Reliability in PJM Whitepaper

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March 22, 2021

Why a paper on reliability?

- Reliability needs to be kept in the forefront during the significant change in the energy industry.
- Recognition that we will need to adapt our practices as well.
- It is a mutual interest among all policymakers and stakeholders.

Paper Organization

The paper is organized to address several questions:

1	2	3	4
How does PJM view reliability?	What do we need to maintain it?	How do we currently accomplish that function?	Why it may need to change going forward?

- We do not propose solutions in this paper.
- The intent is to inform and initiate discussion on changes that may be required given industry trends.

22 Trends

These are some of the drivers of change in the reliability paper.

- CO_2 Policies
- Increasing Renewables
- DER Growth
- Aging Infrastructure
- Tech/Business Innovations
- Stakeholder Expectations

Building Blocks of Reliability

Adequate Supply

Resources to reliably power the system and meet customer demand

Accurate Forecasting

Projection of future customer demand and system needs

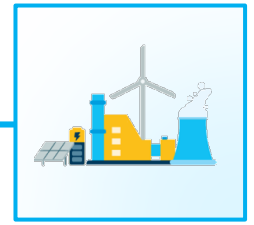
Robust Transmission

Reliable delivery of power across the grid, and to customers via local distribution companies

Reliable Operations

Monitoring and dispatch of the system by trained operators

Adequate Supply



What is it?

- Enough supply to meet the demand
- Flexibility to meet day-to-day and intraday changes in demand
- Ancillary services to manage uncertainty.

How do we do it?

- Generally through markets (capacity, energy, ancillary services)
- Some are not market-based
  - Voltage control
  - Blackstart
  - Frequency control

Possible changes?

- Potential erosion of these services given changing resource mix
- Are the quantities we carry enough?
- How would we go about incentivizing more?
- Should we compensate for others? If so, how?

Accurate Forecasting

What is it?

Ability to accurately forecast in real-time and the planning timeframes

- Total demand
- Net demand
- Interchange
- Renewable output

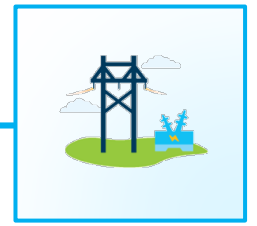
How do we do it?

- Robust load forecasting model in planning
- Multiple vendor forecasts in the real-time domain for renewables and load

Possible changes?

- Look for help externally for model review and refinement
- Bring in additional vendor models
- Enhance incentives for renewable resource owners to operate to forecast accurately

Robust Transmission



What is it?

Making sure that energy can be moved across the transmission system where necessary without overloads

How do we do it?

Generally through the Regional Transmission Expansion Plan (RTEP) and the interconnection processes

Possible changes?

- Address aging infrastructure
- Enhance the interconnection queue process (underway)
- Modeling and planning of new technologies

Reliable Operation

What is it?

Keeping the bulk power system secure and serving load

How do we do it?

- Gen/load balancing
- Transmission system security
- Outage coordination
- Extreme weather preparation
- Gas-electric coordination
- Coordinating with neighbors

Possible changes?

- Opportunities for further gas-electric alignment
- More extreme scenario planning
- Take advantage of dispatchable distributed resources