



**Statement of Michael E. Bryson, Senior Vice President – Operations
on Behalf of PJM Interconnection, L.L.C.**

Joint Technical Conference to Discuss Improving Winter Readiness of Generating Units

Docket #AD22-4-000

April 28, 2022

For Public Use

I. Comments

PJM is pleased to provide these comments for Commission consideration as part of its April 28, 2022, joint technical conference on improving winter readiness of generating units. This written statement supplements my oral presentation in the panel 3 discussion on “Implementing Cold Weather Preparedness Plans for Reliability Operations.” My name is Michael E. Bryson. I currently serve as PJM’s Senior Vice President – Operations, where I am responsible for PJM’s Reliability and Operations.

As relevant here, PJM works with its member companies to ensure reliable and efficient delivery of electricity to those it serves. PJM uses various processes and procedures specified in the PJM Manuals to prepare for winter weather operations and assesses generation preparedness ahead of the winter season in coordination with Generation Owners.

A. PJM Winter Operations Assessment Task Force Study

The PJM Operations Assessment Task Force (OATF) consists of representatives from PJM and PJM Transmission Owners. This team, under the direction of PJM, conducts seasonal studies for the summer and winter periods. The purpose of the study is to analyze the PJM system with the transmission and generation configuration approximating the conditions expected to exist during the study period. The study conditions include forecasted demand based on forecast weather and estimated outages, as well as a series of more extreme scenarios, including external contingencies that could impact PJM reliability, loss of more than one BES element (N-1-1 Relay trip conditions), Max-Cred Contingency Analysis, import capability analysis, extreme (90/10) load forecast study, solar and wind generation sensitivity study, and gas pipeline disruption study. The study focuses on the current PJM RTO boundary and the boundaries of any applicable external companies that will be integrated into PJM prior to the study period at the time the scope for the study was drafted by PJM. The process for conducting the OATF study is documented in PJM Manual 38, Operations Planning, Attachment A.¹

B. Annual Generation Resource Cold Weather Preparation Guideline and Checklist

Annually, in the month of November, PJM issues a data request that asks Generation Owners to certify that they have prepared their units for cold weather operations in accordance with industry guidelines. PJM allows Generation Owners to use the comprehensive checklist in PJM Manual 14-D, Attachment ‘N’, Cold Weather Preparation Guideline and Checklist, or a plant -specific checklist. The desired outcome is to identify and prioritize components, systems and other areas of vulnerability, which may experience freezing problems or

¹ <https://www.pjm.com/-/media/documents/manuals/m38.ashx>

other cold weather operational issues. The PJM checklist addresses areas such as training, personnel preparation, staffing, equipment preparation, fuel and environmental preparation, and actions taken when there is cold weather forecast, lessons learned after cold weather events, as well as links to documents that provide industry guidance.²

C. Annual Cold Weather Resource Operational Exercise

Under PJM Manual 14D, Generator Operations, Section 7.5, Cold Weather Generation Resource Preparation,³ PJM recommends that Generation Owners self-schedule any of their generation resources that have not operated in the eight weeks leading up to Dec. 1 to determine whether they are capable of reliably operating on both primary and alternate fuel and responding to PJM's dispatch instructions. Under the PJM Capacity Performance (CP) market construct, it is expected that generation resources do whatever is necessary to prepare for cold weather operations. Prior to CP, generation resources were paid to come online for this exercise.

D. Pre-Winter Emergency Procedures Drill

Pursuant to Manual 13, PJM conducts Emergency Procedure drills each year in November that include PJM, Generation Owners, and Transmission Owners, and is focused on capacity shortage events. The drill helps ensure all entities are familiar with required actions and communications required for each Emergency Procedure, up to and including load shed action, as specified in PJM Manual 13, Emergency Operations.⁴

E. PJM Winter Readiness Meeting

PJM also conducts an internal, cross-divisional meeting annually in the fall to review each PJM department's preparedness for winter operations. It includes discussions and presentations by Operations, Markets and Planning divisions. Topics addressed in these cross-divisional meetings include: (i) weather and load forecast outlook; review of winter OATF study (including base case parameters, peak load study results, and sensitivity studies); (ii) potential gas/electric concerns for upcoming peak period; Interconnection Projects update (including key project upgrades and delays, generation additions and retirements, review of additional reactive resources coming online, generation preparation, outage and performance updates); (iii) review of NERC Standard FAC-014, Requirement 6, list of multiple facility contingencies (if any) which result in stability

² These requirements, guidelines and checklist are found in PJM Manual 14D, section 7.5, <https://www.pjm.com/-/media/documents/manuals/m14d.ashx>

³ <https://www.pjm.com/-/media/documents/manuals/m14d.ashx>

⁴ <https://www.pjm.com/-/media/documents/manuals/m13.ashx>

limitations; and (iv) review of any specific concerns or questions from PJM's Dispatch, Reliability Engineering and Markets personnel.

II. PJM's Responses to Specific Questions Concerning Ongoing Measures for Winter Preparedness and Operations to Ensure Reliability Applicable to PJM

- A. Describe how BAs manage planned outages and maintenance of generation facilities during winter, make the decision to postpone planned outages in anticipation of forecast cold weather events, and consider peak load and GO/GOP fuel supply and inventory concerns when scheduling generation outages.

Planned and maintenance outage coordination between PJM and Generation Owners is governed by Manual 14D, Generation Operations, sections 7.3.1 Planned Outages and 7.3.2 Maintenance Outages, and the PJM Governing Agreements.⁵ Outages may consist of temporarily taking an entire plant offline or reducing a plant's capability. Upon receipt of a request for an outage, PJM may approve it, suggest alternate dates, or deny it based on Generator Outage Reserve Margins and other related factors. PJM evaluates generator outages for their effect on reliability, including thermal and voltage analysis at a transmission zone level or on an RTO-wide level. Outage requests are considered on a first-come, first-served basis.

With respect to scheduling generation outages and determining the amount of megawatts that can be safely permitted to take an outage, PJM's analyses contemplate that unforeseen circumstances may arise at any time. Such unforeseen circumstances can include abnormally high system demand (driven by abnormally warm or cold weather), common mode generation outages (e.g., wind cutoff, icing, hurricane, gas pipeline restrictions), and general unplanned generation outages due to mechanical failures. To ensure the continued reliability of the PJM system in the event of such scenarios, PJM maintains a Generation Outage Reserve margin above the expected future weekly peak load levels. PJM will not permit outages to be scheduled if this margin would not be maintained.

Planned Outage requests must be submitted to PJM at least 30 days in advance and are encouraged to be submitted as far in advance as possible to allow for sufficient analysis and coordination, since these types of outages are typically long in duration and involve complex maintenance tasks, repairs, plant modifications, environmental upgrades and other similar work. Additional reliability analysis is also performed to ensure there are no conflicts with transmission outages or other generating outages that would create thermal or voltage violations that cannot be mitigated. If any are identified, PJM works with the generation and

⁵ Operating Agreement, Schedule 1/Tariff, Attachment K-Appendix, section 1.9.2 Planned Outages; see also, Tariff, Attachment DD, section 9, Peak Season Maintenance Compliance Penalty Charge. PJM is currently engaged in dialogue with PJM's stakeholders around existing outage planning and coordination processes and how they can be improved. This includes exploring potential revisions to PJM's manuals and potential enhancements to existing tools and processes.

Transmission Owners to reschedule the outages as necessary to prevent the violations from occurring.

PJM's outage analysis also involves coordination with its neighbors given the system linkages between the different RTO/ISO regions.

Maintenance Outages are generally limited to nine days in duration. Such outages are intended for generators to perform maintenance that needs to be done in between major "overhauls" that tend to take long periods or to maintain/repair plant systems (e.g., tube leak repairs, maintenance on mills or pulverizers, testing, and valve repairs). Maintenance Outage requests are evaluated against near-term ($T + 6$ days) weather forecast, resulting load (demand) forecast and already approved or in-progress outages. The evaluation of Maintenance Outage requests also factor in Generator Outage Reserves to ensure enough offline units can be brought online to maintain grid reliability. Unlike Planned Outages, the shorter Maintenance Outages are subject to recall by PJM for grid reliability reasons with 72 hours' notice. Units not made available within 72 hours are reclassified as an Unplanned (Forced) Outage.

Per the PJM Tariff, Generation Owners, not PJM, are responsible for scheduling generation outages.⁶ PJM evaluates outage requests based on multiple factors, including weather forecast, load forecast, existing outages scheduled, and adequate generator outage reserve margins at both an RTO and zonal level. PJM's analyses of outage requests also consider the reliability services a unit may provide to the grid, including reactive power capability and stability. As with Planned outages, additional reliability analysis is also performed to ensure there are no conflicts with transmission outages or other generating outages that would create thermal or voltage violations that cannot be mitigated. If any are identified, PJM works with the Generation and Transmission Owners to reschedule the outages as necessary to prevent the violations from occurring.

PJM also cannot rely solely on the generator outage reserve when deciding what outages can be accommodated given the sometimes unexpected daily needs of the power grid. In daily operations, system studies are performed to identify and mitigate issues (typically transmission issues) before they arise on the system. The results of these studies can sometimes lead PJM to call upon units to run in order to address or mitigate reliability issues. The need for these units to run could, under certain circumstances, lead to the rescheduling or cancellation of previously scheduled outages.

⁶ Rules governing generation resource outage scheduling are further documented in PJM Manual 10: Pre-Scheduling Operations, available at: <https://www.pjm.com/~media/documents/manuals/m10.ashx>. PJM capacity resources are required to submit outage data to PJM. This data is important both for ongoing reliability assessments and for determining the actual, available level of unforced or net capacity. See Reliability Assurance Agreement Among Load Serving Entities in the PJM Region, Schedule 11(3) ("Actual outage data for each month for Generator Forced Outages, Generator Maintenance Outages and Generator Planned Outages shall be submitted so that it is received by such date specified in the PJM Manuals."); see also PJM Manual 14D: Generator Operational Requirements, section 7.3, available at: <https://www.pjm.com/~media/documents/manuals/m14d.ashx>.

- B. Discuss the ways (other than limiting generation outages) in which TOPs/BAs/RCs take fuel supply and inventory concerns into account when planning for winter peak or an extreme cold weather event.

PJM conducts a variety of critical activities in preparation for each winter season in order to assess existing and planned fuel inventories for storable fuels as well as assess supply and transportation risks for all fuel types.

i. Annual Fuel and Emission Data Request

One of the key undertakings is the annual pre-winter Generation Owner fuel and emissions data request in accordance with Manual 14D, Section 7.3.5. The data request is focused on fuel supply and delivery details, fuel inventory and emissions limitations, and it is intended to enhance PJM situational awareness in preparation for severe weather.

ii. Weekly Fuel and Non-Fuel Consumable Data Requests

In addition to the pre-winter preparation activities, starting with the 2021/2022 winter season, PJM initiated a weekly fuel and non-fuel consumable data request for all generators that utilize coal or oil as their primary or backup fuel. This data request focuses on more real-time inventory levels and supply risks for both fuel and non-fuel consumable materials (e.g., emission control chemicals). Capturing this data on a more frequent basis allows PJM to better identify and understand any supply, supply chain or transportation issues that could impact generator operations. Reliability assessments are conducted based on identified potential supply risks to determine if any impact on grid operations might occur.

iii. Cold Weather Operating Limit Data Request

PJM issues an annual cold-weather operating-limit data request to all generation resources, regardless of technology type. This data request started in 2019 in response to recommendations in a NERC/FERC report on a MISO cold weather event in January 2018.⁷ PJM updated this data request in 2021 to account for lessons learned and recommendations from the Electric Reliability Council of Texas (ERCOT) cold weather event in February 2021.⁸ PJM is in the process of including in the PJM Manuals how cold weather operating limit data will be applied in PJM's operating plans.

iv. Changes to Maximum Emergency Generation Reporting

With the 2021/2022 winter season presenting increased challenges with regard to supply chain and transportation concerns, in October 2021, PJM initiated a change to its Maximum Emergency Generation

⁷ https://www.nerc.com/pa/rrm/ea/Documents/South_Central_Cold_Weather_Event_FERC-NERC-Report_20190718.pdf

⁸ http://www.ercot.com/content/wcm/key_documents_lists/225373/2.2_REVISED_ERCOT_Presentation.pdf

Reporting process in Manual 13 to assist generating units in managing fuel inventories. Under this procedure, PJM may request that Generation Owners move fuel or emission-limited steam units into the Maximum Emergency category if the Generator Owners' remaining run hours fall below 240 hours (10 days). Unless needed for thermal control, voltage control, capacity, system restoration or testing, the units could remain in Maximum Emergency status until their inventory rose above 21 days (504 hours). For combustion turbines that are also limited by fuel and/or emissions, they can be requested into Maximum Emergency if the resource's remaining run hours are below 24 hours until they are expected to be back above 24 hours.

v. Gas and Electric Coordination

Given that natural gas generation makes up the largest percentage of the resource mix in PJM, the availability of natural gas supply and transportation is of utmost importance, particularly during the winter months when the gas pipeline capacity is most utilized. PJM has developed a strong relationship with the natural gas industry in order to work together on the acute interdependency that exists between the electric and gas industries.⁹ As part of this relationship, PJM, together with other ISO/RTO Council members, participates in an annual pre-winter meeting with the interstate pipeline organizations as well as the natural gas supply industry to assess gas industry preparedness for the upcoming winter season. Additionally, throughout the winter months, the PJM Gas-Electric Coordination Team conducts weekly calls with each of the interstate pipeline control centers that serve PJM generation to assess current operating conditions, load forecasts, maintenance work, and other issues that could affect operations during upcoming seven-day periods.

The PJM Gas-Electric Coordination Team also performs a daily gas generation risk assessment that focuses on the identification of any pipeline restrictions that could affect fuel deliverability and whether sufficient gas has been scheduled to meet gas generation unit commitments in the Day-Ahead Market. This risk assessment is shared internally with PJM Dispatch, Operations and Markets personnel to provide operational awareness. Additionally, to better prepare for emergency fuel limitations, PJM has created a number of gas contingencies within its Emergency Management System, which are initiated whenever a Cold Weather Alert is issued or when a pipeline event occurs that presents a risk to fuel delivery. The contingency analysis evaluates the impacts of the loss of multiple gas-fired generators in the event of a pipeline or supply failure.

⁹ See PJM's comments filed in response to the Commission's March 15, 2021, *Climate Change, Extreme Weather, and Electric System Reliability*, Supplemental Notice of Technical Conference Inviting Comments, Docket No. AD21-13-000 (Mar. 15, 2021), in which PJM addressed the need for such coordination and communication with gas pipelines.

Although PJM has done much partnering with the gas pipelines as noted above, this does not mean that overall work on gas-electric coordination, both at the industry-to-industry level as well as at the regulatory level, is complete. PJM outlined in its Comments in Docket No. AD21-13-000 specific improvements it believes are important in this area and urges FERC action, working with the two industries, on these important industries.¹⁰

vi. Use of Real-Time Values

Another tool that PJM employs to address generator fuel delivery limitations involves the use of Real-Time Values. As an example, if in real time, after the close of the Day-Ahead Market, a pipeline operator-issued restriction [e.g., Operational Flow Order (OFO), Critical Day notice, Ratable Take Requirement] occurs on the pipeline or there are contractual limitations, and a resource is not able to procure gas (ex. interruptible service level), a Market Seller may submit a Real-Time Value (RTV) to reflect the current operational capability of the generator. By entering a RTV, the limits override the approved/proxy Parameter Limited Schedule (PLS) limits and automatically bridge over to Security Constrained Economic Dispatch (SCED), so PJM Dispatch is aware of the constraint and the PJM Markets systems can accurately dispatch the resource in a manner that is physically achievable (e.g., Increased Minimum Run Time due to a pipeline Ratable Take Requirement).

vii. Interregional Coordination

On an interregional basis, PJM, the New York Independent System Operator, Inc. (NYISO), and the New England Independent System Operator (ISONE) have established a joint Memorandum of Understanding (MOU). This MOU is memorialized in PJM Manual 13, Emergency Operations, Section 6 as the Inter-RTO Natural Gas Coordination Procedure. The MOU addresses the collaboration between the three entities in the event of an extreme cold weather event. When an extreme cold weather event is anticipated, the three entities will jointly act to communicate with the interstate natural gas pipelines and coordinate actions to be taken to manage potential gas supply inadequacy situations as described in the Memorandum of Understanding on Natural Gas & Electric Interdependency.¹¹

¹⁰ https://elibrary.ferc.gov/eLibrary/filelist?accession_number=20210415-5230&optimized=false.

¹¹ <https://www.pjm.com/~media/documents/agreements/20050613-gas-mou-questions.ashx>. (PJM never had to sue this procedure)

C. How can the NERC Guideline¹² related to fuel-related risks be improved and made more useful to generators, TOPs/BAs/RCs and fuel suppliers?

PJM was part of the team that drafted this initial document. It reflects the lessons learned and best practices of not only PJM, but also all Reliability Coordinators. PJM, through the NERC Real Time Operating Subcommittee (RTOS), assists with the periodic review of the document as well. However, given that this Guideline is not a Standard, it is important to reinforce the need to ensure that generators, TOPs/BAs/RCs, and fuel developers are reviewing the NERC Guideline as part of ongoing training with their operations and planning personnel, particularly as part of winter preparedness activities. Additionally, as somewhat of an expansion of portions of the Guideline, the NERC Energy Reliability Assessment Task Force (ERATF) has recently proposed two Standard Authorization Requests to address both short- and long-term fuel assurance studies.

¹² https://www.nerc.com/comm/RSTC_Reliability_Guidelines/Fuel_Assurance_and_Fuel-Related_Reliability_Risk_Analysis_for_the_Bulk_Power_System.pdf#search=fuel%20guideline