

Resilience Roadmap - Next Steps

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THROUGH 2018

Prepare

Enhance

- › Situational awareness (drills/exercises)
- › Existing insider threat identification

Strengthen

- › Network design & segmentation
- › Supply chain security risk management processes

Evaluate

- › Reserves
- › Black start fuel
- › Frequency response
- › Changing resource mix

Identify

- › Threats to operations & planning (Reserve triggers)

Update

- › Black start plans

Upgrade

- › Emergency Comm.

BEYOND 2018

Expand Outreach

- › Federal agencies
- › State partners (Information sharing & exercises)

Enhance

- › Resilient monitoring capabilities

Operate

Evaluate

- › DER aggregation
- › Alternate technology
- › Price-setting resources
- › Load-following product
- › 30-minute reserves

Expand

- › Fuel security analysis

Examine

- › Infrastructure innovation
- › Alternate technology for black start

Leverage

- › Alternate technology for microgrids & DER

Enhance

- › Dispatching/switching for strategic islands & critical infrastructure
- › Flexible resources (Beyond reliability criteria)

Recover

Collaborate

- › Transmission owners
- › Industry (Infrastructure interdependencies)

Assess

- › Vulnerabilities in black start plans

Examine

- › Alternate technology for black start

- **Evaluate Impact of Extreme Events (GMD, Weather, Gas-pipeline etc.)**
 - **2017** - Gas-pipeline Extreme contingency evaluation completed.
 - **2018** – Continue evaluation of other extreme events to include review of reserves/regulation requirements, transmission loading, defining triggers to operationalize contingencies, and transition of operational changes that impact reserve and energy market prices.
 - **2018** - Review Manual M-13: “Emergency Operations”, specifically Section 3: “Weather/Environmental Emergencies” and Section 4: “Sabotage/Terrorism Emergencies”, to determine if there are any new events that should be explicitly defined with controlling actions for PJM Operators
 - **2018** - Communicate proposed changes and obtain endorsement by the appropriate stakeholder committees.

- Reviewing all of existing emergency triggers defined in M-13 and corresponding control actions side-by-side. These include, but are not limited to, control actions in the following categories:
 - Generation (Schedule or Decommit, Reserves, Staffing)
 - Transmission (Max-Credible Contingencies, Reduce Transfers)
 - Cancel Maintenance (Generation, Transmission, Critical Systems)
 - Communication (Internal, External, Check Systems)
 - Interdependent Infrastructure Network Coordination
 - Physical or Cyber Security (Cyber Scans, Site Switchovers)

- Reviewing all of existing emergency triggers defined in M-13 and corresponding control actions side-by-side

	Trigger Event 1	Trigger Event 2	Trigger Event 3
Control Action A	X	X	
Control Action B	X	X	
Control Action C	X		X
Control Action D			X

- Compare controlling actions, identify discrepancies and/or deficiencies, explore the need for additional controlling actions.

	Trigger Event 1	Trigger Event 2	Trigger Event 3
Control Action A	X	X	
Control Action B	X	X	?
Control Action C	X		X
Control Action D	?		X
Control Action E	?	?	?

- Use control action list and similar triggering events to create procedures for new identified triggering events

	Trigger Event 1	Trigger Event 2	Trigger Event 3	Trigger Event 4
Control Action A	X	X		
Control Action B	X	X	X	X
Control Action C	X		X	X
Control Action D	X		X	
Control Action E	X	X		X

- Assign to Systems Operating Subcommittee
- Incorporate proposed changes into PJM Emergency Operations Manual (M-13)
 - Target Manual Review September/October 2018
- Max-Credible Contingency reviews
- Train Operators on any procedure changes.