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WHAT'S ALL THIS TALK ABOUT GRID RESILIENCE?

National Security or Much Ado About Nothing?

APPA Legal Seminar

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Overview

- **Grid Strategies Whitepaper**
- **DOE NOPR and FirstEnergy Emergency Request**
- **Fuel Security v. Resource Adequacy**
- **PJM and ISO New England Initiatives**
- **Generation Resilience Objectives**

Grid Strategies: A Customer-Focused Framework for Electric System Resilience

- DOE report shows that 90% of power outages occur on distribution system.
- Only 10% outages due to “high impact, low frequency events.”
- Rhodium Group report shows less than 0.1% of customer outages are caused by generation shortfalls or lack of fuel supply (2012 – 2016).
- Conclusion: highest value for reliability and resilience improvements are those addressing the distribution system.

DOE NOPR ON GRID RESILIENCE

- October 2017: FERC published a Notice of Proposed Rulemaking (“NOPR”) in Docket No. RM18-1 on behalf of U.S. Department of Energy:
 - Proposed final action by December 2017 requiring RTOs and ISOs with energy and capacity markets to implement reforms that price reliability and resilience attributes for resources with 90-day on-site fuel supplies.
 - Comments submitted October 23, 2017
 - Reply comments submitted November 7, 2017
- Final Order dated January 8, 2018 terminated the docket.

FERC Rejected Grid Resilience NOPR

- *Grid Reliability and Resilience Pricing*, 162 FERC ¶ 61,012 at PP 15-16 (2018):
 - Mere allegations of grid resilience or reliability issues due to potential retirements of particular resources does not demonstrate that existing tariffs are unjust and unreasonable.
 - No evidence of past or planned generator retirements that pose a reliability or fuel security risk.
 - No evidence that cost-of-service based rates for certain existing resources would not unduly discriminate against other resources that also provide resilience attributes.

Grid Resilience Inquiry, Docket No. AD18-7-000

- FERC initiated an inquiry in Grid Resilience in RTOs and ISOs, Docket No. AD18-7-000 (2018) into:
 - A common understanding of what resilience of the bulk power system means and requires;
 - An understanding of how each RTO and ISO assesses resilience in its geographic footprint; and
 - Whether additional FERC action regarding resilience is needed at this time.
 - RTO Comments submitted March 9, 2018.
 - Stakeholder Comments submitted May 9, 2018.

Fuel Security v. Resource Adequacy

- FERC proposed definition of resilience:
 - “ability to withstand and reduce the magnitude and/or duration of disruptive events , which includes the capability to anticipate, absorb, adopt to and/or rapidly recover from such an event.” *Grid Resilience and Pricing*, 162 FERC ¶ 61,012 at P 23.
- Commissioner LaFleur’s concurrence observes:
 - “resilience – the ability to withstand or recover from disruptive events and keep serving customers – is unquestionably an element of reliability.” LaFleur Concurrence at 1.
- NERC defines reliability to include post-outage recovery, restoration and ability to withstand sudden disturbances as well as supply power at all times.

FirstEnergy Emergency Request

- Emergency Request submitted to DOE March 29, 2018
 - Requests a determination that an emergency exists.
 - Requests DOE to direct PJM to enter into out-of-market payments with coal and nuclear plants in PJM.
 - Appendix lists 85 plants in PJM – approximately half the capacity in the region.
- Leaked White House memo (May 31, 2018):
 - Directs DOE to require all ISOs/RTOs to enter into cost-based contracts to keep designated Subject Generation Facilities (coal and nuclear plants) open.

Assessing Resilience v. Reliability

- Many elements of the bulk system provide both attributes: system planning, real-time operational security, threat identification and risk management.
- Metric of reliability is reserve margin – all regions have supplies above targeted reserve margins – PJM procured commitments at 22% reserves; actual reserves in the region are at 28% IRM
- Metric for resilience? None yet developed, but a metric is imperative if consumers are to pay billions in subsidies in the name of fuel security

Generating Attributes Providing Resilience

Reliability Service	Wind	Solar PV	Demand Response	Battery Storage	Gas	Coal	Nuclear
Voltage support							
<small>Key: Green is positive, yellow is medium, and red indicates that in most cases the resource does not provide that service.</small>							
Reactive power and voltage control	Green	Green	Yellow	Green	Yellow	Yellow	Green
Voltage and frequency disturbance ride-through	Green	Yellow	Yellow	Green	Yellow	Yellow	Yellow
Frequency support							
<small>Note: For the following reliability services, yellow means the resource can provide the service, but during many hours it may not be the most economic choice to do so.</small>							
Fast frequency stabilization following a disturbance (through primary frequency response and inertial response)	Yellow	Yellow	Yellow	Green	Yellow	Yellow	Yellow
Ramping and balancing							
Frequency regulation	Yellow	Yellow	Yellow	Green	Green	Yellow	Red
Dispatchability / Flexibility / Ramping	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Red
Peak energy, winter (color reflects risk of common mode unavailability reducing fleetwide output below accredited capacity value)	Green	Yellow	Yellow	Green	Yellow	Yellow	Green
Peak energy, summer (color reflects risk of common mode unavailability reducing fleetwide output below accredited capacity value)	Yellow	Green	Green	Green	Yellow	Green	Green

- Source: A Customer-focused Framework for Electric System Resilience, Allison Silverstein, Rob Gramlich and Michael Goggin, at 35 (May 2018).

PJM Identification of Resilience Attributes

Resource Type	Essential Reliability Services (Frequency, Voltage, Ramp Capability)					Fuel Assurance		Flexibility			Other		
	Frequency Response (Inertia & Primary)	Voltage Control	Ramp			Not Fuel Limited (> 72 hours at Ess. Max Output)	On-site Fuel Inventory	Cycle	Short Min. Run Time (< 2 hrs./ Multiple Starts Per Day)	Startup/ Modification Time < 30 Minutes	Black Start Capable	No Environmental Restrictions (that would limit Run Hours)	Equivalent Availability Factor
			Regulation	Contingency Reserve	Load Following								
Hydro	●	●	●	●	●	○	●	●	●	●	●	●	●
Natural Gas - Combustion Turbine	●	●	●	●	●	○	●	●	●	●	●	●	●
Oil - Steam	●	●	●	●	●	●	●	○	○	○	○	○	●
Coal - Steam	●	●	●	●	●	●	●	○	○	○	○	○	●
Natural Gas - Steam	●	●	●	●	●	○	●	○	○	○	●	●	●
Oil/ Diesel - Combustion Turbine	●	●	○	●	○	○	●	●	●	●	●	○	●
Nuclear	○	●	○	○	○	●	●	○	○	○	○	●	●
Battery/ Storage	○	●	●	●	○	○	○	●	●	●	○	●	●
Demand Response	○	○	●	●	●	○	○	●	●	○	○	●	●
Solar	○	○	○	○	○	○	○	●	●	●	○	●	●
Wind	○	○	○	○	○	○	○	●	●	●	○	●	●

- Source: Grid Resilience in RTOs and ISOs, Docket No. AD18-7-000, Comments and Responses of PJM Interconnection, LLC at 71 (March 9, 2018)

Resilience Attributes

- CHARTS – demonstrate that:
 - each type of resource has capabilities to provide *some* of the needed reliability and resilience services, but,
 - NONE can cost-effectively provide all essential reliability services. (Grid Strategies Whitepaper at 34-35).
- PJM Fuel Study shows system reliability under a range of scenarios with up to 86% gas-fired resources.
- Grid Strategies conclusion (Whitepaper at 38):
 - No single resource is critical in itself;
 - A diverse portfolio, combined with demand response and distributed generation, offset outage risk from individual plants or fuel sources.

Current Fuel Security Rules

- Fuel security is an element of current reliability planning:
 - PJM Capacity Performance Order – *PJM Interconnection, LLC*, 151 FERC ¶ 61,208 (2015).
 - ISO New England Pay-for-Performance – *ISO New England, Inc.*, 147 FERC ¶ 61,172 (2014).
- Do the RTOs need more?
 - This is the question being asked in:
 - PJM's on-going Fuel Security stakeholder initiative; and
 - ISO New England's compliance filing in Docket No. ER18-2364.

PJM Capacity Performance Order

- Intent was to address declining performance, including need to promote “securing reliable fuel.” *PJM Interconnection, LLC*, 151 FERC ¶ 61,208 at P 43.
 - “We find it reasonable that resources are able to reflect fuel security costs as the availability of fuel is an integral component of resource performance.” *Id.* at P 352.
 - “In fact, it is this expectation, and the likely higher clearing price for the Capacity Performance product that will result, that will help incent investments in maintenance, dual or firm fuel, or weatherization to improve capacity resource performance, particularly during summer and winter peak periods.” *Id.* at P 466.

PJM Price Formation – Fuel Cost Policies

- *PJM Interconnection, LLC*, 158 FERC ¶ 61,133 (2017) – accepts PJM’s filing re Fuel Cost Policies subject to further modifications, allowing generators to:
 - submit day-ahead offers that vary by hour;
 - update offers in real time;
 - include cost of firm fuel procurement in energy offers;
 - Incremental fuel cost
 - Incremental maintenance and labor costs
 - No-load cost during period of operation
 - Emissions allowances/adders
 - Variable O&M and other incremental operating adders
 - Ten percent adder

ISO New England Pay-for Performance Order

- In 2014, FERC found ISO NE’s Forward Capacity Market (“FCM”) failed to provide incentives for resource performance, threatening reliable operations and forcing consumers to pay for capacity without receiving reliability benefits.
 - “ISO-NE’s two-settlement capacity market design replicates the performance incentives that would exist in an uncapped energy market by linking payments to performance during scarcity conditions. It follows that a resource that acquires a Capacity Supply Obligation . . . does not merit compensation when it fails to perform in accordance with that obligation, regardless of fault.” *Id.* at P 63.
 - *ISO New England*, 147 FERC ¶ 61,172 at P 23 (2014).

ISO New England Fuel Security Waiver

- *ISO New England, Inc.*, 164 FERC ¶ 61,003 (2018)
 - Denied ISO NE’s request for a waiver to provide a cost-of-service payment to two Constellation Mystic Power units for fuel security.
 - Initiated an FPA Section 206 investigation, preliminarily finding the ISO’s tariff unjust and unreasonable because it failed to address “specific regional fuel security concerns.”
 - Directed ISO NE to either (1) file tariff revisions providing for short-term, cost-of-service agreement to address fuel security concerns; or (2) show cause why its tariff remains just and reasonable.

Constellation Mystic Power

- Companion filing to ISO NE Waiver filing seeking cost-of-service compensation to ensure fuel security for 2022 – 2024.
- Notwithstanding ruling on the waiver filing, FERC approved Constellation Mystic Power's request for RMR-type contract, subject to a hearing on cost issues.
 - *Constellation Mystic Power, LLC*, 164 FERC ¶ 61,022 (2018).
- Allows recovery for the costs associated with the LNG facility that supplies fuel to the plants.

Constellation Mystic Power (con't)

- Powelson Dissent –
 - Record does not show that a \$400 million subsidy over two years – is the least-cost alternative.
 - “Longer-term alternatives, even if done through out-of-market payments, could be more cost effective than retaining Mystic,” e.g., continuing the Winter Reliability Program, Pay-for-Performance, transmission alternatives or installing dual fuel capability at other power plants.
 - “[U]nprecedented exercise of market power, using lack of fuel security as its threat” due to the inability of one market participant to “compete in the market.”

Constellation Mystic Power (con't)

- Glick Dissent:
 - Order requires consumers to bear “significant additional costs without even a cursory examination by the Commission of other options for addressing potential fuel security concerns more efficiently.”
 - “The fact that reliability is among the Commission’s most important responsibilities does not transform every reliability concern into an emergency.”
 - Mystic reliability issue doesn’t arise for another four years, FERC should encourage stakeholders to evaluate fuel security issues and identify cost-effective solutions.

ISO NE FUEL SECURITY FILING

- Docket No. ER18-2384 filed 8/31/2018.
- RMR-like approach to fuel security.
- Short term solution:
 - FCMs 2022/23 – 2024/25 – pending stakeholder discussions for long-term solution.
- Available only for retiring resources:
 - Not available for resources delisting on a year-to-year basis.

ISO NE Fuel Security Filing (con't)

- Model assumptions (18 scenarios):
 - Variables: LNG supply (gas demand and renewables); capacity imports (2,800 MW, 3,000 MW and 3,500 MW); oil inventories (1.2 – 2 refills/year).
- Reliability Trigger:
 - 10 minute reserves below 700 MW in any hour in absence of a contingency in more than one scenario.
 - Load shedding in any hour in any one scenario.
- Ex-ante cost allocation: Real Time Load Obligations.
- Price Taker in FCM:
 - Both out-of-market treatment and repricing bids would over-procure capacity, be more costly for consumers and exceed benefits of retention.
 - No price suppression: the lower price reflects reduced resource adequacy benefit at the margin.

NEPOOL Alternative to ISO NE Proposal

- Reduce out-of-market arrangements and lower costs.
- Sunset at two years – end of 2023/24 FCM.
- Assumptions consistent with firm fuel obligations:
 - Reduces scenarios to four (excludes low variable inputs)
 - *New England Power Generators Association, Inc. v. ISO New England, Inc.*, 144 FERC ¶ 61,157 (2013).
- Trigger:
 - Exclude 10 minute reserves below 700 MW criterion;
 - Limit load shedding criterion to any one scenario totaling at least the MW of expected energy not served at the net ICR (used to set demand curves).
- Assume states will meet statutory RPS requirements
 - Data shows states are meeting these requirements.

PJM Current Fuel Security Initiative

- April 30, 2018 Valuing Fuel Security Initiative
- Objectives:
 - Define fuel security criteria.
 - Develop market solutions that allow resources to compete to meet those criteria and value fuel security attributes.
 - Cost effective procurement of fuel security; price signals to incent investment in fuel secure infrastructure.

PJM Current Fuel Security Initiative

- Assumptions: generation (thermal, renewables), load, fuel oil constraints, topology, transmission constraints, interchange hurdle rates, fuel prices.
- Identify fuel delivery infrastructure risks (oil and gas delivery, frozen coal piles).
- Transmission analysis (N-1 scenarios both electric and gas).
- Determine locational “Fuel Secure” MW requirements.
- Evaluate current capabilities of resources that mitigate weather and man-made risks.
- Criteria for market-based mechanism to mitigate fuel security risks.

HIGH COST OF FUEL SECURITY

- The Brattle Group estimates cost at \$20 - \$35 billion annually for coal and nuclear plants subsidies.
 - The Cost of Preventing Baseload Retirements, A preliminary Examination of the DOE Memorandum at 3, Prepared for Advanced Energy Economy, M. Celebi, M. Chupka, K. Oh and R. Sweet (July 2018).
- Constellation Mystic Power estimates cost to subsidize its two units at \$404.6 million over two years.
 - *Constellation Mystic Power, LLC*, Docket No. ER18-1639, Attachment D, Exh. No. MYS-006, Direct Testimony of Alan Heintz at 15.
- Leaked White House Memo estimates the benefit of avoided outages at \$18 - \$70 billion annually – but generation outages are only 0.1% of that total, thus generation-related benefit is only \$18 - \$70 million annually.

Grid Resilience Objectives: the Four Questions

- Four criteria for providing additional payments for fuel security:
 - Is there a need for additional incentives for fuel security?
 - If so, how much additional fuel security is needed, what resources provide that attribute, and are additional performance obligations appropriate?
 - What are the most cost effective tools to acquire that additional fuel security?
 - Is there a market solution, and if so, should that solution be in the capacity or energy market?

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Ms. Goulet is a partner in McCarter & English, LLP, and has more than 30 years of federal and state energy policy and rate litigation/settlement experience. Representing municipal utilities, rural electric cooperatives, state commissions and state consumer advocate offices in both the electric and natural gas industries, she focuses on Regional Transmission Organization matters, especially those associated with the PJM Interconnection, LLC.

She has practiced before the U.S. Court of Appeals for the District of Columbia and Third Circuits. Prior to entering private practice in 2005, Ms. Goulet served for 26 years with consumer advocate offices in Pennsylvania and West Virginia, and as Law Clerk to the Chair of the Public Service Commission of West Virginia. She is a member of Phi Beta Kappa, and was recognized as one of the Groundbreaking Lawyers of 2009 by Public Utilities Fortnightly.