third parties such as TVA (e.g., for forecasting, planning, and settlement data; frequency of sharing, etc.) as appropriate	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Maintain a plan for grid data ownership, stewardship, and governance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Maintain plan for data security, privacy, archive, and retention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29) In regard to your **Communication Architecture**, has your organization deployed the following?

	900 MHz (a)	Cellular (b)	Fiber Optics (c)	Other (d)
1. Distribution Automation (DA)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Automation Meter Infrastructure (AMI)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Distribution Supervisory Control and Data Acquisition (DSCADA)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30) Does your organization have a network operations center (NOC)?

- a. Yes
- b. No, but plan to in the next 3 years
- c. No, but plan to in the next 4-10 years
- d. Not planning on it at all

31) In regard to **Cybersecurity**, does your organization have the following?

	Yes (a)	No, but plan to in the next 3 years (b)	No, but plan to in the next 4-10 years (c)	Not planning on it at all (d)
1. A designated cybersecurity group or personnel	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. A plan for cyber intrusion, response, and recovery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. An approach for incorporating cybersecurity considerations into infrastructure design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GLOSSARY

Advanced Metering Infrastructure (AMI) – Integrated system of digital electric power meters, field communication devices and communication network systems that enables two-way communication between electric metering endpoints and the corresponding utility service provider. Typically, AMI metering enables interval metering and supports automatic meter data transmission on a defined schedule directly to the utility service provider.

Demand Response Management System (DRMS) – An information management system that provides an ability to control, operate, and monitor remote energy consuming assets. It connects the flow of information to the Demand Response (DR) devices to/from the utility leveraging the AMI network.

Distributed Energy Resources Management System (DERMS) – A software platform used to manage a group of Distributed Energy resources (DER).

Distribution Management System (DMS) – Software applications designed to support Distribution Operators in monitoring and controlling the electric distribution network efficiently and reliably. (When DMS is equipped with functions that *automate* outage restoration and optimize distribution system switching schemes for performance, the system is referred to as an *Advanced* Distribution Management System (ADMS)).

Grid Automation (*Distribution Automation*) – Automatic control of the electric power system via instrumentation and control devices. *Substation automation* refers to using data from intelligent electronic devices (IED), control and automation capabilities within the substation, and control commands from remote users to control power-system devices. *Feeder automation* is the use of IEDs and automation capabilities on the portion of the distribution network outside the substation.

Grid-Edge Technology – Varying hardware, software, and business innovations that are increasingly smart, connected infrastructure to be installed at or near the “edge” of the electric power grid, closer in proximity to the “end-use customer”. Grid-edge hardware may include advanced metering infrastructure, solar panels, smart appliances. Grid-edge software may include automated price-responsive demand response, real-time grid optimization, and data analytics.

Hosting Capacity (*or Hosting Capacity Assessment*) – An assessment to determine the amount of distributed energy and other resources that can be interconnected to or integrated with the distribution system before control changes or systems upgrades are required in order to maintain safe and reliable operations. As technology and capability upgrades are implemented, the hosting capacity of the system typically improves, allowing more resources to interconnect.

Network Operations Center (NOC) – A centralized location (or center of operations) where a utility service provider’s servers and networking equipment is stationed. This operations center may be co-located with other utility central operations or housed at an external/offsite location

Non-Wires Alternatives (NWA) – The use of distributed energy resources (DER) and microgrids in replacement of traditional “wires and poles” infrastructure, often to defer major capacity expansion construction projects or to increase electric network flexibility and reliability.

Pre-storm Staging and Optimization – The application of technology or statistical modeling (machine learning, AI, etc.) to pre-determine and pre-stage human resources and equipment in advance of major weather events in order to optimize system repair and service restoration.