

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation,)	
Complainant,)	
)	
v.	)	Docket No. EL23-66-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	
)	

ANSWER OF PJM INTERCONNECTION, L.L.C.

PJM Interconnection, L.L.C. (“PJM”), pursuant to Rule 213 of the Federal Energy Regulatory Commission’s (“Commission”) Rules of Practice and Procedure,¹ submits this answer to the Complaint filed by Calpine Corporation (“Calpine” or “Complainant”) on May 10, 2023.² As discussed below, the Commission should deny the Complaint, because it does not establish that PJM’s actions to maintain reliability during Winter Storm Elliott³ violated its Open Access Transmission Tariff (“Tariff”), Amended and Restated Operating Agreement (“Operating Agreement”), or its manuals.

¹ 18 C.F.R. § 385.213.

² *Calpine Corp. v. PJM Interconnection, L.L.C.*, Complaint of Calpine Corporation, Docket No. EL23-66-000 (May 10, 2023) (“Complaint”).

³ Winter Storm Elliott refers to a large winter storm that passed through the PJM Region between December 23 and December 25, 2022. *See Winter Storm Elliott Info*, PJM Interconnection, L.L.C., <https://pjm.com/markets-and-operations/winter-storm-elliott> (last visited June 8, 2023) (collecting PJM’s public statements addressing Winter Storm Elliott’s impact on PJM’s operations and markets).

I. INTRODUCTION

Calpine is a Capacity Market Seller,⁴ responsible for a number of Capacity Resources in PJM. For each year since the inception of Capacity Performance that Calpine's resources have been committed to provide capacity, Calpine has been well paid by PJM Region loads to support resource adequacy at the times of greatest need. But, during Winter Storm Elliott, when the PJM Region encountered its most acute resource adequacy challenge since the inception of the Capacity Performance construct, certain Calpine Capacity Resources underperformed, earning Non-Performance Charges.

Calpine offers no excuses for its resources' underperformance. Instead, Calpine seeks to reduce or eliminate its exposure to Non-Performance Charges by asking the Commission to undo PJM's declarations of Emergency Actions triggering Performance Assessment Intervals. Calpine claims there is a "mismatch between what happened on the ground and what PJM's Tariff and manual require"⁵ because PJM did not curtail all non-firm exports during the Emergency Actions.⁶ Specifically, Calpine argues that, because PJM's "very first action" upon declaring an emergency was not to curtail exports, "some or most of the [Performance Assessment Intervals] could have been eliminated, rendering Non-Performance Charges for those [Performance Assessment Intervals] errant and unjust and unreasonable."⁷

⁴ Capitalized terms used, but not otherwise defined, in this pleading have the meaning provided in, as applicable, the Tariff, the Operating Agreement, or the Reliability Assurance Agreement Among Load-Serving Entities in the PJM Region ("Reliability Assurance Agreement").

⁵ Complaint 12.

⁶ Complaint at 9-11.

⁷ Complaint at 9-11.

However, none of Calpine’s arguments undermines PJM’s declared Emergency Actions on December 23 and 24. That PJM allowed non-firm exports to occur during the Emergency Actions does not invalidate PJM’s declarations. PJM, at all times, acted consistent with its primary obligation of maintaining reliability in the PJM Region, while lending support to neighboring regions in need, when possible. Michael Bryson, PJM’s Senior Vice President of Operations, and Steven T. Naumann, an outside expert on planning operations, reliability, and regulatory aspects of electric power systems explain that PJM operators’ actions during Winter Storm Elliott were appropriate and followed all applicable rules of the Tariff, Operating Agreement, North American Electric Reliability Corporation (“NERC”), and the PJM Manuals.⁸

While Calpine states that its Complaint does not “second-guess PJM’s operational decisions or [PJM’s] determination that assistance to neighboring regions was warranted,”⁹ that is in fact the crux of Calpine’s complaint—PJM’s operators should not have declared Emergency Actions triggering the Performance Assessment Intervals in which Calpine’s resources underperformed without curtailing non-firm exports. But the Commission should not be led down the path of parsing individual PJM operator actions during an emergency to determine whether the specific declarations made, and specific steps taken (or not) support such declarations. Micro-managing those decisions after the fact, as Calpine and certain other Winter Storm Elliott complainants request the Commission to do, amounts to the very sort of “second-guessing” that the Commission has made clear it

⁸ See Attachment B, Affidavit of Michael E. Bryson on Behalf of PJM Interconnection, L.L.C. at Exhibit 1 (“Bryson Aff.”); Attachment C, Affidavit of Steven T. Naumann, P.E. on Behalf of PJM Interconnection, L.L.C. at Exhibit 1 (“Naumann Aff.”).

⁹ Complaint at 11.

will avoid when it comes to regional transmission organizations (“RTOs”) exercising their “operational and reliability-related discretion.”¹⁰ Monday morning quarterbacking as to the fine details of PJM’s implementation of its assigned responsibility, and discretion, to manage emergencies¹¹ is not only inappropriate, but would create a dangerous precedent that the Commission should be very reluctant to set.

As explained in detail below, PJM and its operators managed the many difficult challenges posed by Winter Storm Elliott,¹² including unusually high overnight and holiday weekend demand, massive amounts of generator forced outages, managing hydro-pumped storage resources to best extract their desperately needed benefits, and providing assistance to neighbors. Importantly, during this entire event, PJM did not direct a single mandatory load curtailment—*the lights stayed on*. The Commission should keep those facts in mind as it evaluates Complainant requests to tease out of individual operator actions to, in effect, excuse Capacity Resource non-performance.

Under the Tariff’s Capacity Performance rules, Capacity Market Sellers “bear the burden of delivering on their capacity obligation.”¹³ As certain of Calpine’s Capacity Resources did not meet their obligations during Winter Storm Elliott, PJM properly assessed Non-Performance Charges. Calpine’s efforts to nullify those charges through its Complaint are unavailing.

¹⁰ *Big Sandy Peaker Plant, LLC v. PJM Interconnection, L.L.C.*, 154 FERC ¶ 61,216, at P 50 (2016).

¹¹ *See* Operating Agreement, section 10.4(xx).

¹² The severity of the event and the threat to maintaining grid reliability was recognized by the Secretary of Energy who issued an emergency order on December 24, 2022. *See* Department of Energy, Order No. 202-22-4 (Dec. 24, 2022), <https://www.pjm.com/-/media/documents/ferc/orders/2022/20221224-pjm-202c-doe-order.ashx>.

¹³ *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208 (2015) (“CP Order”), *order on reh’g & compliance*, 155 FERC ¶ 61,157, at P 110 (2016) (“CP Rehearing Order”), *aff’d sub nom. Advanced Energy Mgmt. All. v. FERC*, 860 F.3d 656 (D.C. Cir. 2017).

II. BACKGROUND

A. The Capacity Performance Construct Shifted Performance Risk to Generators from Load by Requiring Generators to Perform when Needed, or Pay Stringent Non-Performance Charges. Excuses from Such Charges Were Limited by Design and Explicitly Approved by the Commission to Meet the Intended Goal of Ensuring Reliability During Stressed System Conditions

Following severe weather events in January 2014 during which generating resources in the PJM Region performed very poorly, PJM proposed, and the Commission accepted, capacity market reforms to incentivize committed Capacity Resources to deliver the promised energy and reserves when PJM calls upon them in emergencies.¹⁴ Central to these reforms was a new capacity product, the Capacity Performance Resource, which must be “capable of sustained, predictable operation such that the resource will be reliably available to provide energy and reserves in an emergency condition.”¹⁵

To incentivize Capacity Performance Resources to deliver the capacity and reliability they are paid to provide, the Tariff provides that when PJM takes Emergency Actions, underperforming Capacity Resources face Non-Performance Charges and overperforming resources earn bonus payments.¹⁶ Specifically, for the period (known as Performance Assessment Intervals) when certain PJM-declared Emergency Actions are in effect, the Tariff requires PJM to assess Non-Performance Charges when a Capacity Resource underperforms.¹⁷ The Commission found that Non-Performance Charges will

¹⁴ See generally CP Order and CP Rehearing Order.

¹⁵ CP Order at P 28.

¹⁶ The details for applying and determining Non-Performance Charges and bonus payments are set forth in Tariff, Attachment DD, section 10A. A resource does not need to be a Capacity Resource to receive bonus payments.

¹⁷ See Tariff, Attachment DD, section 10A(c) (prescribing comparison of Actual Performance against Expected Performance); Tariff, Definitions – E-F (defining Emergency Action), *id.*, Definitions – O-P-Q (defining Performance Assessment Interval).

“act as a strong incentive for performance,”¹⁸ explaining that “if and to the extent [a Capacity Resource] fails to perform during an emergency, when it is most needed, it is appropriate that the compensation for that resource be reduced and possibly entirely forfeited.”¹⁹

There are only two excuses from Non-Performance Charges, and they are “strictly circumscribed.”²⁰ Specifically, a resource’s performance shortfall may be excused only if the resource was on a PJM-approved Generator Planned Outage or Generator Maintenance Outage or the resource “was not scheduled to operate by [PJM], or was online but was scheduled down, by [PJM], based on a determination by [PJM] that such scheduling action was appropriate to the security-constrained economic dispatch of the PJM Region.”²¹ There is a crucial caveat to that second exception: a resource shall be assessed Non-Performance Charges to the extent it “otherwise was needed and would have been scheduled by [PJM] to perform, but was not scheduled to operate, or was scheduled down, solely due to: (i) any operating parameter limitations submitted in the resource’s offer, or (ii) the seller’s submission of a market-based offer higher than its cost-based [offer].”²²

Capacity Resources are not paid to simply standby; they are paid to be available to perform and serve PJM’s loads. Thus, Capacity Market Sellers should assume that their resources will be needed, at a minimum, any time the PJM Region is under a declared emergency for capacity shortages. If Capacity Market Sellers need to purchase natural gas and self-schedule to ensure that their Capacity Resources can be available when needed,

¹⁸ CP Rehearing Order at P 72.

¹⁹ CP Rehearing Order at P 29.

²⁰ CP Order at P 167.

²¹ Tariff, Attachment DD, section 10A(d).

²² Tariff, Attachment DD, section 10A(d).

then sellers of gas-fueled Capacity Resources should engage in such forward-looking behavior.²³

The Non-Performance Charges advance the overarching goal of Capacity Performance: ensuring all Capacity Resources are available to provide energy or reserves when needed, while reallocating non-performance risk from consumers to capacity suppliers.²⁴ Stated another way, PJM's Tariff rules penalizing under-performance are designed so that customers get the reliability for which they are paying and generators' capacity revenues are tied "more closely with real-time delivery of energy and reserves during emergency system conditions."²⁵

B. Commission Policy, and the Governing Provisions of the Tariff and Operating Agreement, Afford PJM Substantial Discretion and the Needed Tools and Flexibility to Declare, Manage, and Resolve Emergencies

As noted in the preceding section, Non-Performance Charges are assessed during Performance Assessment Intervals, which are triggered by PJM's declaration of certain types of procedures that qualify as Emergency Actions. The Commission has repeatedly recognized the importance of affording RTOs, such as PJM, the discretion to respond to operational circumstances related to reliability concerns, and the Tariff and Operating

²³ Generators have recognized that the Capacity Performance rules require that "the generator must manage its fuel supply risks and ensure that it is able to perform when called to do so by PJM." *See PJM Interconnection, L.L.C.*, Answer of Direct Energy to PJM Interconnection, L.L.C.'s Motion for Leave to Answer and Answer, Docket No. ER19-664-000, at 3 (Feb. 14, 2019).

²⁴ *See, e.g.*, CP Order at P 5 ("[A] resource adequacy construct that fails to provide adequate incentives for resource performance can threaten the reliable operation of PJM's system and force consumers to pay for capacity without receiving commensurate reliability benefits."); CP Rehearing Order at PP 27 ("PJM's proposed revisions to the capacity market penalty structure reallocate a significant portion of this performance risk to capacity resource owners and operators."), 109 (recognizing that each non-performance excuse "represent[s] a reallocation of nonperformance risk from capacity suppliers to consumers." (citing *ISO New England Inc.*, 147 FERC ¶ 61,172, at P 71 (2014))).

²⁵ CP Order at P 158.

Agreement assign PJM the central role in declaring and managing emergencies, with few if any express Tariff conditions on how PJM implements that vital responsibility.

For context, the Commission has long recognized that “[t]he reality of pool operations is a continuous matching of load and supply that requires every system operator to have the flexibility to respond to operational crises as they develop.”²⁶ Applying this policy, the Commission recently declined to specify requested criteria that “could restrict operators’ ability to apply their expert judgment to actual conditions on the system in making decisions to maintain reliable operations.”²⁷ In the same vein, the Commission has found that “it may be appropriate to provide operational and reliability-related discretion to independent system operators, and to not second-guess their decisions in that regard.”²⁸

Understandably, the need for such discretion is most acute during emergencies, and PJM’s governing documents are designed to not unduly constrain PJM’s efforts to address emergencies. Most importantly, the Operating Agreement (executed by all Capacity Market Sellers, among others), without elaboration, assigns to PJM the authority to declare an Emergency and manage grid operations to ensure reliability and alleviate or end the Emergency.²⁹ The Operating Agreement broadly defines “Emergency” to include “an abnormal system condition requiring manual or automatic action to maintain system frequency, or to prevent loss of firm load, equipment damage, or tripping of system elements that could adversely affect the reliability of an electric system or the safety of

²⁶ *Me. Pub. Utils. Comm’n*, 97 FERC ¶ 61,322, at P 26 (2001).

²⁷ *PJM Interconnection, L.L.C.*, 180 FERC ¶ 61,051, at P 82 (2022).

²⁸ *Big Sandy Peaker Plant*, 154 FERC ¶ 61,216, at P 50; *see also Midcontinent Indep. Sys. Operator, Inc.*, 164 FERC ¶ 61,129, at P 37 (2018) (“We find that it is appropriate for MISO to have discretion to respond to operational circumstances related to reliability concerns.”).

²⁹ Operating Agreement, section 10.4(xx).

persons or property;” and “a condition that requires implementation of emergency procedures as defined in the PJM Manuals.”³⁰

Implementing this responsibility, PJM has an entire manual solely devoted to Emergency Operations.³¹ That manual opens with policy statements that provide the essential context for the details that follow, explaining that “Power system disturbances” which can occur “as the result of loss of generating equipment . . . or as the result of unexpected load changes . . . may be of, or develop into, a magnitude sufficient to affect the reliable operation of the PJM RTO and/or the Eastern Interconnection;” and stressing that “[t]hese events demand timely, decisive action to prevent further propagation of the disturbance.”³² PJM’s overarching responsibility during Emergencies is “[t]aking actions [*PJM*] determines are consistent with Good Utility Practice and are necessary to maintain the operational integrity of the PJM RTO and the Eastern Interconnection.”³³

As particularly relevant here, the Tariff defines “Emergency Actions” that trigger Performance Assessment Intervals as “any emergency action for locational or system-wide capacity shortages that either utilizes pre-emergency mandatory load management reductions or other emergency capacity, or initiates a more severe action including, but not limited to, a Voltage Reduction Warning, Voltage Reduction Action, Manual Load Dump Warning, or Manual Load Dump Action.”³⁴ One such action, declared here, is a “Maximum Generation Emergency” which means “an Emergency *declared by [PJM]* to

³⁰ Operating Agreement, Definitions – E-F.

³¹ See System Operations Division, *PJM Manual 13: Emergency Operations (Rev. 86)*, PJM Interconnection, L.L.C. (Nov. 3, 2022), <https://www.pjm.com/-/media/documents/manuals/archive/m13/m13v86-emergency-operations-11-03-2022.ashx> (“PJM Manual 13”).

³² PJM Manual 13, section 1.1.

³³ *Id.* (emphasis added); see also Tariff, Definitions – G-H (defining Good Utility Practice).

³⁴ Tariff, Definitions – E-F.

address either a generation or transmission emergency in which *[PJM] anticipates* requesting one or more Generation Capacity Resources . . . to operate at its maximum net or gross electrical power output, subject to the equipment stress limits for such Generation Capacity Resource . . . in order to manage, alleviate, or end the Emergency.”³⁵

C. PJM Exercised Its Discretion to Declare Emergency Actions During Winter Storm Elliott in Response to Very Challenging, Rapidly Changing Conditions, Including Unexpectedly High Demand and Unexpectedly High Forced Outages

1. The PJM Region faced unprecedented, rapidly changing conditions during Winter Storm Elliott.

Winter Storm Elliott, lasting from December 23, 2022, through December 25, 2022, caused record cold temperatures across the PJM Region.³⁶ The severe cold weather on December 23,³⁷ including a record-breaking temperature drop of 29 degrees Fahrenheit over 12 hours on that day surpassed the previous PJM record of a 22-degree drop during the 2014 Polar Vortex.³⁸ Adding to the grid management challenges, the overnight minimum load in the early morning hours of December 24 was by far the highest on record for that date—exceeding by 40,000 megawatts (“MW”) the second highest minimum overnight load on that date in the prior decade.³⁹ The challenges were exacerbated by

³⁵ Tariff, Definitions – L-M-N (emphasis added).

³⁶ See *Winter Storm Elliott Frequently Asked Questions*, PJM Interconnection, L.L.C., 3 (Apr. 12, 2023), <https://www.pjm.com/-/media/markets-ops/winter-storm-elliott/faq-winter-storm-elliott.ashx> (“Winter Storm Elliott FAQ”).

³⁷ All dates noted in this chronology are in 2022.

³⁸ See Winter Storm Elliott FAQ at 3.

³⁹ See Mike Bryson, Sr. et al., *Winter Storm Elliott*, PJM Interconnection, L.L.C., 8 (Jan. 13, 2023), <https://pjm.com/-/media/committees-groups/committees/mic/2023/20230111/item-0x---winter-storm-elliott-overview.ashx> (“Winter Storm Elliott Overview”).

almost a third of PJM’s generation fleet (about 47,000 MW) taking unplanned (i.e., forced) outages during these emergency conditions.⁴⁰

2. *PJM deployed its available tools to give generators advance notice of the need to prepare for challenging conditions*

Beginning on December 20, PJM issued multiple Cold Weather Advisories and Cold Weather Alerts on both a regional basis and an entire RTO basis. These various types of advisories and alerts, detailed in the timeline presented in Attachment A, were intended to elevate awareness of impending conditions and provide notice to Members—including those responsible for Capacity Resources—so they could prepare personnel and facilities for extreme cold weather conditions.

3. *PJM declared Emergency Actions during December 23 and December 24 as part of PJM’s successful effort to preserve reliability*

On the morning of December 23, PJM started the operating day with approximately 133 gigawatts (“GW”) of energy committed in the Day-Ahead Energy Market and an additional 9 GW of available 30-minute reserves, notwithstanding the approximately 12 GW of unplanned (forced) outages that were reported for the PJM generation fleet.⁴¹ The resulting total of 158,000 MW of generation reported as available on the morning of December 23 exceeded the then-forecast PJM Region peak of about 127,000 MW, leaving (at that time) almost 29 GW of reserve capacity expected to be available to absorb load increases and generation contingencies and support PJM’s neighboring systems.⁴² For comparison, PJM’s day-ahead reserve requirement for December 23 was 3 GW.

⁴⁰ Operating Committee, *Winter Storm Elliott Generator Performance*, PJM Interconnection, L.L.C. (Feb. 9, 2023), <https://www.pjm.com/-/media/committees-groups/committees/oc/2023/20230209/20230209-item-04---winter-storm-elliott-generator-performance.ashx>.

⁴¹ See Winter Storm Elliott FAQ at 3, 7.

⁴² See Winter Storm Elliott Overview at 5.

However, as the day went on, temperatures plunged incredibly quickly and demand spiked. At the same time, PJM began seeing high levels of forced generation outages.⁴³ PJM responded by exercising its discretion to invoke its Emergency-related authorities, including calling upon generators with capacity commitments, deploying Synchronized Reserves, initiating RTO-wide Maximum Generation Emergency Actions, and calling on demand response resources. At 17:30⁴⁴ on December 23, in conjunction with PJM's issuance of an Energy Emergency Alert ("EEA") level 2,⁴⁵ PJM declared a Pre-Emergency Load Management Reduction Action and a Maximum Generation Emergency Action.⁴⁶ The declaration of the Maximum Generation Emergency Action triggered Performance Assessment Intervals and put all on notice of the severity of the emergency conditions facing the PJM Region.⁴⁷ During the evening of December 23, with (as previously noted) power demand rising to a peak of about 135,000 MW and generator forced outages

⁴³ See Winter Storm Elliott Overview at 12.

⁴⁴ All times in this answer are in 24-hour clock and in Eastern Prevailing Time.

⁴⁵ As explained in NERC Reliability Standard EOP-011-1, Attachment 1: "To ensure that all Reliability Coordinators clearly understand potential and actual Energy Emergencies in the Interconnection, NERC has established three levels of EEAs. The Reliability Coordinators will use these terms when communicating Energy Emergencies to each other. An EEA is an Emergency procedure, not a daily operating practice, and is not intended as an alternative to compliance with NERC Reliability Standards. The Reliability Coordinator may declare whatever alert level is necessary, and need not proceed through the alerts sequentially." *Reliability Standard EOP-011-1 Emergency Operations*. North American Electric Reliability Corporation, Attachment 1 (Dec. 1, 2015), <https://www.nerc.com/pa/Stand/Reliability%20Standards/EOP-011-1.pdf> ("EOP-011-1")

⁴⁶ See Attachment A at 1. Although it was issued to be in effect through 23:59, PJM cancelled the Maximum Generation Emergency Action at 23:00.

⁴⁷ Performance assessment hours are triggered when PJM declares an Emergency Action. Tariff, Attachment DD, section 10.A(a). An Emergency Action is defined as "locational or system-wide capacity shortages" that cause "pre-emergency mandatory load management reductions or . . . a more severe action." Tariff, Definitions – E-F.

increasing to 34,500 MW,⁴⁸ at 23:00, PJM declared a Maximum Generation Alert and Load Management Alert, as well as an EEA1, starting December 24 at 00:00.⁴⁹

Given the persistent high load demand and high forced outage rates (rising up to about 47,000 MW by the morning peak, as previously noted) on the morning of December 24, PJM continued to invoke its various alerts and authorities to manage the Emergency and maintain reliability, and to put all Market Participants on notice of the urgent need for capacity. Thus, PJM issued a rare public Region-wide call for conservation from 04:00 on December 24 to 10:00 on December 25.⁵⁰ At 04:20, PJM issued an EEA2, a Pre-Emergency Load Management Reduction Action, and an Emergency Load Management Reduction Action.⁵¹ On December 24, PJM issued a Maximum Generation Emergency for the period from 04:28 to 22:00 triggering Performance Assessment Intervals.

Additionally, around 06:30 on December 24, in response to generators starting to inform PJM operators that their resources were reaching their emission runtime limits, PJM began working with the U.S. Department of Energy (“DOE”) to obtain an emergency order pursuant to section 202(c) of the Federal Power Act (“FPA”).⁵² PJM petitioned DOE for a declaration of energy emergency on the afternoon of December 24.⁵³ At 17:30, DOE

⁴⁸ See Winter Storm Elliott FAQ at 3.

⁴⁹ See Attachment A at 1.

⁵⁰ See Attachment A at 2.

⁵¹ See Attachment A at 2.

⁵² 16 U.S.C. § 824a(c).

⁵³ Request for Emergency Order Under Section 202(c) of the Federal Power Act of PJM Interconnection, L.L.C., Dept. of Energy (Dec. 24, 2022), <https://www.energy.gov/sites/default/files/2022-12/PJM%20202%28c%29%20Request.pdf>.

issued the requested FPA section 202 emergency order,⁵⁴ authorizing all electric generating units serving the PJM Region to operate up to their maximum generation output levels under limited, prescribed circumstances, even if doing so exceeded their air quality or other permit limitations. The DOE emergency order lasted from 17:30 on December 24 through 12:00 on December 26.⁵⁵

PJM's actions helped preserve reliability during this very challenging period. *Most importantly, PJM did not shed any load during Winter Storm Elliott.*

III. ANSWER

A. *PJM's Emergency Actions—Including Its Support to Neighboring Systems in Distress—Complied with the Tariff, Operating Agreement, NERC Requirements, and Manuals*

Calpine's sole argument for reducing or eliminating its Non-Performance Charges is "that PJM's actions with respect to exports violated its Tariff and manuals and PJM implemented its emergency procedures . . . in an unjust and unreasonable manner."⁵⁶ Specifically, Calpine alleges PJM's failure to curtail exports before or during the Emergency Actions (e.g., a Maximum Generation Emergency Action or a Pre-Emergency or Emergency Load Management Reduction Action) that triggered Performance Assessment Intervals violated the Tariff and manuals.⁵⁷ In support, Calpine points to PJM Manual 13, NERC Reliability Standard EOP-011-1, and a PJM energy market rule (codified in the Tariff and Operating Agreement).⁵⁸ But none of these authorities *requires*

⁵⁴ See Department of Energy, Order No. 202-22-4 (Dec. 24, 2022), <https://www.pjm.com/-/media/documents/ferc/orders/2022/20221224-pjm-202c-doe-order.ashx>.

⁵⁵ *Id.*

⁵⁶ Complaint at 13-14.

⁵⁷ Complaint at 9-12.

⁵⁸ Complaint at 9-10.

PJM to curtail exports before declaring or during an Emergency Action. In fact, the Tariff, Operating Agreement, PJM Manual 13, and applicable NERC standards provide PJM with great authority and discretion in declaring emergencies and flexibility in addressing emergency conditions.

Contrary to Calpine’s assertions, PJM acted properly throughout Winter Storm Elliott. PJM properly exercised its authority under the Operating Agreement authority to declare an Emergency and manage grid operations to ensure reliability and alleviate or end the Emergency.⁵⁹ PJM maintained reliability in the face of severe weather and unprecedented generator performance failures. When able, PJM also lent support to its neighbors in their time of need, but recalled such exports when needed to maintain reliability. As discussed below, and in the attached affidavits of Messrs. Bryson and Naumann, PJM had ample authority to allow non-firm exports during Winter Storm Elliott when PJM believed it could assist neighboring systems without jeopardizing reliability in PJM. In addition, PJM “did not initiate Load Management procedures for the purpose of assisting other regions” and thus “was not constrained from providing exports to regions experiencing or attempting to avoid capacity deficient conditions.”⁶⁰ PJM committed no violations of the Tariff, Operating Agreement, or PJM Manual 13.

Michael Bryson, PJM’s Senior Vice President of Operations, explains that PJM is required under the Tariff, Operating Agreement, PJM Manual 37,⁶¹ PJM Manual 13, NERC

⁵⁹ Operating Agreement, section 10.4(xx).

⁶⁰ Bryson Aff. ¶ 6.

⁶¹ System Operations Division, *PJM Manual 37: Reliability Coordination (Rev. 19)*, PJM Interconnection, L.L.C., section 1.1 (Mar. 23, 2022), <https://www.pjm.com/-/media/documents/manuals/archive/m37/m37v19-reliability-coordination-03-23-2022.ashx> (“PJM Manual 37”).

reliability standards, and agreements with other Balancing Authorities to provide emergency assistance to neighboring regions when possible.⁶² PJM met these obligations and satisfied Good Utility Practice by “help[ing] adjacent Balancing Areas to the extent feasible without shedding load in PJM.”⁶³ If PJM had done otherwise it would have been acting contrary to such requirements and contrary to how PJM operators are trained to act in emergency situations. In the face of an uncertain load forecast and “shockingly poor” generator performance, PJM operators appropriately took pre-emergency and emergency actions “instead of risking that PJM could avoid load-shedding by curtailing non-firm exports.”⁶⁴ As Mr. Bryson explains, “PJM prioritized meeting its own load by cutting exports—both firm and non-firm—when necessary.”⁶⁵ But “once PJM had sufficient capacity to provide assistance to other Balancing Areas, it was obligated to do so.”⁶⁶ For example, after the morning peak on December 24, 2022, “PJM took pre-emergency and emergency actions to meet its own needs, which created more capacity than it needed on a minute-by-minute basis, and it supplied some of that capacity to other areas that needed it through non-firm exports (as well as firm exports and emergency sales).”⁶⁷ On both

⁶² See Bryson Aff. ¶¶ 7-19.

⁶³ Bryson Aff. ¶ 19. Further, PJM is authorized by the Tariff “to direct or coordinate corrective action, whether or not specified in the PJM Manuals, as necessary to alleviate unusual conditions that threaten the integrity or reliability of the PJM Region, or the regional power system.” See Tariff, Attachment K-Appendix, section 1.7.15; Operating Agreement, Schedule 1, section 1.7.15.

⁶⁴ Bryson Aff. ¶ 19.

⁶⁵ Bryson Aff. ¶ 23.

⁶⁶ Bryson Aff. ¶ 30.

⁶⁷ Bryson Aff. ¶ 29.

December 23 and 24, 2022, even if PJM had curtailed all non-firm exports, pre-emergency and emergency actions would still have been necessary.⁶⁸

1. PJM Manual 13 Does Not and Cannot Prohibit Exports to Neighboring Systems During Emergencies

Calpine asserts that PJM Manual 13, section 2.1 requires PJM's "very first action" upon declaring an emergency to be curtailment of non-firm exports to neighboring regions,⁶⁹ and that section 2.3.2 requires PJM to curtail non-firm exports *prior* to calling an emergency.⁷⁰ These claims have no merit.

As an initial matter, "[t]he PJM Manuals are the instructions, rules, procedures, and guidelines established by PJM for the operation, planning, and accounting requirements of PJM and the PJM Energy Market."⁷¹ Thus, PJM Manual 13 refers to "expected" behaviors, not compulsory conduct, and PJM Manual 13, like all manuals, is supplementary to the Tariff and Operating Agreement. As discussed above in Part II.B, PJM has broad authority under the Tariff and Operating Agreement to declare emergencies and decide what steps to take to avoid, mitigate, or shorten emergencies.⁷² Nothing in the PJM Manuals could limit the ability of the PJM operators to address emergency conditions under the discretionary authority conferred in the Tariff and Operating Agreement, including *requiring* PJM to curtail non-firm exports upon declaring an emergency.

⁶⁸ See Bryson Aff. ¶¶ 21, 22.

⁶⁹ Complaint at 9.

⁷⁰ Complaint at 10.

⁷¹ PJM Manual 13 at 9.

⁷² See, e.g., Operating Agreement, section 10.4(xx).

There are good and obvious reasons for the Tariff, Operating Agreement, and PJM Manual 13 to give PJM broad flexibility during emergencies.⁷³ As Mr. Naumann explains, preserving reliability can be extremely challenging “when system operators face severe conditions, especially where decisions need to be made within a short period of time and circumstances are rapidly changing.”⁷⁴ It therefore, “should be no surprise that operators may take actions in real-time to address difficult problems that others may question after the fact as being overly conservative or uneconomic.”⁷⁵ That is exactly what Calpine seeks to do here. But it is critical to remember that during emergencies “delaying actions can result in unnecessary loss of load” and it is vitally “important for operators to be proactive—i.e., stay ahead of potential problems, not reactive after problems occur—to ensure reliability, especially during periods of severe stress.”⁷⁶ Simply stated, “operators have to make decisions based on current conditions, expected conditions, and the uncertainty of various elements of the system with an eye to preventing loss of load. They must have flexibility.”⁷⁷

Given the well-founded need for flexibility, PJM Manual 13 does not and cannot prohibit non-firm exports to neighboring systems during emergencies. PJM Manual 13 is

⁷³ PJM’s Tariff and Operating Agreement also incorporate mutual assistance principles. *See* Tariff, Attachment K-Appendix, section 1.6.2(vi) (PJM shall “[a]dminister . . . agreements for the transfer of energy in conditions constituting an Emergency in the PJM Region or in an interconnected Control Area, and the mutual provision of other support in such Emergency conditions with other interconnected Control Areas”); Operating Agreement, Schedule 1, section 1.6.2(vi) (same); Tariff, Attachment K-Appendix, section 1.6.2(vii) (PJM shall “[c]oordinate the curtailment or shedding of load, or other measures appropriate to alleviate an Emergency, in order to preserve reliability in accordance with NERC, or Applicable Regional Entity principles, guidelines and standards, and to ensure the operation of the PJM Region in accordance with Good Utility Practice and this Agreement”); Operating Agreement, Schedule 1, section 1.6.2(vii) (same).

⁷⁴ Naumann Aff. ¶ 6.

⁷⁵ Naumann Aff. ¶ 6.

⁷⁶ Naumann Aff. ¶ 6.

⁷⁷ Naumann Aff. ¶ 16.

replete with statements confirming that operators have broad discretion to deviate from the PJM Manual 13 procedure when necessary to preserve reliability.⁷⁸ Section 1.1 of PJM Manual 13 begins by declaring that “the policy of PJM is to maintain, at all times, the integrity of the PJM RTO transmission systems *and* the Eastern Interconnection, and to give maximum reasonable assistance to adjacent systems when a disturbance that is external to the PJM RTO occurs.”⁷⁹ Section 1.1 continues that PJM must take actions “it determines are consistent with Good Utility Practice and are necessary to maintain the operational integrity of the PJM RTO *and* the Eastern Interconnection.”⁸⁰ In this vein, section 2.3 explicitly informs that “PJM dispatchers have the flexibility of implementing the emergency procedures in whatever order is required to ensure overall system reliability” and “the flexibility to exit the emergency procedures in a different order than they are implemented when conditions necessitate.”⁸¹

Similarly, section 2.3.2, which addresses “Real-Time Emergency Procedures (Warnings and Actions),” preserves PJM’s operational flexibility during emergencies. Section 2.3.2 provides that “[d]ue to system conditions and the time required to obtain results, PJM dispatchers may find it necessary to vary the order of application [of Warnings and Actions in real time] to achieve the best overall system reliability.”⁸² PJM can therefore “deviate from or change the order of the above actions [pertaining to Maximum Generation

⁷⁸ See Bryson Aff. ¶¶ 11-17; Naumann Aff. ¶¶ 14-15. Other PJM Manuals likewise reflect the broad range of PJM’s discretion to take appropriate actions during emergencies. PJM Manual 37 states that “PJM Members are responsible for . . . [t]aking any action, as requested or directed by PJM, to manage, alleviate, or end an Emergency or other reliability issue.” PJM Manual 37, section 1.1.

⁷⁹ PJM Manual 13, section 1.1.

⁸⁰ PJM Manual 13, section 1.1.

⁸¹ PJM Manual 13, section 2.3.

⁸² PJM Manual 13, section 2.3.2.

Emergency Action] as/if necessary.”⁸³ A specially highlighted “Note” in section 2.3.2 emphasizes that “[t]he Real-Time Emergency Procedures section combines Warnings and Actions in their most probable sequence based on notification requirements during extreme peak conditions.”⁸⁴

Further, contrary to Calpine’s broad assertion,⁸⁵ section 2.3.2 has a specific procedure for determining whether to cut transactions to other Balancing Authorities if PJM has declared a Maximum Emergency Action. Specifically, Mr. Bryson explains that “[t]his provision gives such transactions, when made known to PJM, a priority almost as high as native load stating that ‘[i]f the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM.’”⁸⁶ Accordingly, Mr. Bryson concludes that “[c]learly, given this directive, there cannot be a mandatory requirement that PJM must cut all non-firm exports before taking an Emergency Action.”⁸⁷

2. *NERC Reliability Standards do not require PJM to curtail non-firm exports as a condition of declaring an emergency*

Calpine also suggests that NERC Reliability Standard EOP-011-1 provides an independent basis for denying PJM needed operational flexibility during emergencies.⁸⁸

⁸³ PJM Manual 13, section 2.3.2.

⁸⁴ PJM Manual 13, section 2.3.2.

⁸⁵ See Complaint at 10 (asserting that PJM Manual 13, section 2.3.2 provides that “PJM will ‘[c]urtail all non-firm exports.’”).

⁸⁶ Bryson Aff. ¶ 15 & n.35 (quoting PJM Manual 13, section 2.3.2).

⁸⁷ Bryson Aff. ¶ 15.

⁸⁸ See Complaint at 10 (“North American Electric Reliability Corporation (‘NERC’) rules governing system emergencies presuppose that a Reliability Coordinator will limit exports as a condition of announcing an EEA.” (citing EOP-011-1, Attachment 1, section B(1)).

Mr. Bryson explains why this argument is misplaced.⁸⁹ It is true that EOP-011-1 provides that curtailing “[n]on-firm wholesale energy sales (other than those that are recallable to meet reserve requirements)” may be a typical step before declaring an EEA1 alert. However, EOP-011-1 also specifies that “[t]he Reliability Coordinator may declare whatever alert level is necessary, and need not proceed through the alerts sequentially.”⁹⁰ Therefore, issuing an EEA1 alert is not a prerequisite for declaring an EEA2 event such as the Maximum Generation Emergency Actions or the Pre-Emergency Load Management Reduction Actions that PJM declared on December 23 and 24, triggering Performance Assessment Intervals during Winter Storm Elliott.

As a result, PJM’s declaration of an EEA2 on December 23 before declaring an EEA1 event was proper. PJM Manual 13 repeatedly states that, “[a] NERC EEA2 may be issued when the following has occurred: Public appeals to reduce demand, voltage reduction, interruption of non-firm load in accordance with applicable contracts, demand side management/active load management, *or* utility load conservation measures.”⁹¹ Mr. Bryson attests that this language in particular must mean that PJM Manual 13 “does not mandate that Maximum Generation Emergency Action or a Pre-Emergency/Emergency

⁸⁹ See Bryson Aff. ¶¶ 16-17.

⁹⁰ EOP-011-1, Attachment 1

⁹¹ PJM Manual 13, section 2.3.2 (Step 2 - Emergency Load Management Reduction Action) (emphasis added); *id.* (Step 7 - Deploy All Resources); *id.* (Step 9 - Voltage Reduction Action); *id.* section 2.5 (Transmission Security Emergency Procedures) (Step 2 - Emergency Load Management Reduction Action); *id.* (Step 7 - Deploy All Resources); *id.* (Step 9 - Voltage Reduction Action) (emphasis added); *see also id.* section 2.3.2 (Step 2 - Emergency Load Management Reduction Action) (Note 4, EEA Levels) (stating that a NEARC EEA2 “may be issued,” rather than “is issued”); *id.* section 5.2 (Transmission Security Emergency Procedures) (Note 4, EEA Levels) (same).

Load Management Reduction Action may be taken only when all non-firm exports are curtailed.”⁹²

In short, there is no plausible way to read PJM Manual 13 or NERC Reliability Standard EOP-011-1 as requiring the recall of all non-firm exports as a condition of calling a Maximum Generation Emergency Action or a Pre-Emergency or Emergency Load Management Reduction Action.

3. *PJM Energy Market Rules Did Not Require PJM to Curtail Non-Firm Exports to Maintain Reserve Levels*

Calpine also suggests PJM’s allowance of non-firm exports during emergency conditions violated the PJM energy market rule directing PJM to “curtail deliveries to an External Market Buyer if necessary to maintain appropriate reserve levels for a Control Zone as defined in the PJM Manuals, or to avoid shedding load in such Control Zone.”⁹³ This claim has no merit. Importantly, the plain language of the rule provides that curtailments are required only “if necessary.” Calpine makes no attempt to show that curtailments were necessary,⁹⁴ and thus fails to meet its required burden of proof.⁹⁵ In any event, Mr. Bryson shows that export curtailments were not necessary, as PJM had sufficient megawatts available.⁹⁶ Mr. Naumann explains that PJM Manual 13 “contemplates” the situation where PJM “assist[s] its neighbors when it can while retaining the ability to recall

⁹² Bryson Aff. ¶ 14.

⁹³ Complaint at 10 (quoting Tariff, Attachment K-Appendix, section 1.10.6(c); Operating Agreement, Schedule 1, section 1.10.6(c)).

⁹⁴ See Complaint at 10.

⁹⁵ See *Sage Grouse Energy Project, LLC v. PacifiCorp*, 154 FERC ¶ 61,223, at P 25 & n.73 (“[T]he Commission requires that the complainant provide the Commission with evidentiary materials, including documents that support the facts in the complaint.”).

⁹⁶ See Bryson Aff. ¶¶ 39-41.

non-firm transactions when necessary”⁹⁷ by providing that “[i]f the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM.”⁹⁸ Thus, PJM was able to maintain appropriate reserve levels,⁹⁹ while supporting neighboring regions when possible.

B. Curtailing Non-Firm Exports Would Not Have Resolved the Emergency Conditions

Underlying the Complaint’s arguments is the notion that if PJM had curtailed exports PJM would not have triggered Performance Assessment Intervals by declaring Emergency Actions, including Pre-Emergency Load Management Reduction Actions, Emergency Load Management Reduction Actions, and Maximum Generation Emergency Actions. But, as Mr. Bryson testifies, “[c]urtailing all non-firm transactions would not have alleviated the conditions that compelled the decision of the PJM operators to take Emergency Actions.”¹⁰⁰

Mr. Bryson demonstrates that, for the Emergency Actions triggering Performance Assessment Intervals on December 23, “even if the operators had cut all non-firm exports there would have been a deficit of at least 1,789 MW needed to satisfy PJM load and firm exports,” and “Pre-Emergency and Emergency Actions thus would have been necessary to satisfy capacity needs even if all non-firm exports had been cut.”¹⁰¹ Likewise, for the Emergency Actions triggering Performance Assessment Intervals on December 24, “even

⁹⁷ Naumann Aff. ¶ 21.

⁹⁸ Naumann Aff. ¶ 21 (quoting PJM Manual 13, section 2.3.2).

⁹⁹ See Bryson Aff. ¶¶ 38-41.

¹⁰⁰ Bryson Aff. ¶ 19.

¹⁰¹ Bryson Aff. ¶ 21.

if the operators had cut all non-firm exports there would have been a deficit between about 4,688 MW and 2,920 MW during this period needed to satisfy PJM load and firm exports.”¹⁰² PJM’s declaration of “Pre-Emergency and Emergency Actions thus would have been necessary even if all non-firm exports had been cut.”¹⁰³

Moreover, PJM *did curtail* non-firm exports when necessary. Mr. Bryson provides evidence that there were a “significant number of hours in which the assistance requested by other regions was not supplied,” and that those hours “correlate[] to the periods when PJM needed most of its generation for internal loads notwithstanding that during some these times other regions were seeking emergency supplies.”¹⁰⁴

Finally, Mr. Bryson provides insight that “the PJM’s operators’ reasons for taking Pre-Emergency and Emergency Actions [on December 24] related mainly to uncertainty in the load forecast and the surprisingly poor overall performance of generation,”¹⁰⁵ including poor performance from some of Calpine’s Capacity Resources. He explains that the poor performance of Capacity Resources on December 23 reasonably informed PJM operators’ decisions on December 24, and led to concerns about PJM’s ability to meet the evening peak on December 24. “In particular, operators were concerned that if the Maximum Generation Emergency Action and the Pre-Emergency/Emergency Load Management Reduction Action were rescinded and PJM attempted to reinstate them in the face of a high evening peak on December 24, there could be a significantly lower response rate,” i.e., “[i]f allowed to go offline, some generators might not restart due to the cold

¹⁰² Bryson Aff. ¶ 22.

¹⁰³ Bryson Aff. ¶ 22.

¹⁰⁴ Bryson Aff. ¶ 23.

¹⁰⁵ Bryson Aff. ¶ 40.

weather conditions or units running on gas might resell their gas supply.”¹⁰⁶ Thus, “PJM’s ability to allow some non-firm exports to flow during the time leading up to the [December 24] evening peak was not indicative as to whether PJM could meet the evening peak without Emergency Actions even if all non-firm exports were curtailed.”¹⁰⁷

C. Under PJM’s Operating Agreement, Disputes Concerning PJM’s Dispatch Decisions Cannot Be Raised With FERC

While the Complaint appears to disavow challenging PJM operators’ decisions during Winter Storm Elliott,¹⁰⁸ the crux of the complaint is that PJM operators erred allowing non-firm exports to occur during Emergency Actions. However, the Commission need not reach or decide any allegation of improper scheduling by PJM, as such claims are barred by Operating Agreement, Schedule 1, section 1.8.2 and *PPL EnergyPlus*.¹⁰⁹ Specifically, Operating Agreement, Schedule 1, section 1.8.2 provides that disputes concerning PJM’s dispatch decisions should be brought directly to PJM, not to the Commission. This provision states that “[c]omplaints arising from or relating to [the selection, scheduling or dispatch of resources] shall be brought to the attention of [PJM].”¹¹⁰ Section 1.8.2 requires that any such complaints must “be brought to the attention of [PJM] not later than the end of the fifth Business Day after the end of the Operating Day to which the selection or scheduling relates, or in which the scheduling or dispatch took place.”¹¹¹ It further provides that PJM’s market participants shall not be

¹⁰⁶ Bryson Aff. ¶ 26.

¹⁰⁷ Bryson Aff. ¶ 25.

¹⁰⁸ See, e.g., Complaint at 11 (“To be clear: Calpine does not herein second-guess PJM’s operational decisions or its determination that assistance to neighboring regions was warranted.”).

¹⁰⁹ *PPL EnergyPlus, LLC*, 117 FERC ¶ 61,338, at P 33 (2006) (“*PPL EnergyPlus*”).

¹¹⁰ Operating Agreement, Schedule 1, section 1.8.2(a); Tariff, Attachment K-Appendix, section 1.8.2(a).

¹¹¹ Operating Agreement, Schedule 1, section 1.8.2(a); Tariff, Attachment K-Appendix, section 1.8.2(a).

entitled to any “form of reimbursement from [PJM] or any other Market Participant for any loss, liability or claim, including any claim for lost profits, incurred as a result of a mistake, error or other fault by [PJM] in the selection, scheduling or dispatch of resources.”¹¹²

The Commission’s decision in *PPL EnergyPlus* confirms this reading of the Operating Agreement. There, the Commission barred the claim of a generator that its unit should have been called sooner by the operators during a reliability emergency related to the overload of a single transmission line.¹¹³ The generator argued that its unit should have been dispatched before PJM called a Maximum Emergency Generation Event and started to purchase emergency power and not afterwards, in violation of the Operating Agreement.¹¹⁴ The Commission dismissed the generator’s claim stating: “PJM and the signatories to the Operating Agreement, including PPL, have agreed that disputes concerning these matters not lead to the retroactive unraveling of PJM’s market dispatch decisions leading to re-creation of hypothetical prices based on potentially different dispatch decisions.”¹¹⁵ This finding should apply equally to any claims of improper scheduling implied by the Complaint.

Further, PJM’s longstanding rationale for including this provision in the Operating Agreement, as explained by the Commission, underscores why it should be applicable in this case:

As PJM correctly notes . . . the parties’ claim limitation agreement recognizes the day-to-day stress of system operations and the need, on PJM’s part, to exercise judgment in making dispatch decisions, particularly in emergencies. Because such dispatch decisions are made in real-time, such decisions cannot be reversed and trying to

¹¹² Operating Agreement, Schedule 1, section 1.8.2(d); Tariff, Attachment K-Appendix, section 1.8.2(d)..

¹¹³ *PPL EnergyPlus*, 117 FERC ¶ 61,338, at PP 2, 33.

¹¹⁴ *PPL EnergyPlus*, 117 FERC ¶ 61,338, at PP 3-4.

¹¹⁵ *PPL EnergyPlus*, 117 FERC ¶ 61,338, at P 33.

recreate monetary damages for potential errors would be difficult and inappropriate.¹¹⁶

The “stress” faced by the PJM operators and the “need for judgement” during Winter Storm Elliott dwarf the issues faced by the operators in *PPL EnergyPlus*, where the emergency conditions affected only a small part of the PJM system. This rationale thus applies with even greater force to the facts in this proceeding given the severity of the situation that PJM faced.

IV. ADMISSIONS AND DENIALS PURSUANT TO 18 C.F.R. § 385.213(c)(2)(i)

Pursuant to Rule 213(c)(2)(i) of the Commission’s rules of Practice and Procedure,¹¹⁷ PJM affirms that any allegation in the Complaint is not specifically and expressly admitted above is denied.

V. AFFIRMATIVE DEFENSES PURSUANT TO 18 C.F.R. § 385.213(c)(2)(ii)

PJM’s affirmative defenses are set forth above in this answer, and include the following, subject to amendment and supplementation.

1. The Complainant has not satisfied its burden of proof under FPA section 206 (16 U.S.C. § 824e), and has not demonstrated that PJM violated any Commission order, the Tariff, the Operating Agreement, Reliability Assurance Agreement, the Consolidated Transmission Owners Agreement, or any other Commission-jurisdictional governing document.
2. Complainant fails to demonstrate that relief under FPA sections 306 and 309 (16 U.S.C. §§ 825e and 825h) is warranted.

¹¹⁶ *PPL EnergyPlus*, 117 FERC ¶ 61,338, at P 33.

¹¹⁷ 18 C.F.R. § 385.213(c)(2)(i).

VI. COMMUNICATIONS AND SERVICE

PJM requests that the Commission place the following individuals on the official service list for this proceeding:¹¹⁸

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¹¹⁸ To the extent necessary, PJM requests a waiver of Commission Rule 203(b)(3), 18 C.F.R. § 385.203(b)(3), to permit more than two persons to be listed on the official service list for this proceeding.

VII. CONCLUSION

For the reasons set forth in this answer, the Commission should deny the Complaint.

Respectfully submitted

/s/ Ryan J. Collins

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June 9, 2023

ATTACHMENTS

ATTACHMENT A: TIMELINE

ATTACHMENT B: AFFIDAVIT OF MICHAEL E. BRYSON ON BEHALF OF PJM
INTERCONNECTION, L.L.C.

ATTACHMENT C: AFFIDAVIT OF STEVEN T. NAUMANN, P.E., ON BEHALF OF
PJM INTERCONNECTION, L.L.C.

Attachment A

Timeline of PJM's Actions Related to Winter Storm Elliott

Timeline of PJM's Actions in Response to Winter Storm Elliott

This exhibit describes the steps that PJM took before, during, and after Winter Storm Elliott to preserve reliability in the face of unprecedented weather and load conditions, extraordinary failures and uncertainties caused by the poor performance of PJM Capacity Resources and the enormous operational complexities confronting the PJM operators in their management of the PJM system while attempting to provide mutual assistance to other regions.

- **12/20/2022 09:00:** PJM issued a Cold Weather Advisory for the Western Region Zones from 07:00 on 12/23/2022 through 23:00 on 12/25/2022.
 - Because PJM issued a Cold Weather Advisory, generators in the Western Region Zones were required to update unit specific operation limitations associated with cold weather preparedness including fuel supply and inventory concerns.
- **12/21/2022 10:00:** PJM issued a Cold Weather Alert for the Western Region Zones from 07:00 on 12/32/2022 through 23:00 on 12/25/2022; PJM extended the Cold Weather Advisory for the Western Region Zones from 07:00 on 12/23/2022 through 23:00 on 12/26/2022.
 - Because PJM issued a Cold Weather Alert, generation plants in the affected region were required to: review fuel supply/delivery schedules in anticipation of greater-than-normal operation of units, monitor and report projected fuel limitations to the PJM operator and update the unit Max Run field in Markets Gateway if less than 24 hours of run-time is remaining and contact PJM Dispatch if it is anticipated that spot market gas is unavailable, resulting in unavailability of bid-in generation.
- **12/22/2022 17:30:** PJM expanded its Cold Weather Advisory from 07:00 on 12/23/2022 through 23:00 on 12/26/2022 to the entire RTO (originally for Western Region Zones).
 - Because PJM issued an RTO-wide Cold Weather Advisory, all PJM generators were required to update unit specific operation limitations associated with cold weather preparedness including fuel supply and inventory concerns.
 - Given the expected weather, PJM was very conservative in developing its operating plans for 12/23/2022.
 - PJM's forecast load entering 12/23/2022 was 126,968 MW.
 - PJM had approximately 158,000 MW of operating capacity showing as available for 12/23/2022. PJM believed that it was guarding against potential uncertainty by having substantially more capacity available than would normally be needed to meet the load forecast.

- Based on submitted Generator Availability Data, PJM believed that it had almost 29 GW of reserve capacity available to absorb load and generating contingencies and to support neighboring systems.
- **12/23/2022 circa 03:00:** PJM load and generation forced outages/derates began increasing substantially.
- **12/23/2022 between 03:30 and 08:00:** Consistent with normal practices, PJM participated in regularly held conference calls with Tennessee Valley Association (TVA), VACAR South Reliability Coordinator, Mid-Continent Independent System Operator (MISO), New York Independent System Operator (NYISO) and the Florida Reliability Coordinating Council (FRCC) to discuss inter-regional coordination including peak load estimates, reserve requirements, estimated loads and anticipated daily challenges. Further, on an as-needed basis, additional calls between PJM and other regions occurred throughout the entirety of Winter Storm Elliott.
- **12/23/2022 06:30:** PJM sent 500 MWs of Emergency Energy to TVA due to TVA being in an EEA3.
- **12/23/2022 circa 07:30:** PJM began contacting generators to remain online or to come on line to meet morning and evening peaks and discovered that many units shown as available in Markets Gateway and eDART could not actually perform, in particular because gas-fired units lacked fuel. In addition, in a pattern that continued throughout the entire winter storm event, many generators did not provide timely updates of their parameters in Markets Gateway and/or failed to provide timely updates of their status in eDART.
- **12/23/2022 10:14:** 100% RTO Synchronized Reserve Event – PJM deployed Synchronized Reserves to recover low Area Control Error (ACE) due to PJM reserves falling to approximately 1500 MW. PJM canceled the Synchronized Reserves at 10:25.
 - PJM experienced low ACE due to load increasing as generators tripped or failed to start. ACE is a measure of how well the Balancing Authority is matching generation to the load. If load and generation are perfectly balanced, the ACE is zero. When a generator within a Balancing Authority trips off-line the ACE goes negative.
 - “Synchronized Reserves” are “the reserve capability of generation resources that can be converted fully into energy or Demand Resources whose demand can be reduced within ten minutes from the request of the [PJM] dispatcher, and is provided by equipment that is electrically synchronized to the Transmission System.” Synchronized Reserves are supplied from both 10-minute synchronized generating resources and 10-minute demand-side response resources.

- **12/23/2022 11:00:** PJM issued a Cold Weather Alert for the entire RTO from 00:00 on 12/24/2022 through 23:59 on 12/25/2022.
 - Because PJM issued an RTO-wide Cold Weather Alert, all PJM generation plants were required to: review fuel supply/delivery schedules in anticipation of greater-than-normal operation of units, monitor and report projected fuel limitations to the PJM operator and update the unit Max Run field in Markets Gateway if less than 24 hours of run-time was remaining and contact PJM Dispatch if it anticipated that spot market gas was unavailable, resulting in unavailability of bid-in generation.
- **12/23/2022 16:00:** PJM began curtailing exports.
- **12/23/2022 16:11:** The first of a series of calls occurred with TVA involving potential recall of almost 2500 MW in exports. TVA indicates that implementation would push that region into EEA3 load shed. PJM works with TVA to preserve TVA exports.
- **12/23/2022 16:17:** 100% RTO Synchronized Reserve Event – PJM deployed Synchronized Reserves to recover from low ACE. PJM canceled the Synchronized Reserves at 18:09.
- **12/23/2022 17:05:** PJM requested 500 MW of shared reserves from NPCC.
- **12/23/2022 17:30:** PJM issued an EEA2 with Pre-Emergency Load Management Reduction Action covering 30 minute and 60 minute Demand Response and a Maximum Generation Action. Performance Assessment Intervals triggered.
- **12/23/2022 17:36:** PJM requested an additional 1,000 MW of shared reserves from NPCC.
- **12/23/2022 18:10:** PJM began lifting export transaction curtailments.
- **12/23/2022 22:00:** Pre-Emergency Load Management Reduction Action, Emergency Load Management Reduction Action, and EEA2 ended; all exports were reloaded.
- **12/23/2022 23:00:** PJM declared a Maximum Generation Alert/Load Management Alert, and an EEA1, starting Saturday, 12/24/2022 at 00:00. The Maximum Generation Action for 12/23/2022 ended, terminating the Performance Assessment Intervals.
 - Entire overnight period – PJM was unable to pump at any of the pumped storage facilities (approximately 6 GW).
 - Entire overnight period – The “Christmas Eve Valley” experienced in the early morning hours on 12/24/2022 was 40,000 MW higher than the next

highest “valley” over the last decade and 15,000 MW higher than any peak load on that date in a decade.

- **12/24/2022 00:05:** PJM deployed Synchronized Reserves for the loss due to low ACE. PJM ends the Synchronized Reserves at 00:30.
- **12/24/2022 02:23:** PJM deployed Synchronized Reserves again as a result of a generator unit tripping off-line. PJM ends the Synchronized Reserves at 02:54.
- **12/24/2022 02:25:** PJM received 605 MW of NPCC shared reserves from 02:25 through 04:26.
- **12/24/2022 between 03:30 and 08:00:** Consistent with normal practices, PJM participates in regularly held conference calls with Tennessee Valley Association (TVA), VACAR South Reliability Coordinator, Mid-Continent Independent System Operator (MISO), New York Independent System Operator (NYISO) and the Florida Reliability Coordinating Council (FRCC) to discuss inter-regional coordination including peak load estimates, reserve requirements, estimated loads and anticipated daily challenges. Further, on an as-needed basis, additional calls between PJM and other regions occurred throughout the entirety of Winter Storm Elliott.
- **12/24/2022 04:00:** PJM issued a call for conservation of electricity use at 04:00 through 10:00 on 12/25/2022 and curtailed exports.
- **12/24/2022 04:20:** PJM issued an EEA2 – Pre-Emergency Load Management Reduction Action and Emergency Load Management Reduction Action covering 120 minute Demand Response.
- **12/24/2022 04:26:** PJM receives 1000 MW of NPCC shared reserves from 04:26 to 04:47.
- **12/24/2022 04:28:** PJM issued an EEA2 – Maximum Generation Emergency Action. Performance Assessment Intervals triggered.
 - The purpose of the Maximum Generation Emergency Action is to increase the PJM generation above the maximum economic level. It is implemented whenever generation is needed that is greater than the highest incremental cost level.
- **12/24/2022 04:52:** PJM issued a Voltage Reduction Alert.
- **12/24/2022 05:23:** PJM deployed Synchronized Reserves due to low ACE. PJM ends the Synchronized Reserves at 05:51.
- **12/24/2022 06:00:** Load Management came into effect; PJM curtails Non-Firm energy exports.

- **12/24/2022 06:17:** PJM encouraged Market Participants to submit bids to sell emergency energy into PJM and issued a public appeal to conserve energy.
- **12/24/2022 06:30:** PJM received first notification that generators were having to limit their output due to federal government environmental restrictions.
- **12/24/2022 07:15:** PJM issued Voltage Reduction Warning and Reduction of Non-Critical Plant Load.
- **12/24/2022 07:30:** PJM conducted an SOS conference call with the PJM transmission owners to update their leadership on the situation and to indicate the potential that PJM may need to shed load.
- **12/24/2022 08:00:** Over 24% of the PJM fleet experienced forced outages at around this time. These outages decreased after 08:00, but approximately 32,000 MW of generation was still experiencing forced outages by 22:00 on 12/24/2022.
- **12/24/2022 08:30:** PJM reached morning peak of approximately 130,000 MW; at the peak there were 46,000 MW of forced outages, with PJM experiencing 200 unit trips throughout the event. Approximately 6,000 MW of steam generation was called but was not online as expected for the morning peak. Factoring in start failures, units that operated at reduced output, and lack of pumped storage, PJM was missing approximately 57,000 MW of capacity that it expected to be available at this time.
- **12/24/2022 10:00:** Non-Firm energy exports resumed.
- **12/24/2022 15:00:** All exports were reloaded.
- **12/24/2022 17:30:** DOE 202(c) Order received and implemented effective immediately through 12:00 on 12/26/2022.
- **12/24/2022 18:15:** PJM ended Voltage Reduction Warning and Reduction of Non-Critical Plant Load.
- **12/24/2022 18:34:** PJM ended the Voltage Reduction Alert.
- **12/24/2022 22:00:** All pre-emergency and emergency procedures cancelled. PJM returned to EEA0. Performance Assessment Intervals end.
- **12/24/2022 22:38:** PJM issued a Maximum Generation Emergency/Load Management Alert for 12/25/2022.
 - The purpose of the Maximum Generation Emergency Action is to increase the PJM generation above the maximum economic level. It is implemented whenever generation is needed that is greater than the highest incremental cost level.

- PJM issued this Maximum Generation Emergency/Load Management Alert due to uncertainties regarding whether 12/25/2022 would match the unprecedentedly high load conditions of 12/23 and 12/24/2022.
- **12/25/2022 11:10:** PJM issued a Cold Weather Alert from 07:00 through 23:00 on 12/26/2022 for the Western Region Zones only.
 - Because PJM issued a Cold Weather Alert, generation plants in the affected region were required to: review fuel supply/delivery schedules in anticipation of greater-than-normal operation of units, monitor and report projected fuel limitations to the PJM operator and update the unit Max Run field in Markets Gateway if less than 24 hours of run-time is remaining and contact PJM Dispatch if it is anticipated that spot market gas is unavailable, resulting in unavailability of bid-in generation.
- **12/25/2022 22:00:** The Maximum Generation Emergency and Load Management Alert declared at 22:38 on 12/24/2022 ended, and PJM returned to EEA0. PJM's calls for conservation also end at this time.
 - The purpose of the Maximum Generation Emergency Action is to increase the PJM generation above the maximum economic level. It is implemented whenever generation is needed that is greater than the highest incremental cost level.
- **12/26/2022 23:00:** Cold Weather Alert for Western Regions Zones ended.

Attachment B

Affidavit of Michael E. Bryson
on Behalf of PJM Interconnection, L.L.C.

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation,)	
Complainant,)	
)	
v.	)	Docket No. EL23-66-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	
)	
Invenergy Nelson LLC,)	
Complainant,)	
)	
v.	)	Docket No. EL23-67-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	

**AFFIDAVIT OF MICHAEL E. BRYSON
ON BEHALF OF PJM INTERCONNECTION, L.L.C.**

1. My name is Michael E. Bryson. My business address is 2750 Monroe Blvd., Audubon, Pennsylvania, 19403. I am the Senior Vice President of Operations for PJM Interconnection, L.L.C. (PJM).

2. I am submitting this affidavit on behalf of PJM in support of PJM's Answers to the Complaints filed by the Calpine Corporation and Invenergy Nelson LLC in the captioned proceedings. I have reviewed these Complaints and aver that the statements, analyses, and conclusions I present in my May 26, 2023 affidavit submitted on behalf of PJM in support of PJM's Answers to the Complaints filed by the ComEd Zone Generators and the Coalition of PJM Capacity Resources in Docket Nos. EL23-54 and EL23-55, which I include as Exhibit 1 to this affidavit, apply equally to the issues raised in the captioned Complaints of Calpine Corporation and Invenergy Nelson LLC.

3. This concludes my affidavit.

Exhibit 1

Affidavit of Michael E. Bryson
on behalf of PJM Interconnection, L.L.C.

Submitted in Docket Nos. EL23-54 and EL23-55
on May 26, 2023

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Essential Power OPP, LLC, <i>et al.</i>,)	
Complainants)	
v.	)	Docket No. EL23-53-000
PJM Interconnection, L.L.C.)	
Respondent)	
)	
Aurora Generation, LLC, <i>et al.</i>,)	
Complainants)	
v.	)	Docket No. EL23-54-000
PJM Interconnection, L.L.C.)	
Respondent)	
)	
Coalition of PJM Capacity Resources)	
Complainant)	
v.	)	Docket No. EL23-55-000
PJM Interconnection, L.L.C.)	
Respondent)	

**AFFIDAVIT OF MICHAEL E. BRYSON
ON BEHALF OF PJM INTERCONNECTION, L.L.C.**

A. Introduction

1. My name is Michael E. Bryson. My business address is 2750 Monroe Blvd., Audubon, Pennsylvania, 19403. I am the Senior Vice President of Operations for PJM Interconnection, L.L.C. (PJM). I am submitting this affidavit on behalf of PJM in support of PJM's Answers to the Complaints filed by the CZG and the Coalition of PJM Capacity Resources in the captioned proceedings.
2. I earned a Bachelor of Science in general engineering from the United States Military Academy at West Point, New York, focusing on computer science and electrical engineering, and have a Master of Business Administration from Saint Joseph's University in Philadelphia. I earned a graduate certificate in power engineering from the Worcester Polytechnic Institute.
3. Prior to my current position at PJM, I have held the positions of Executive Director of System Operations, General Manager of Dispatch Operations, and manager of the Transmission Department for the System Operations Division. I am the current chair of the Independent System Operator and Regional Transmission Organization Operating Committee. I also serve on the boards of directors of PJM Technologies, Inc., and PJM Repository Information Services, Inc. I previously served on the boards of directors of the ReliabilityFirst Corporation and Consortium for Electric Reliability Technology Solutions.

4. I am responsible for PJM's Operations Division, overseeing transmission operations for real-time systems. These operations include scheduling, transmission dispatch, generation dispatch, reliability coordination, training, and all engineering analysis required to run the system and support the critical energy management systems.
5. The purpose of my declaration is to address claims that PJM acted improperly during Winter Storm Elliott by exporting power to other Balancing Areas during periods in which PJM had declared Pre-Emergency Load Management Reduction Actions and Emergency Actions, including Maximum Generation Emergency and Emergency Load Management Reduction Actions. The CZG Complainants¹ allege that the Performance Assessment Intervals (PAIs) triggered by PJM's Emergency Actions were invalid, and requests that the Commission "eliminate the penalties assessed to the [CZG Complainants]," because, in their view, PJM's Emergency Actions during Winter Storm Elliott did not comply with the Tariff, Operating Agreement, or Manual 13.² Specifically, the CZG Complainants assert that "[1] PJM failed to curtail all non-firm exports before taking Emergency Actions, and [2] PJM incorrectly used Load Management/Demand Response to facilitate aid to adjacent control areas that triggered PAIs, in direct violation of its Tariff, Operating Agreement, and Manual 13."³ The CZG Complainants assert that "there was no emergency in the ComEd region and therefore no need for Complainants' generation facilities,"⁴ then go on to make the extraordinary claim that their failure to perform should be excused because "bringing more capacity online would have made system conditions worse."⁵ Further, the CZG Complainants say that PJM was not permitted to assist other Balancing Authorities after PJM dispatched Load Management Reduction Actions.⁶ The Coalition more or less repeats these arguments as relates to PJM's exports.⁷ The Nautilus Entities take a slightly different approach and argue that curtailing all Non-Firm exports and issuing an EEA1 is just one of four prerequisites that Manual 13 requires before PJM may take Emergency

¹ For clarity, this affidavit will refer to the "ComEd Zone Complainants," the "Coalition," and the Nautilus Entities when referencing arguments unique to those parties. Likewise, when the parties present the same or similar claims, I will refer to the "Complainants."

² Complaint of ComEd Zone Generators (ComEd Zone Complaint) at 3.

³ *Id.* at 3-4.

⁴ *Id.* at 4.

⁵ *Id.* at 5; *accord id.* ("Clearly, the generation should not have been dispatched as it would have made the situation worse, and clearly emergency demand response was not only unnecessary, but it, too, was making things worse in the ComEd zone.").

⁶ *See, e.g., id.* at 40; *id.*, Test. of Dr. Paul Sotkiewicz, Ph.D., Ex. CZG-0004, at P 97.

⁷ *See* Complaint of the Coalition of PJM Capacity Resources (Coalition Complaint), at 25-26.

Actions.⁸ They further contend that PJM's continuing exports to adjacent Balancing Areas is evidence that they were not "needed" to address the emergency, and thus cannot be liable for Non-Performance Charges.⁹

6. All of these claims are wrong. Complainants' assertions misstate the terms of the controlling documents, misrepresent or misunderstand the relevant facts, and ignore mutual assistance policies established by this Commission and the North American Electric Reliability Corporation (NERC). Specifically, Complainants misread the Tariff, Operating Agreement, and Manual 13¹⁰ to impose irrational and counter-productive constraints on emergency operations that are entirely alien to my understanding of those documents and contrary to the manner in which our operators are trained to respond in emergency conditions. On the contrary, PJM acted properly and fully in compliance with its obligations to support neighboring Balancing Authorities in crisis by allowing the non-firm exports to those Balancing Authorities after PJM initiated Pre-Emergency Load Management Reduction Actions and Emergency Actions. Also, because PJM did not initiate Load Management procedures for the purpose of assisting other regions, PJM was not constrained from providing exports to regions experiencing or attempting to avoid capacity deficient conditions. Further, the CZG Complainants' claim that there was no emergency in the ComEd Zone or elsewhere in PJM to justify Emergency Actions is absurd on its face, as is their claim that bringing the Complainants' 6,552 MW of non-performing capacity resources on line would have exacerbated the emergency.¹¹

⁸ Complaint of the Nautilus Entities (Nautilus Complaint) at 19.

⁹ *Id.* at 32.

¹⁰ PJM Manual 13: Emergency Operations (Nov. 3, 2022), <https://www.pjm.com/-/media/documents/manuals/archive/m13/m13v86-emergency-operations-11-03-2022.ashx>. References to all PJM Manuals herein are to the versions in effect during Winter Storm Elliott.

¹¹ As Mr. McGlynn explains in his affidavit:

- For the snapshot of the system as of 4:45 on December 24th, PJM could have reliably accommodated a net 5,845 MW from the ComEd generators;
- For the snapshot of the system as of 10:54 on December 24th, PJM could have reliably accommodated a net 5,055 MW from the ComEd generators; and
- For the snapshot of the system as of 16:03 on December 24th, PJM could have reliably accommodated a net 5,001 MW from the ComEd generators. Notably for the analysis run at 16:03, this energy is in addition to the net 540 MW of energy being produced at this time from five units, at Aurora and Elwood, included in the two prior analyses, that had not been operating earlier in the day.

McGlynn Aff. at P 24.

B. PJM Is Obligated To Provide Assistance to Other Regions And Is Entitled To Receive Assistance From Other Regions During Emergency Conditions

7. The Eastern Interconnection is one of the largest fully integrated transmission systems in the world. One of the advantages of its large scope is to provide enhanced reliability to all of the Balancing Areas that comprise it. In addition to the reliability benefits associated with having multiple redundant paths for power flows from generators to loads, there are also significant reliability benefits associated with diversity of load, generation, and geography. The benefit of geographic diversity is that over a large region such as the Eastern Interconnection, one region may not be as severely impacted by an event as an adjoining region. For example, one part of the Eastern Interconnection may be experiencing an extreme weather event when another portion of the Eastern Interconnection may be relatively less affected by the event. The Commission illustrated this point when commenting on the impacts of Winter Storm Uri in February 2021:

ERCOT faced the greatest challenge [in Winter Storm Uri] due to the magnitude of unplanned generating unit outages in its area, coupled with its limited ability to import power to help offset generation shortfalls. . . . In contrast to ERCOT, some regions, such as MISO and SPP, had the ability to import power from the east, where weather conditions were less severe, to make up for a large portion of their generation shortfalls during the event. For example, PJM was exporting an unprecedented amount of electricity into MISO and SPP, reaching over 15,700 MW of interregional transfers on February 15, 2021.¹²

It would waste the Eastern Interconnection's capabilities to accept Complainants' artificial, needlessly formalistic, and counter-productive constraints on providing mutual assistance. Further, accepting Complainants' arguments would be inconsistent with the Commission's policies as embodied in the quoted passage.

8. NERC also has rules governing mutual assistance. PJM has NERC obligations as a Reliability Coordinator and as a Balancing Area that require PJM to provide assistance to other regions, particularly when PJM can do so without shedding load within its own footprint. Attachment 1 to NERC Standard EOP-011-1,¹³ Section 2.3 provides: "During EEA 2, Reliability Coordinators and energy deficient Balancing Authorities have the following responsibilities: Other Reliability Coordinators of Balancing Authorities with available resources shall coordinate, as appropriate, with the Reliability Coordinator that has an energy deficient Balancing Authority." NERC Standard IRO-014-3 R7 likewise provides: "Each Reliability Coordinator shall assist Reliability Coordinators, if requested and able, provided that the requesting Reliability Coordinator has implemented its

¹² *Transmission Sys. Plan. Performance Requirements for Extreme Weather*, 179 FERC ¶ 61,195 at P 32 (2022) (footnotes omitted).

¹³ NERC Standard EOP-011-1 was in effect during Winter Storm Elliott. NERC Standard EOP-011-2 superseded that standard on April 1, 2023.

emergency procedures, unless such actions cannot be physically implemented or would violate safety, equipment, regulatory, or statutory requirements.”¹⁴ Other Reliability Coordinators and Balancing Areas have reciprocal obligations to PJM under these same rules and, for that reason, PJM not only provided emergency energy to other Balancing Authorities during capacity shortages, but also received assistance from the Northeast Power Coordinating Council (NPCC) during the Winter Storm Elliott emergency.¹⁵

9. The Tariff and Operating Agreement also incorporate mutual assistance principles. They state that PJM “shall . . . [a]dminister . . . agreements for the transfer of energy in conditions constituting an Emergency in the PJM Region or in an interconnected Control Area, and the mutual provision of other support in such Emergency conditions with other interconnected Control Areas”¹⁶ Further, PJM “shall . . . [c]oordinate the curtailment or shedding of load, or other measures appropriate to alleviate an Emergency, in order to preserve reliability in accordance with NERC, or Applicable Regional Entity principles, guidelines and standards, and to ensure the operation of the PJM Region in accordance with Good Utility Practice and this Agreement.”¹⁷
10. PJM also has agreements with other regions that flesh out procedures to provide assistance during emergencies and potential emergencies. PJM has such agreements with Duke Energy Progress, LLC (Duke),¹⁸ Midcontinent Independent System Operator (MISO),

¹⁴ NERC Standard IRO-014-3, Coordination Among Reliability Coordinators, R7.

¹⁵ Net Scheduled Imports to PJM were in excess of 2,000 MW/hr for most of the cold weather period and reached as high as 4,000 MW/hr.

¹⁶ PJM Open Access Transmission Tariff (Tariff), Attach. K-App’x, § 1.6.2(vi); *see also id.* § 1.7.11 (“The Office of the Interconnection, with the assistance of the Members’ dispatchers as it may request, shall be responsible for monitoring the operation of the PJM Region, for declaring the existence of an Emergency, and for directing the operations of Market Participants as necessary to manage, alleviate or end an Emergency. . . . Actions by the Office of the Interconnection and the Market Participants shall be carried out in accordance with this Agreement, the NERC Operating Policies, Applicable Regional Entity reliability principles and standards, Good Utility Practice, and the PJM Manuals.”).

¹⁷ *Id.* § 1.6.2(vi).

¹⁸ Amended and Restated Joint Operating Agreement Among and Between PJM Interconnection, L.L.C., and Duke Energy Progress, LLC (July 22, 2019) (PJM-Duke JOA), <https://www.pjm.com/directory/merged-tariffs/progress-joa.pdf>.

Inc.,¹⁹ Tennessee Valley Authority (TVA),²⁰ New York Independent System Operator, Inc. (NYISO),²¹ and VACAR South Reliability Coordinator.²² For example, the PJM-MISO JOA provides:

In the event an emergency condition is declared in accordance with a Party's published operating protocols, the Parties agree to provide emergency assistance to each other and to facilitate obtaining emergency assistance from a third party. The Parties will coordinate respective actions to provide immediate relief until the declaring Party eliminates the declaration of emergency. The Parties will notify each other of emergency maintenance and forced outages that would have a significant impact on the other Party as soon as possible after the conditions are known. The Parties will evaluate the impact of emergency and forced outages on the Parties' systems and coordinate to develop remedial steps as necessary or appropriate. If the emergency response allows for coordinating with the other Party before action must be taken, the normal RTO to RTO request for action will be followed. The Parties will conduct joint annual emergency drills and will ensure that all operating staff are trained and certified, if required, and will practice the joint emergency drills that include criteria for declaring an emergency, prioritized action plans, staffing and responsibilities, and communications.²³

As is typical in agreements of this type, the general goal is to coordinate operations during emergencies to alleviate the emergency condition. As Manual 37 states, "PJM directs actions to provide emergency assistance to all Reliability Coordination neighbors, during

¹⁹ Joint Operating Agreement Between the Midcontinent System Operator, Inc. and PJM Interconnection, L.L.C. (Dec. 11, 2008) (PJM-MISO JOA), <https://www.pjm.com/directory/merged-tariffs/miso-joa.pdf>.

²⁰ Joint Reliability Coordination Agreement Among and Between PJM Interconnection, L.L.C., and Tennessee Valley Authority (Oct. 15, 2014) (PJM-TVA JOA), <https://www.pjm.com/-/media/documents/agreements/joint-reliabilityagreement-jrca-pjm-tva.ashx>.

²¹ Joint Operating Agreement Among and Between New York Independent System Operator Inc. and PJM Interconnection, L.L.C. (Sept. 16, 2019) (PJM-NYISO JOA), <https://pjm.com/~/-/media/documents/agreements/nyiso-joa.ashx>.

²² PJM-VACAR South Amended Adjacent Reliability Coordinator Coordination Agreement (Mar. 7, 2018) (PJM-VACAR JOA), <https://www.pjm.com/-/media/documents/agreements/executed-pjm-vacar-rc-agreement.ashx>. The VACAR South RC Area includes the territories of the following companies: Cube Hydro Carolinas, LLC, Duke Energy Carolinas, LLC, Duke Energy Progress, LLC, Dominion Energy South Carolina, Inc. and the South Carolina Public Service Authority.

²³ PJM-MISO JOA, § 8.1.1.

declared emergencies, which is required to mitigate the operational concern to the extent that the same entities are taking in kind steps and the assistance would be effective.”²⁴

11. Mutual assistance concepts are also recognized in PJM Manual 13. One important provision concerns exports from PJM to other Balancing Authorities when PJM has declared a Maximum Generation Emergency. Section 2.3.2 includes among the steps taken by PJM in a Maximum Generation Emergency Action:

- PJM Dispatch determines the feasibility [of] recalling off-system capacity sales that are recallable (network resources).
 - PJM Dispatch will determine any limiting transmission constraints internal to PJM that would impact the ability to cut transactions to a specific interface.
 - PJM Dispatch will identify off-system capacity sales associated with the identified interfaces.
 - PJM Dispatch will contact the sink Balancing Authority to determine the impact of transaction curtailment.
- If the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM.²⁵

This provision supplements the Operating Agreement and Tariff concerning PJM’s obligations to provide mutual assistance by explaining the level of priority that off-system capacity sales will receive during a capacity emergency even while PJM itself is in near deficit conditions.

12. In addition, Manual 13 provides that:

When adjacent Balancing Areas are deficient in generation and are requesting assistance from the PJM RTO, actions are taken, provided the adjacent Balancing Area has taken the same actions requested of PJM [including] as required, increased generation, including Maximum Emergency generation (with the exception of fuel limited and environmentally restricted capacity).²⁶

²⁴ Manual 37: Reliability Coordination (Mar. 22, 2023), Attach. A (PJM Reliability Plan, § 1.1, <https://www.pjm.com/-/media/documents/manuals/m37.ashx>).

²⁵ PJM Manual 13, § 2.3.2 (Step 4A – Maximum Generation Emergency Action) at 32; *accord id.* § 5.2 (Transmission Security Emergency Procedures) (Step 4A) at 93 (same).

²⁶ *Id.* § 2.5 at 51.

This provision allows PJM to initiate actions, including Emergency Actions, for the purpose of providing assistance to another Balancing Area provided that, when it does so, it must specifically indicate that the action is being done to support that region.²⁷

C. Nothing in Manual 13 or NERC Standard EOP-011-2 Prevents PJM From Taking Actions that Trigger a Performance Assessment Interval While Making Non-Firm Exports

13. One of Complainants' central contentions is that PJM must curtail all non-firm exports as a "prerequisite" of calling a Maximum Generation Emergency Action or a Pre-Emergency or Emergency Load Management Reduction Action.²⁸ In support, they reference Manual 13 and NERC Standard EOP-011-1.²⁹ In fact, neither Manual 13 nor NERC Standard EOP-011-1 imposes such an obligation.
14. Manual 13, like all manuals, is supplementary to the Tariff and Operating Agreement. As discussed by Mr. McGlynn in his Affidavit,³⁰ PJM has broad authority under the Tariff and Operating Agreement to declare emergencies and decide what steps to take to avoid, mitigate, or shorten emergencies. Nothing in the PJM Manuals could limit the ability of the PJM Operators to address emergency conditions under the discretionary authority conferred in the Tariff and Operating Agreement.³¹ In this case, however, there is no inconsistency to address because Manual 13 does not specify a requirement to curtail non-

²⁷ *Id.* ("PJM Dispatch prefaces these procedures [when initiated to provide assistance to other regions] by the words 'due to PJM providing emergency assistance to an adjacent Control Area(s), PJM is issuing an (appropriate alert or action message.)'").

²⁸ CZG Complaint at 21-22 ("The evidence introduced by Dr. Harvey and Dr. Sotkiewicz demonstrates that th[e] prerequisite [of curtailing all non-firm exports] was not met, as PJM failed to curtail non-firm exports prior to taking Emergency Actions. In fact, during many of the PAIs, PJM was a net exporter of electricity including energy supported by Non-Firm transmission as shown by Dr. Sotkiewicz."); Coalition Complaint at 27-28 ("PJM's Tariff mandates the curtailment of these reservation exports *prior to* entering into the Maximum Generation Emergency Action, which PJM failed to do." (emphasis in original)); Nautilus Complaint at 19-20 (referring to PJM's "obligation to curtail all non-Firm exports prior to declaring a Maximum Generation Emergency Action").

²⁹ See CZG Complaint at 21; *id.*, Sotkiewicz Aff., CZG-0004, at P 4; Coalition Complaint at 26-27; Nautilus Complaint at 19.

³⁰ McGlynn Aff. at P 20.

³¹ The ComEd Zone and Coalition Complainants argue that their respective misinterpretations of Manual 13 were incorporated into the PJM Tariff and Operating Agreement. However, I will note that if Complainants' arguments were to be accepted, *i.e.*, that Manual 13 is removes all operator discretion regarding actions during emergencies, then Manual 13 procedures it would simply overwrite and nullify other PJM documents, NERC rules, Reliability First principles, and long-standing practices regarding mutual assistance.

firm exports—or any other preliminary step—as a “prerequisite” to instituting either a Maximum Generation Emergency Action or a Pre-Emergency/Emergency Load Management Reduction Action. Manual 13 specifies that “[d]ue to system conditions and the time required to obtain results, PJM dispatchers may find it necessary to vary the order of application [of actions] to achieve the best overall system reliability.”³² Manual 13 further states, repeatedly, that “[a] NERC EEA2³³ is issued when the following has occurred: Public appeals to reduce demand, voltage reduction, interruption of non-firm load in accordance with applicable contracts, demand side management/active load management, *or* utility load conservation measures.”³⁴ Thus, PJM Manual 13 does not mandate that Maximum Generation Emergency Action or a Pre-Emergency/Emergency Load Management Reduction Action may be taken only when all non-firm exports are curtailed.

15. Complainants’ argument is also inconsistent with other provisions of Manual 13. As noted above, Section 2.3.2 of Manual 13 has a specific procedure for determining whether to cut transactions to other Balancing Areas if PJM has declared a Maximum Emergency Action. This provision gives such transactions, when made known to PJM, a priority almost as high as native load stating that “[i]f the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM.”³⁵ Clearly, given this directive, there cannot be a mandatory requirement that PJM must cut all non-firm exports before taking an Emergency Action.
16. Complainants’ reliance on NERC Standard EOP-011-1 is also misplaced. While NERC Standard EOP-011-1 states that curtailing “[n]on-firm wholesale energy sales (other than those that are recallable to meet reserve requirements)” may be a typical step before

³² Manual 13, § 2.3.2 at 28.

³³ EEA2 is a NERC procedure in which, *inter alia*, “[l]oad management procedures [are] in effect” and “[a]n energy deficient Balancing Authority has implemented its Operating Plan(s) to mitigate Emergencies.” NERC Standard EOP-011-1, Attach. 1: Emergency Operations, § B(2). Nothing in NERC Standard EOP-110-1, Attach. 1, § B(2) references an expectation that the Balancing Authority will have curtailed non-firm exports before issuing the alert.

³⁴ Manual 13, § 2.3.2 (Step 2 - Emergency Load Management Reduction Action) at 30; *id.* (Step 7 - Deploy All Resources) at 37; *id.* (Step 9 - Voltage Reduction Action) at 40; *id.* § 2.5 (Transmission Security Emergency Procedures) (Step 2 - Emergency Load Management Reduction Action) at 90; *id.* (Step 7 - Deploy All Resources) at 98; *id.* (Step 9 - Voltage Reduction Action) at 100 (emphasis added); *see also id.* § 2.3.2 (Step 2 - Emergency Load Management Reduction Action) (Note 4, EEA Levels) at 30 (stating that a NEARC EEA2 “may be issued,” rather than “is issued”); *id.* § 2.5 (Transmission Security Emergency Procedures) (Note 4, EEA Levels) at 91 (same).

³⁵ *Id.*

declaring an EEA1 alert,³⁶ the standard also specifies that “[t]he Reliability Coordinator may declare whatever alert level is necessary, and need not proceed through the alerts sequentially.”³⁷ Therefore, declaring an EEA1 alert is not a prerequisite for declaring an EEA2 event such as the Maximum Generation Emergency Actions or the Pre-Emergency Load Management Reduction Actions that triggered PAIs during Winter Storm Elliott.

17. In addition to Complainants’ failure to acknowledge that NERC Standard EOP-011-1 and Manual 13 give operators the discretion to skip or reorder steps to avoid or address emergency conditions, Complainants also wrongly treat a provision intended to be guidance as a mandate. I interpret the reference to curtailing non-firm load prior to declaring an EEA1 alert in Attachment 1, NERC Standard EOP-011-1, to mean that non-firm load should be curtailed when the operators have a reasonable expectation that doing so will address the emergency or potential emergency. Complainants’ insistence that it is a strict rule regardless of its impact is unreasonable. In the situation faced by the PJM operators during Winter Storm Elliott, curtailing all non-firm exports for the entirety of the PAIs would not have alleviated the need for the Maximum Generation Emergency Actions or the Pre-Emergency/Emergency Load Management Reduction Actions taken by the PJM operators. Further, PJM operators also had to consider PJM’s obligations to provide assistance to other regions and, in the circumstances present during Winter Storm Elliott, the non-firm deliveries were helping to alleviate reliability challenges being experienced in other regions. I will discuss both of these points in greater detail below.

D. Acceptance of Complainants’ Assertion That Initiating Pre-Emergency Load Management Reduction Action Requires Curtailment of Non-Firm Exports Would Nullify the Flexibility Granted to PJM to Utilize This Tool

18. Acceptance of Complainants’ contention that Manual 13 requires the prior curtailment of all non-firm exports before calling for a Pre-Emergency Load Management Reduction Action³⁸ would nullify the flexibility expressly granted to PJM under its Tariff to utilize this tool. The Tariff states that, “PJM will initiate a pre-emergency event *prior to* the declaration of a Maximum Generation Emergency or an emergency event *when*

³⁶ NERC Standard EOP-011-1, Attach. 1, § B(1).

³⁷ *Id.* § B.

³⁸ See CZG Complaint at 4 (“Manual 13 requires PJM to curtail all non-firm exports before taking . . . Emergency Actions, including both Pre-Emergency and Emergency Load Management Reduction Actions” (alteration in original)); *id.* at 29 (“For the avoidance of doubt, these Emergency Actions include Pre-Emergency Load Management Reduction Actions—i.e., Manual 13 requires PJM to curtail all non-Firm exports before taking Pre-Emergency Load Management Reduction Actions.” (alteration in original)); CZG Complaint, Sotkievich Aff. at P 90 (“Prior to initiating an Emergency Action such as call for Pre-Emergency . . . Load Management . . . PJM is required by Manual 13; . . . to curtail all Non-Firm exports of energy.”), Coalition Complaint at 25 (“PJM must curtail non-firm exports before taking capacity-related Emergency Actions.”); Nautilus Complaint at 19.

practicable. A pre-emergency event is implemented when economic resources are not adequate to serve load and maintain reserves or maintain system reliability, and prior to proceeding into *emergency procedures*.³⁹ Further, as the Commission stated in its order approving the Pre-Emergency Load Management Reduction Program, “it is reasonable for PJM to seek some added flexibility to dispatch these resources in response to system conditions, *without* the added step of declaring a system emergency.”⁴⁰ Complainants’ contention that there is a rigid prerequisite surrounding the use of this program is completely at odds with both the Tariff and the Commission’s findings. Further, Manual 13 refers to the potential step of curtailing non-firm exports only in connection with “emergency procedures”⁴¹ which, in the Tariff passage quoted above, comes *after* PJM has initiated “a pre-emergency event.”

E. PJM Acted Properly During Winter Storm Elliott By Allowing Non-Firm Exports Following PJM’s Declaration of Maximum Generation Emergency Actions and the Pre-Emergency and Emergency Load Management Reduction Actions

19. During Winter Storm Elliott, PJM acted consistently with its obligations by allowing non-firm transactions during periods in which Maximum Generation Emergency Actions and the Pre-Emergency and Emergency Load Management Reduction Actions were in effect. As I discussed above, PJM is obligated to provide assistance to other Balancing Areas when it can do so and when those regions are facing emergencies or potential emergency conditions.⁴² During Winter Storm Elliott, PJM operators sought to help adjacent Balancing Areas to the extent feasible without shedding load in PJM. As I will detail below, PJM operators were successful in their efforts as PJM avoided load shedding and the assistance that PJM provided to other regions enabled them either to avoid or mitigate shedding their customers’ load. Finally, while I disagree with the CZG Zone Complainants’ claim that the reliability issues facing the ComEd Zone can be evaluated separately from the rest of PJM under the facts here, I will show that, accepting this premise, there was no impediment to the initiation of Pre-Emergency and Emergency Actions in the ComEd Zone even under Complainants’ erroneous Tariff interpretation.

1. Curtailing All Non-Firm Exports Would Not Have Enabled PJM To Avoid Taking Pre-Emergency and Emergency Actions

Curtailing all non-firm transactions would not have alleviated the conditions that compelled the decision of the PJM operators to take Emergency Actions. As explained in greater detail in Mr. McGlynn’s Affidavit, one of the reasons why the PJM operators took these steps related to the uncertainty of the load forecast—both in terms of the weather

³⁹ Tariff, Attach. K App., § 8.5 (emphasis added).

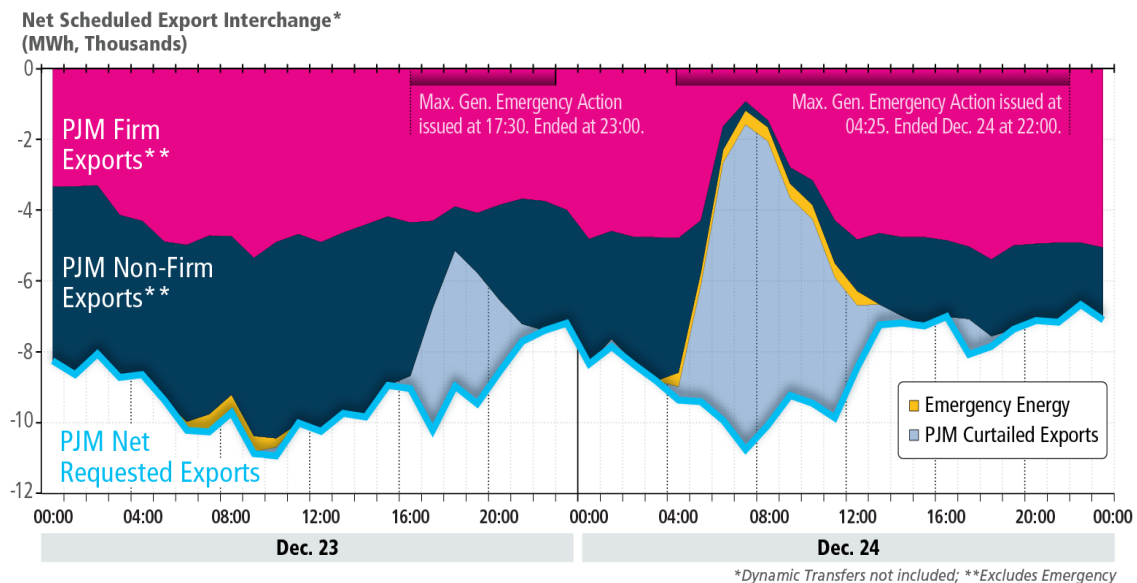
⁴⁰ *PJM Interconnection, L.L.C.*, 147 FERC ¶ 61,103 at P 38 (2014) (emphasis added).

⁴¹ The term “emergency procedures” is sometimes capitalized in Manual 13 and sometimes in lower case. See e.g., Manual 13, § 2.3 at 28.

⁴² See *supra* at P 8.

forecast and uncertainty regarding how loads would respond to the weather conditions.⁴³ The most important reason, however, was the spectacular failure of generators to be available consistent with PJM’s expectations of them as Capacity Resources subject to Capacity Performance obligations. As discussed by Mr. Pilon in his affidavit, “because of the poor generator performance, PJM was facing approximately 57,000 MW of generator unavailability for the morning peak on December 24.”⁴⁴ Not only did many generators fail to produce power as expected but they also failed in many cases even to update their parameters so that operators had the information they needed to make the most effective dispatch decisions. In fact, about 24% of the PJM generation fleet was not available which actually was worse than PJM experienced during the 2014 Polar Vortex that was the precipitating event for adopting the Capacity Performance construct. Based upon these general considerations alone—the uncertainty of the load forecast and the shockingly poor performance of generators—the operators were justified in taking Emergency Actions instead of risking that PJM could avoid load-shedding by curtailing non-firm exports.

20. The operators’ decisions to initiate Emergency Actions, moreover, are validated by the supply/demand conditions that were present. The graph below depicts the levels of exports from PJM during Winter Storm Elliott:



21. Comparing the values in this graph to the supply/demand conditions that PJM actually experienced confirms that PJM could not have met system demand only by cutting non-firm exports. On December 23, 2022, at 17:30, PJM issued a Pre-Emergency Load Management Reduction Action for the 30 minute and 60 minute Demand Resources that resulted in load reductions of about 1,100 MW. At the same time, PJM operators also

⁴³ McGlynn Aff. at P 56.

⁴⁴ Pilon Aff. at P 26.

issued a Maximum Generation Emergency Action that resulted in an average of 2,372 MW of additional generation.⁴⁵ In total, these actions had about 3,472 MW of impact. In comparison, for hour 18:00 non-firm exports were 1,241MW and for hour 19:00 non-firm exports were 1,683 MWs. Accordingly, even if the operators had cut all non-firm exports there would have been a deficit of at least 1,789 MW needed to satisfy PJM load and firm exports. Pre-Emergency and Emergency Actions thus would have been necessary to satisfy capacity needs even if all non-firm exports had been cut.

22. The situation for December 24, 2022 is similar. At 04:20 on December 24, 2022, PJM issued a Pre-Emergency Load Management Reduction Action and an Emergency Load Management Reduction Action that covered all Demand Resources and resulted in about 2,400 MW of load reduction. And at 04:28, PJM issued a Maximum Generation Emergency Action that it resulted in an average of about 2,879 MW in additional generation.⁴⁶ In total, these actions had 5,279 MW of impact. In comparison, for hour 05:00, non-firm exports were 1,820 MW falling to a low of 591 MW in hour 8:00 and increasing to a maximum level of 2,359 MW in hour 19:00 before the PAIs ended at 22:00. Accordingly, even if the operators had cut all non-firm exports there would have been a deficit between about 4,688 MW and 2,920 MW during this period needed to satisfy PJM load and firm exports. Pre-Emergency and Emergency Actions thus would have been necessary even if all non-firm exports had been cut.
23. These graphs also show that PJM prioritized meeting its own load by cutting exports—both firm and non-firm—when necessary. The graph shows a significant number of hours in which the assistance requested by other regions was not supplied. This correlates to the periods when PJM needed most of its generation for internal loads notwithstanding that during some these times other regions were seeking emergency supplies.
24. The Complainants also fail to acknowledge that PJM’s operators were simultaneously considering PJM’s potential needs over multiple time frames.⁴⁷ The ComEd Zone Complainants focus on the period after 06:00 on December 24, 2022, claiming that “there was no emergency in ComEd Zone beginning at least as of 06:00 on December 24 and thereafter”⁴⁸ and asserting that there was “excess generation” in the ComEd Zone.⁴⁹ Likewise, the Coalition faults PJM for issuing Maximum Generation Emergency Actions across the entire RTO and failing to distinguish generators in less-affected areas.⁵⁰ The

⁴⁵ This is hourly total MW operating above Ecomax for the Maximum Generation Emergency period.

⁴⁶ This is hourly total MW operating above Ecomax for the Maximum Generation period.

⁴⁷ *See, e.g.*, Pulong Aff. at 21-22, 29.

⁴⁸ CZG Complaint at 34 (quoting Test. of Dr. Scott Harvey, Ex. CZG-0001, at P 70).

⁴⁹ *Id.* at 35.

⁵⁰ Coalition Complaint at 37.

Nautilus Entities argue that the OPP and Rock Springs units were not needed between 12:00 and 24:00 on December 24, citing PJM's exports as evidence for that claim.⁵¹ But looking at the totality of the circumstances, PJM's operators acted consistently with Good Utility Practice in retaining the Pre-Emergency Load Management Reductions and Maximum Emergency generation based on the information they had at the time. PJM operators had to continue to assume that more generation in the ComEd Zone and the entire PJM footprint would continue to experience outages for the rest of the weekend.

25. An overriding concern of the operators during December 24, 2022, given what had happened over the previous day and in the morning, was whether PJM could meet the evening peak in the RTO. PJM's ability to allow some non-firm exports to flow during the time leading up to the evening peak was not indicative as to whether PJM could meet the evening peak without Emergency Actions even if all non-firm exports were curtailed. PJM was reasonably concerned that loads might be as high or higher as the earlier peaks experienced on December 23 and 24.⁵² Keeping both the Maximum Generation Emergency Actions and Pre-Emergency/Emergency Load Management Reduction Actions in effect throughout the day on December 24, 2022 were reasonable measures to address this possibility.
26. In particular, operators were concerned that if the Maximum Generation Emergency Action and the Pre-Emergency/Emergency Load Management Reduction Action were rescinded and PJM attempted to reinstate them in the face of a high evening peak on December 24, there could be a significantly lower response rate. If allowed to go offline, some generators might not restart due to the cold weather conditions or units running on gas might resell their gas supply. In addition, if Demand Resources were released and allowed to resume normal power consumption, PJM operators were concerned that they would not be willing and able to redeploy if called again prior to the evening peak. The fact that the evening peak came in at a relatively lower level does not undermine the validity of the operators' decisions under the Good Utility Practice standard based on the information they had when those decisions were made.
27. The validity of the PJM operators' decision to continue with Pre-Emergency/Emergency Load Management Reduction Actions and the Maximum Generation Emergency Action until PJM experienced the evening peak becomes even more plain when taking into account the operators' understanding regarding Demand Resources during the event. When the PJM operators called for Pre-Emergency Load Management Reduction Actions for the 30 minute and 60 minute participants on December 23, 2022, load reductions of about 4,300 MW were expected based on the estimates provided by the Curtailment Service Providers (CSPs). And, when PJM called for Pre-Emergency Load Management Reduction Actions and Emergency Load Management Reduction Actions for all participants, PJM expected load reduction of about 7,400 MWs based on the estimates provided by the CSPs. Until PJM received the data to determine actual load management response weeks later,

⁵¹ Nautilus Complaint at 51-52.

⁵² McGlynn Aff. at PP 56-57.

operators reasonably assumed that the actual reductions would be in line with the CSP estimates. Accordingly, when the operators decided to retain pre-emergency and Emergency Actions until the evening peak on December 24, the data they possessed indicated that the unrestricted peaks on the evening of December 23 and the morning of December 24 would have been approximately 139,300⁵³ MW and 137,400 MW,⁵⁴ respectively. The *perceived* impact of load management therefore was considerably greater than the actual impact of load management based on performance data, so the *perceived* risk of meeting the evening peak on December 24, 2022 was elevated even beyond what an *ex post* analysis of the actual supply/demand balance shows.

2. PJM's Decision To Permit Non-Firm Power to Flow When There Was Sufficient Generation to Meet That Demand Was Not Only Reasonable, But Was Also Necessary For PJM to Fulfill Its Obligations To Assist Adjoining Balancing Areas

28. Complainants provide no justification or rationale for their claim that Manual 13 and NERC rules prohibit PJM from employing Emergency Actions unless non-firm exports have been cut to zero. In fact, accepting the Complainants' interpretation would lead to inefficient outcomes and could adversely affect reliability. Essentially, Complainants' argue that if two adjoining Balancing Areas are experiencing a capacity shortage and, after taking Emergency Actions under their respective tariffs, one of the Balancing Areas has sufficient capacity to provide non-firm service requested by the other Balancing Area to assist in meeting load, then the Balancing Area with the available capacity must turn down the request for help or, alternatively, must end its own emergency declaration. As I indicated earlier, the only sensible reading of Manual 13 and NERC Standard EOP-011-1 is that a Balancing Authority experiencing or approaching a capacity shortage emergency should curtail non-firm exports to the extent that doing so will help alleviate the emergency. However, after the Balancing Authority takes Emergency Action and has the capacity to provide non-firm service requested by another Balancing Authority to avoid shedding load, it would be inefficient and undermine reliability in the Eastern Interconnection to impose an arbitrary restriction preventing it from doing so. But that is exactly what Complainants claim is the rule.
29. In the situation posited here, the Balancing Authority with the extra capacity took the Emergency Action to meet the needs of its own system and thereby *incidentally* created capacity capable of serving load in another Balancing Authority. This was the situation faced by PJM during Winter Storm Elliott, in particular on December 24, 2022, after the morning peak. PJM took Pre-Emergency and Emergency Actions to meet its own needs, which created more capacity than it needed on a minute-by-minute basis, and it supplied

⁵³ Actual peak of about 135,000 MW plus expected :Load Management response of 4,300 MW.

⁵⁴ Actual peak of about 130,000 MW plus expected Load Management response of 7,400 MW.

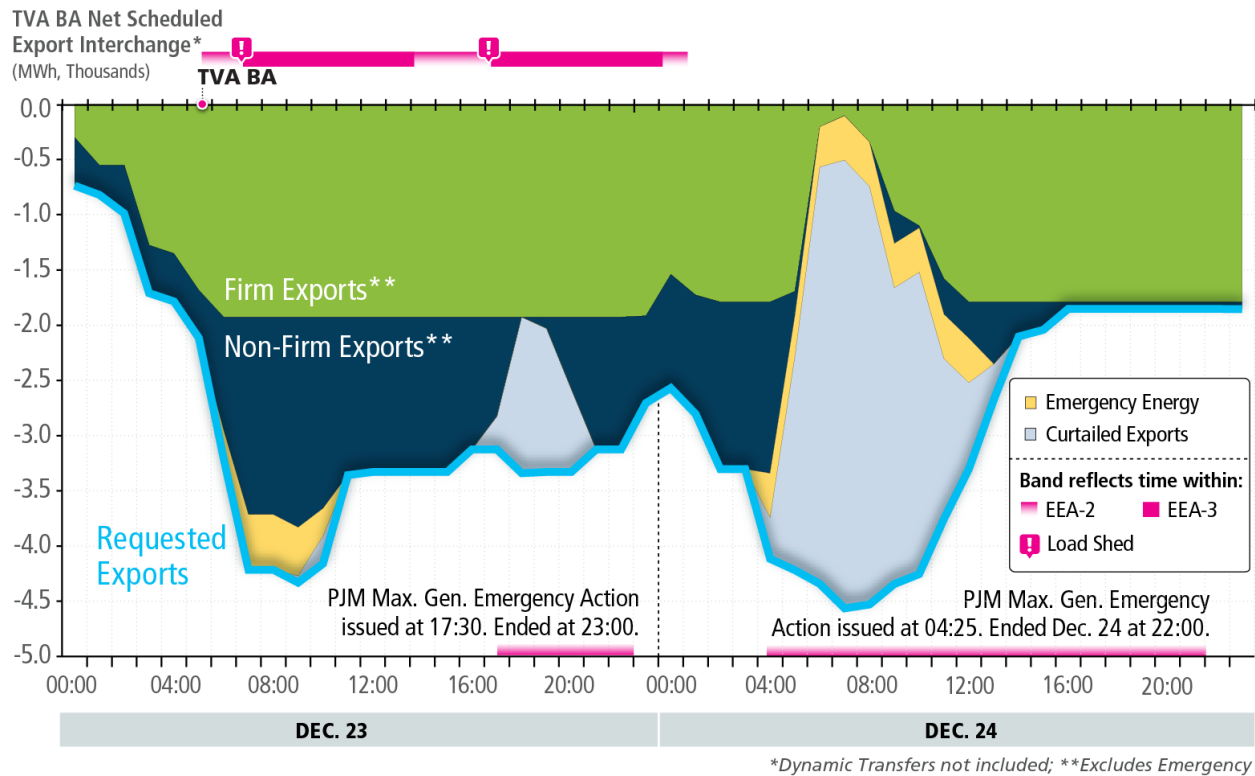
some of that capacity to other areas that needed it through non-firm exports (as well as firm exports and emergency sales).

30. PJM's purpose in initiating and maintaining Pre-Emergency Emergency Actions on December 24, 2022, through the evening peak was not directed towards providing non-firm exports. But once PJM had sufficient capacity to provide assistance to other Balancing Areas, it was obligated to do so. As I noted above, NERC Standard IRO-014-3 R7 provides that "[e]ach Reliability Coordinator shall assist Reliability Coordinators, if requested and able"⁵⁵ PJM met this obligation, in part, when it was "requested and able" to make non-firm exports to other Reliability Coordinators such as VACAR and TVA. Further, as also noted above, Manual 13 specifically contemplates that "[i]f the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM."⁵⁶ As shown below, this was exactly the situation presented to the PJM operators. With this in mind, Dr. Sotkiewicz's, as well as the CZG Zone Complainants and the Coalition, assertion that "[i]f PJM felt comfortable enough to allow Non-Firm exports of energy, the logical implication is that there really was no Emergency Condition"⁵⁷ is a complete misunderstanding of PJM's obligations under Manual 13 and distorts the logic undergirding Section 2.3.2.
31. The non-firm exports supplied to TVA provided assistance during periods when TVA was in a capacity deficient condition. The graph below shows the non-firm exports made to TVA:

⁵⁵ NERC Standard IRO-014-3 R7.

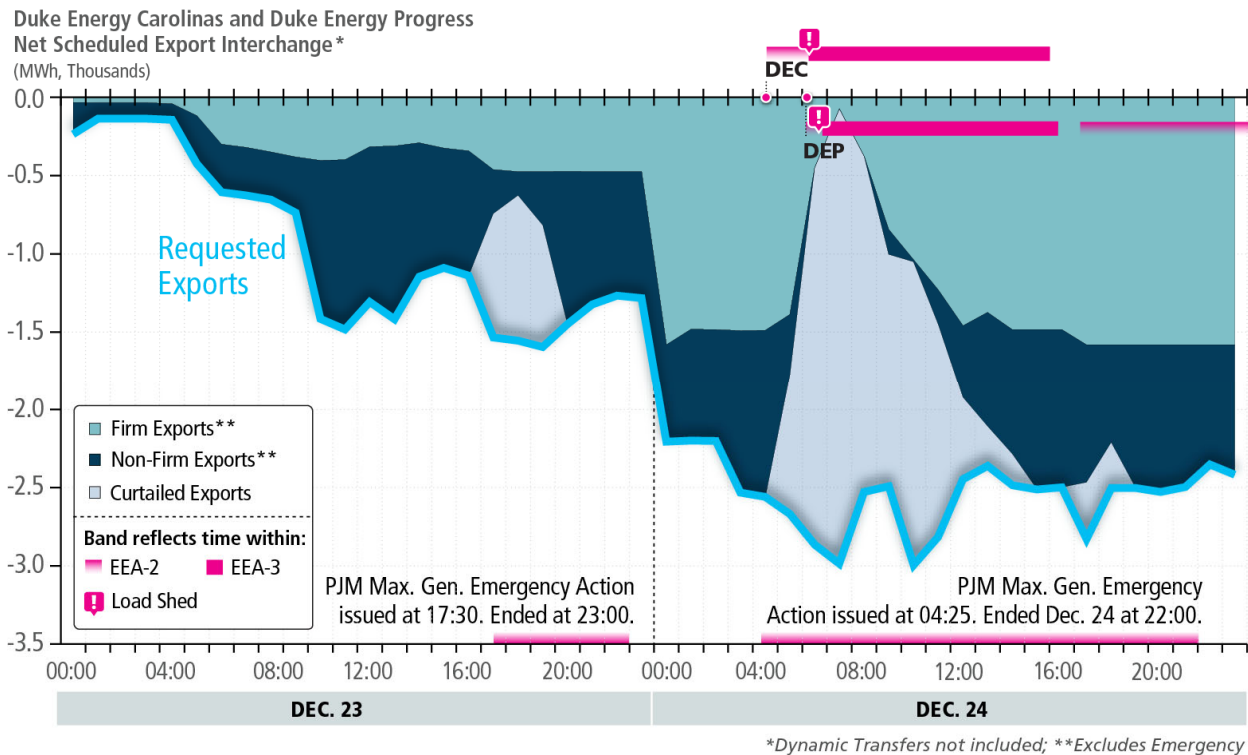
⁵⁶ Manual 13, § 2.3.2.

⁵⁷ CZG Complaint, Sotkiewicz Aff., Ex. CZG-0004, at P 96; Coalition Complaint, Sotkiewicz Aff., Attach. 4, at P 130.



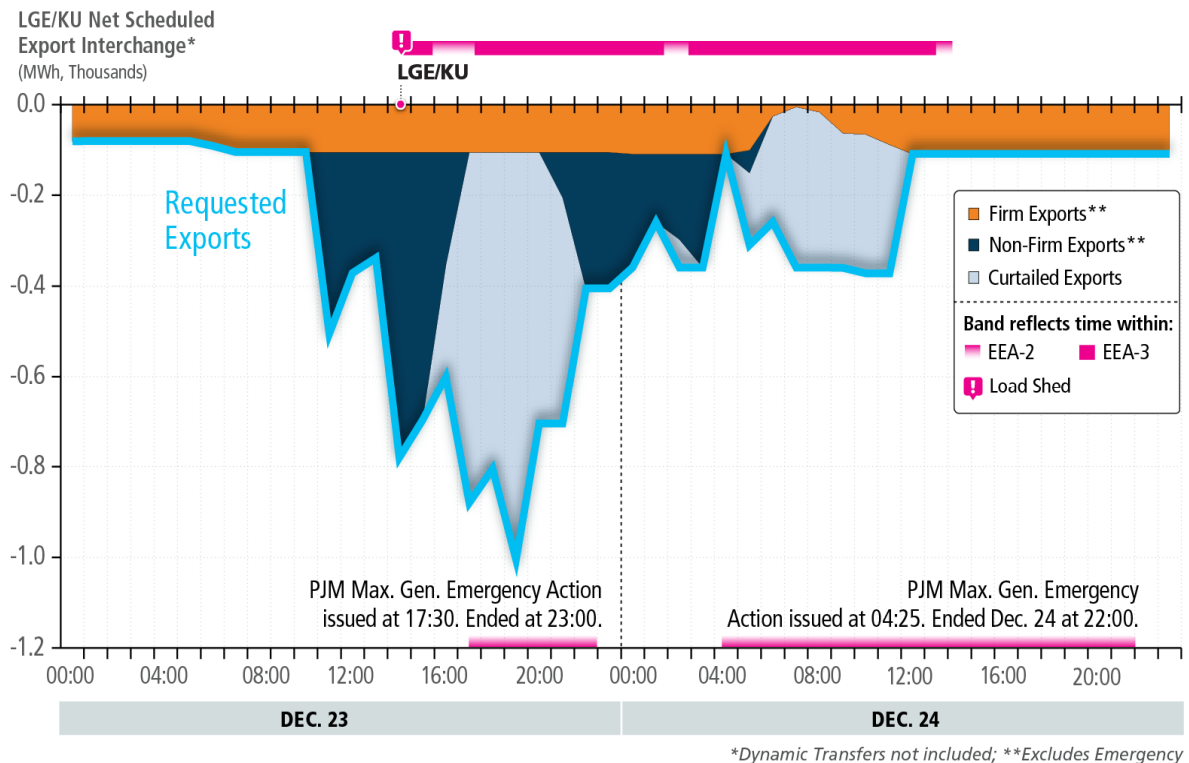
As can be seen by the chart, PJM was able to assist TVA by providing non-firm exports during times that the TVA system was shedding load. Had PJM not done so, it is likely that TVA would have been required to engage in additional load shedding than actually occurred.

32. Similarly, the non-firm exports supplied to Duke Carolinas and Duke Energy Progress provided assistance to those systems when they were experiencing capacity deficient conditions as shown in the chart below:



As depicted above, PJM was also able to provide assistance by making non-firm exports to Duke Carolinas and Duke-Energy Progress when they were shedding load. Again, if PJM had not provided this assistance, in all likelihood Duke Carolinas and Duke Energy Progress would also have had to engage in more load shedding.

33. Finally, Louisville Gas and Electric Company and Kentucky Utilities Company (LGE/KU) also received non-firm exports when they were experiencing capacity deficit conditions as shown in the chart below:



Once again, PJM made non-firm deliveries to LGE/KU when the region was shedding load. Had PJM not made these exports, additional load shedding would likely have been needed.

F. PJM Acted Properly By Providing Assistance to Adjoining Balancing Areas After It Initiated Load Management Actions

34. The CZG Complainants and the Coalition assert that PJM violated a provision in Section 2.5 of Manual 13 that prevents PJM from calling Load Management Actions for the purpose of providing assistance to another region. According to these Complainants, this violation occurred because PJM made non-firm exports after it implemented Load Managements Actions. The factual support for their claims consists of pointing to timelines for December 23, 2022 and December 24, 2022 showing that non-firm exports occurred after the Load Management events began. The CZG Complainants' and the Coalition's argument is a gross misreading of Manual 13 that is inconsistent with the text of the manual and which, if accepted, would prevent PJM from providing *any* assistance to other Balancing Areas during virtually any capacity shortage event that PJM might ever experience.
35. The obvious purpose of Section 2.5 of Manual 13 is to prohibit PJM from initiating Load Management *for the purpose* of providing assistance to another region. Section 2.5 provides: "When adjacent Balancing Areas are deficient in generation and are requesting assistance from the PJM RTO, actions are taken, provided the adjacent Balancing Area has

taken the same actions requested of PJM.”⁵⁸ Subject to certain restrictions, actions may include “Maximum Emergency generation [and] a 5% Voltage Reduction to provide the required assistance” To be clear, this provision assumes that PJM is not itself experiencing an emergency condition when it is invoked. As stated in Manual 13, “PJM Dispatch prefaces these procedures [steps taken to assist other Balancing Areas under this provision] by the words ‘due to PJM providing emergency assistance to an adjacent Control Area(s), PJM is issuing an (appropriate alert or action message).’”⁵⁹ The events that occurred during Winter Storm Elliott therefore do not fall within the scope of this section of Manual 13.

36. PJM *itself* needed Load Management Actions to meet its own needs. During Winter Storm Elliott, PJM never initiated a Load Management Action for the purpose of providing assistance to another region. Even assuming that Load Management might have had the incidental effect of facilitating some non-firm exports when PJM was experiencing emergency conditions, the Manual 13 guidance not to initiate Load Management Actions *for the purpose* of assisting other regions simply does not apply.
37. In fact, accepting the CZG Complainants’ and the Coalition’s interpretation, PJM could never provide emergency assistance of any sort to another Balancing Area if it previously called for Load Management Actions. There is nothing in Section 2.5 of Manual 13 that would limit the (claimed) prohibition of providing assistance to other regions after initiating Load Management Actions to non-firm exports. The sentence cited by these Complainants states: “PJM load management programs are not to be used to provide assistance to adjacent Balancing Areas.”⁶⁰ If the CZG Complainants’ and the Coalition’s reading is correct, this limitation would mean that PJM could not provide firm exports or even emergency sales to another Balancing Area experiencing a capacity shortfall after PJM initiated a Load Management Action. The only time PJM could assist another region in any respect would be if no Load Management Actions were taken. Given that PJM would be expected to call for Load Management Action during any capacity shortage (including during pre-emergency conditions) PJM would be side-lined in virtually any wide-area capacity event that included its territory. Such an interpretation of this manual provision would be irrational.

G. Complainants’ Arguments That PJM Failed to Properly Maintain Reserves in Certain Control Areas Do Not Support their Claims

38. The CZG Complainants and Coalition contend that PJM failed to properly maintain reserve levels and claim that PJM should have curtailed both non-firm and firm exports to do so. According to Dr. Sotkiewicz, PJM violated the Tariff and Operating Agreement because “PJM allowed reserve levels to fall below their requirements RTO-wide and within the

⁵⁸ Manual 13, § 2.5.

⁵⁹ *Id.* (emphasis omitted).

⁶⁰ *Id.*

Mid-Atlantic-Dominion ('MAD') reserve sub-zone frequently while supporting exports.”⁶¹ Specifically, Complainants cite the language of Tariff, Attachment K–Appendix Section 1.10.6 (c) and Operating Agreement Schedule 1, Section 1.10.6(c), which both state that “[t]he Office of the Interconnection shall curtail deliveries to an External Market Buyer if necessary to maintain appropriate reserve levels for a Control Zone as defined in the PJM Manuals, or to avoid shedding load in such Control Zone.”⁶² The CZG Complainants claim that “because the OA trumps the manuals,”⁶³ the admonition to “curtail deliveries to an External Market Buyer if necessary to maintain appropriate reserve levels” prevents PJM from relying upon Manual 13, Sections 2.3.2 and 2.5, which both prevent PJM from cutting external sales “[i]f the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed . . . unless it would prevent load shedding within PJM.”⁶⁴ But even if Dr. Sotkiewicz’s analysis were correct (and I do not concede that it is), it fails to help Complainants’ basic thesis that PJM’s pre-emergency and Emergency Actions were not justified. Further, the Complainants’ asserted dichotomy between the Operating Agreement, Tariff, and Manual 13 is invalid. Complainants badly misread each of those provisions, which do not conflict.

39. As an initial matter, I disagree with Dr. Sotkiewicz’s statement that PJM “allow[ed] reserves to go short increasing the likelihood of a loss of load event in PJM.”⁶⁵ PJM had options to address a large contingency occurring at times when level of reserves fell below the desired levels. PJM had the option to take a Voltage Reduction Action which would have made 1,701.7 MW of reserves available to PJM.⁶⁶ At least 1,239.1 MW are available in 10 minutes or less, some of which are available in as little as 2 minutes.⁶⁷ Also, a Voltage Reduction Action for the Mid-Atlantic-Dominion subzone would have made 1239.1 MW available in 10 minutes or less. These quantities are similar in terms of their operational characteristics to Synchronized Reserves since their sources are currently operating resources synchronized to the system. Further, because this was a capacity shortage emergency and PJM had called a Maximum Generation Action, it had the ability to recall all PJM Capacity Resources being used to serve loads outside of PJM regardless of the type

⁶¹ CZG Complaint, Sotkiewicz Aff., Ex. CZG-0004, at P 100; Coalition Complaint, Sotkiewicz Aff., Attach. 4, at P 131 & n.93.

⁶² CZG Zone Complaint at 19 & n.57 (quoting and citing the Tariff and OA); Coalition Complaint at 25, 32.

⁶³ CZG Complaint at 30.

⁶⁴ *Id.* at 30 (quoting Manual 13, § 2.3.2 at 32); Manual 13, § 2.5 at 92.

⁶⁵ CGZ Complaint, Sotkiewicz Aff., Ex. CZG-Ex-004, at P 117.

⁶⁶ See Manual 13 § 2.3.2 (Step 9 (Real-time)) Voltage Reduction Action at 39, *id.* at 26-27 (tables describing available amounts).

⁶⁷ *Id.* at 26-27 (tables describing available amounts).

of transmission service, *i.e.*, non-firm or firm, being used.⁶⁸ Most of the exports are related to PJM Capacity Resources and thus could have been recalled by PJM if needed to serve its own customers' requirements.

40. Dr. Sotkiewicz claims that all or most exports should have been curtailed at various times on December 23 and December 24, 2022, but he nowhere explains how much curtailment was necessary, so the impact of taking this extraordinary step contrary to Manual 13 cannot be determined. Even more importantly, Dr. Sotkiewicz does not even claim that if PJM had curtailed non-firm and firm exports, PJM would not have needed either Pre-Emergency Load Reduction Actions or Emergency Actions. As I have explained already, the PJM's operators' reasons for taking Pre-Emergency and Emergency Actions related mainly to uncertainty in the load forecast and the surprisingly poor overall performance of generation. Further, as I have also explained, an important reason for extending pre-emergency and emergency procedures after the morning peak ended on December 24, was the PJM operators' concern about meeting the evening peak. Even if PJM should have curtailed external exports to maintain RTO Primary Reserves during certain times between 02:00 and 06:00 on December 24, 2022 (which I do not concede is correct), that would not have addressed the valid concerns the operators had about meeting the evening peak. In fact, about half the identified period on December 24, 2022, falls outside of the times that PJM took pre-emergency and Emergency Actions. The main focus of this portion of Dr. Sotkiewicz's affidavit is the claim that "PJM's failure to curtail exports to maintain reserves in accordance with the Tariff led to reserve shortages and higher reserve prices than needed to be the case."⁶⁹ But the ComEd Zone Complainants and Coalition are seeking to avoid Non-Performance Charges; they do not seek redress for cost impacts associated with PJM's alleged violation of the requirement to maintain reserves.
41. The CZG Complainants' assertion that Dr. Sotkiewicz's affidavit sets up a conflict between a controlling tariff provision and an inferior manual provision is also misleading. PJM's Tariff and Operating Agreement both provide for "the mutual provision of . . . support in . . . Emergency conditions with other interconnected Control Areas" and require PJM to "[c]oordinate the curtailment or shedding of load, or other measures appropriate to alleviate an Emergency."⁷⁰ The Manual 13 guideline is an implementation detail for the

⁶⁸ See *PJM Interconnection, L.L.C.*, 84 FERC ¶ 61,224 at 62,081 (1998) ("PJM explains that the curtailment provisions [*i.e.*, those proposed for Operating Agreement Section 1.11.3A Maximum Generation Emergency] relate to generation curtailments, not transmission curtailments. [PJM's] right to call upon the output of Capacity Resources is already a requirement applicable to the owners of Capacity Resources (*i.e.*, they are permitted to make only nonfirm, recallable sales from Capacity Resources) . . . , and that this provision merely clarifies that fact. We find that PJM's explanation adequately addresses Cargill-Alliant's concerns and agree that the curtailment terms at issue here relate to generation sales, not transmission service, and simply clarify the existing arrangement.").

⁶⁹ CZG Complaint, Sotkiewicz Aff., Ex. CZG-0004, at P 109.

⁷⁰ Tariff § 1.6.2.

performance of PJM's obligations under the Tariff and Operating Agreement. Assuming a conflict between PJM's Tariff/Operating Agreement duties to sustain internal reserves and its Tariff/Operating Agreement commitment to provide assistance to prevent load shed in another area, the task faced by the PJM operators would be to balance, the achievement of these two goals when feasible and consistent with the Good Utility Practice Standard. Specifically, under the facts here, the PJM operators would need to balance the the reserves violations the CZG Zone Complainants and Coalition allege occurred against the load shedding damage that cutting firm transactions to other regions would have caused or failed to mitigate. This is very different than the analysis framed by these Complainants. Even accepting the CZG Complainants' and Coalition's claim that the reserves shortages occurred, opting instead to prevent or mitigate load shedding in neighboring regions during an extreme cold weather event would been the most reasonable choice.

42. This concludes my affidavit.

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Essential Power OPP, LLC, <i>et al.</i>)	
Complainants)	
v.	)	Docket No. EL23-53-000
PJM Interconnection, L.L.C.)	
Respondent)	
)	
Aurora Generation, LLC, <i>et al.</i>)	
Complainants)	
v.	)	Docket No. EL23-54-000
PJM Interconnection, L.L.C.)	
Respondent)	
)	
Coalition of PJM Capacity Resources)	
Complainant)	
v.	)	Docket No. EL23-55-000
PJM Interconnection, L.L.C.)	
Respondent)	

VERIFICATION

I, **Michael E. Bryson**, state, under penalty of perjury, that I am the Michael E. Bryson referred to in the foregoing document entitled “Affidavit of Michael E. Bryson on Behalf of PJM Interconnection, L.L.C.,” that I have read the same and am familiar with the contents thereof, and that the facts set forth therein are true and correct to the best of my knowledge, information, and belief.

/s/ Michael E. Bryson
Michael E. Bryson

Attachment C

Affidavit of Steven T. Naumann, P.E.
on Behalf of PJM Interconnection, L.L.C.

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation,)	
Complainant,)	
)	
v.	)	Docket No. EL23-66-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	
)	
Invenergy Nelson LLC,)	
Complainant,)	
)	
v.	)	Docket No. EL23-67-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	

**AFFIDAVIT OF STEVEN T. NAUMANN, P.E.
ON BEHALF OF PJM INTERCONNECTION, L.L.C.**

1. My name is Steven T. Naumann. My business address is 8210 Tripp Avenue, Skokie, Illinois 60076. I am a self-employed consultant, with over 40 years of experience in planning, operations, reliability and regulatory aspects of electric power systems.

2. I am submitting this affidavit on behalf of PJM in support of PJM's Answers to the Complaints filed by the Calpine Corporation and Invenergy Nelson LLC in the captioned proceedings. I have reviewed these Complaints and aver that the statements, analyses, and conclusions I present in my May 26, 2023 affidavit submitted on behalf of PJM in support of PJM's Answers to the complaints filed in Docket Nos. EL23-53, EL23-54, and EL23-55, which I include as Exhibit 1 to this affidavit, apply equally to the issues raised in the captioned Complaints of Calpine Corporation and Invenergy Nelson LLC.

3. This concludes my affidavit.

Exhibit 1

Affidavit of Steven T. Naumann
on behalf of PJM Interconnection, L.L.C.

Submitted in Docket Nos. EL23-53, EL23-54 and EL23-55
on May 26, 2023

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Essential Power OPP, LLC, <i>et al.</i>,)	
Complainants)	
v.	)	Docket No. EL23-53-000
PJM Interconnection, L.L.C.)	
Respondent)	
)	
Aurora Generation, LLC, <i>et al.</i>,)	
Complainants)	
v.	)	Docket No. EL23-54-000
PJM Interconnection, L.L.C.)	
Respondent)	
)	
Coalition of PJM Capacity Resources)	
Complainant)	
v.	)	Docket No. EL23-55-000
PJM Interconnection, L.L.C.)	
Respondent)	

**AFFIDAVIT OF STEVEN T. NAUMANN, P.E.
ON BEHALF OF PJM INTERCONNECTION, L.L.C.**

1. My name is Steven T. Naumann. My business address is 8210 Tripp Avenue, Skokie, Illinois 60076. I am a self-employed consultant. In 2019, I retired from Exelon Corporation (Exelon) where I served as Vice President, Transmission and NERC Policy for Exelon Business Services Company. In that role, I provided the electric delivery utilities owned by Exelon advice and guidance on regulatory questions relating to system planning, design, operation, and reliability, and rates, terms, and conditions of service that are subject to federal regulation or that concern boundaries and classifications of assets, services, and authority between federal and state jurisdiction. I also provided advice and guidance on reliability and security policy to Exelon Generation, then the generation subsidiary of Exelon.
2. I have over 40 years of experience in planning, operations, reliability and regulatory aspects of electric power systems. I was part of the Exelon executive team leading the integration of Commonwealth Edison Company (ComEd) into PJM. My knowledge of transmission and generation issues in PJM, particularly in the ComEd Zone, is directly relevant to the arguments advanced by the ComEd Zone Generators in this proceeding.
3. I am licensed in Illinois, both as a Professional Engineer and as an attorney, although I do not practice law. I hold a Bachelor of Science degree in Electric Power Engineering and a Master of Engineering degree in Electric Power Engineering, both from Rensselaer Polytechnic Institute in New York, as well as a Juris Doctor from Chicago-Kent College

of Law. My biographical summary, attached as Exhibit PJM-007.1, provides more detail on my qualifications, my publications, and my previous testimony.

4. I am submitting this Affidavit in support of PJM Interconnection, L.L.C. (PJM) in response to the complaints filed in the above captioned proceedings.

Conclusions

5. PJM's primary responsibility is to manage the assets that it operates in a reliable and safe manner. This responsibility is above all others. PJM's mission statement declares that its "primary task" is "to ensure the safety, reliability, and security of the bulk electric power system."¹ As PJM's President and CEO has stated, "[k]eeping the power flowing and the grid reliable is the core mission for PJM and our member companies."²
6. Based on over 40 years of experience, the primary responsibility of all entities that plan and operate the electric power grid is to keep the lights on. This task may be challenging when system operators face severe conditions, especially where decisions need to be made within a short period of time and circumstances are rapidly changing. It should be no surprise that operators may take actions in real-time to address difficult problems that others may question after the fact as being overly conservative or uneconomic. At such times, delaying actions can result in unnecessary loss of load. Furthermore, it is important for operators to be proactive—i.e., stay ahead of potential problems, not reactive after problems occur—to ensure reliability, especially during periods of severe stress.
7. Winter Storm Elliott was an unusually severe winter storm that struck the PJM Region between December 23 and December 24, 2022. The storm presented extraordinary reliability challenges by causing an extremely rapid drop in temperatures coincident with unexpectedly record-breaking high loads for the Christmas holiday.³ It had a major impact not just on PJM but on much of the rest of the Eastern Interconnection. There have been a number of large-scale disturbances that have resulted in wide-area loss of load dating back to the Northeast Blackout of 1965.⁴ One of the more remarkable features of PJM's

¹ PJM, *About PJM: Who We Are*, <https://pjm.com/about-pjm>.

² *PJM 2021 Annual Report, Operations* (June 2022), <https://services.pjm.com/annual-report2021/operations/>. PJM's emphasis on reliability has remained unchanged for the past two decades. For example, in April 2004, the Exelon executive team met with the PJM executive team to finalize the steps of PJM integrating ComEd into PJM on May 1, 2004. At that meeting, I recall that Exelon's then-CEO, John Rowe, asked PJM's then-CEO, Phil Harris, to promise not to go forward with the integration if there was anything not yet completed that would threaten reliability. Mr. Harris, of course, reassured the Exelon team that PJM would ensure reliable operations before completing the switchover.

³ See PJM, *Winter Storm Elliott Info*, <https://www.pjm.com/markets-and-operations/winter-storm-elliott> (collecting PJM's public statements addressing Winter Storm Elliott's impact on PJM's operations and markets).

⁴ See FERC and NERC, *Regional Entity Staff Report, The February 2021 Cold Weather Outages in Texas and the South Central United States 47-50* (Nov. 2021) (February 2021 Cold

performance during Winter Storm Elliott is that PJM, unlike its neighboring Balancing Authorities, was able to navigate Winter Storm Elliott without forcing customers to shed load.⁵

8. While each operating situation is different and the information that operators have to make decisions varies, it is important to put the performance of PJM during Winter Storm Elliott in context of severe cold weather events over the past decade.⁶ Following the February 2011 cold weather event in ERCOT and the Southwest, the FERC-NERC Staff Report made 26 recommendations for the electric system including the need for generator winterization.⁷ Next was the 2014 Polar Vortex, after which NERC made a number of recommendations, generator winterization again among them.⁸ In January 2018, similar high outage rates occurred during the extreme cold in the South Central United States, including MISO and TVA, which connect to PJM.⁹ A more recent incident is the situation in Texas during Winter Storm Uri, in February 2021, when ERCOT was forced to shed over 10,000 MW of load in less than an hour to avoid a blackout of the entire ERCOT

Weather Report) (describing previous cold weather events), <https://www.nerc.com/news/Pages/Final-Report-on-February-2021-Freeze-Underscores-Winterization-Recommendations.aspx>; FERC and NERC Staff Report, Arizona-Southern California Outages on September 8, 2011 (Apr. 2012), <https://www.nerc.com/pa/rrm/ea/Pages/September-2011-Southwest-Blackout-Event.aspx>; U.S.-Canada Power System Outage Task Force, Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations § 7 at 103-07 (Apr. 2004) (describing seven large-scale disturbances), <https://www.energy.gov/oe/articles/blackout-2003-final-report-august-14-2003-blackout-united-states-and-canada-causes-and>.

⁵ See *infra* P 23 & notes 47-51 (detailing emergency actions and substantial forced load shedding in PJM's neighboring Balancing Authorities on December 23 and December 24 as documented by NERC, the Department of Energy, and the Reliability Coordinator Information System).

⁶ Other types of historical weather events also highlight the risk of operators waiting too long to take emergency actions and how dramatic such actions may need to be in a crisis. A particularly noteworthy example occurred in July 1977, when the New York electric grid suffered transmission line outages due to lightning from thunderstorms north of New York City, which was importing power. After a number of outages, the Consolidated Edison operators delayed shedding load, and, after separating from the rest of the Eastern Interconnection, nearly the entire city suffered a blackout. See, e.g., Victor K. McElheny, *Improbable Strikes by Lightning Tripped Its System*, *Con Ed Says*, N.Y. TIMES (July 15, 1977).

⁷ See FERC and NERC, Report on Outages and Curtailments During the Southwest Cold Weather Event of February 1-5, 2011, 197-212 (Aug. 2011), <https://www.nerc.com/pa/rrm/ea/Pages/February-2011-Southwest-Cold-Weather-Event.aspx>.

⁸ See NERC, Polar Vortex Review 19-20 (Sept. 2014), https://www.nerc.com/pa/rrm/january%202014%20polar%20vortex%20review/polar_vortex_review_29_sept_2014_final.pdf.

⁹ See FERC and NERC, Staff Report, The South Central United States Cold Weather Bulk Electric System Event of January 17, 2018 (July 2019), https://www.nerc.com/pa/rrm/ea/Documents/South_Central_Cold_Weather_Event_FERC-NERC-Report_20190718.pdf.

system.¹⁰ ERCOT came within minutes of a full blackout due to a combination of generator outages and high load.¹¹

9. These events prompted regulators and public utilities, including PJM, to develop guidelines to avoid or mitigate cold weather emergencies. Starting in 2012, NERC issued three versions of winter preparedness guidelines culminating in a comprehensive guideline in 2020¹² and Level 2 Alerts providing recommendations to industry prior to the 2021-2022 and 2022-2023 winter seasons.¹³ After a decade of alerts, guidelines, training, and lessons learned, PJM’s generator owners and operators were well aware of the need to winterize their assets and that extreme cold was going to be more common than previously thought. In fact, the Commission recently pointed this out stating “we also emphasize that industry has been aware of and alerted to the need to prepare their generating units for cold weather since at least 2011.”¹⁴ And PJM’s generators certainly were aware that FERC had approved modifications to three NERC reliability standards, even though those standards would not be effective until April 1, 2023.¹⁵
10. Nevertheless, many generators failed to perform once again when Winter Storm Elliott struck PJM on December 23-24. They failed despite mandatory reliability standards that were just over the horizon, numerous examples of cold weather events where large amounts of natural gas-fired generation were unavailable, and a wide array of alerts, reports, lessons learned, guidelines and training in which generators were told repeatedly what they needed to do to operate during extreme cold.
11. For example, NERC’s Generating Unit Winter Weather Readiness Guideline lists 16 “typical problem areas,” that may result in operational issues due to cold and/or freezing

¹⁰ See February 2021 Cold Weather Report, Fig. 73, at 137.

¹¹ See *id.* at 47-50.

¹² See NERC, Reliability Guideline, Generating Unit Winter Weather Readiness – Current Industry Practices – Version 3 (Dec. 15, 2020) (Generating Unit Winter Weather Readiness), https://www.nerc.com/comm/RSTCReliabilityGuidelines/Reliability_Guideline_Generating_Unit_Winter_Weather_Readiness_v3_Final.pdf.

¹³ See Recommendation to Industry, Cold Weather Preparations for Extreme Weather Events – II (Sept. 12, 2022), <https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20R-2022-09-12-01%20Cold%20Weather%20Events%20II.pdf>; Recommendation to Industry, Cold Weather Preparations for Extreme Weather Events (Aug. 18, 2021), <https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/NERC%20Alert%20R-2021-08-18-01%20Extreme%20Cold%20Weather%20Events.pdf>.

¹⁴ See *N. Am. Elec. Reliability Corp.*, 182 FERC ¶ 61,094 at P 88 (2023) (approving Extreme Cold Weather Reliability Standards).

¹⁵ See *N. Am. Elec. Reliability Corp.*, 176 FERC ¶ 61,119 (2021) (approving Cold Weather Reliability Standards); Recommendation to Industry, Cold Weather Preparations for Extreme Weather Events – II at 1 (“The Cold Weather Reliability Standard becomes enforceable on April 1, 2023”) (in red and bold in original).

weather.¹⁶ In turn, PJM has documented a Cold Weather Preparation Guideline and Checklist that includes a detailed list of typical problem areas for generators to include in their winterization plans.¹⁷

- Personnel Preparation
- Staffing
- Equipment Preparation
- Maintain Substation Equipment
- Fuel and Environmental Preparation

Under equipment protection, PJM has listed 33 detailed, albeit not exclusive actions, including:

- Review cold weather scenarios affecting equipment taking into account the effects of precipitation and wind
- Consider pre-warming, operating at full speed no load, early start-up, and/or putting on turning gear scheduled units prior to a forecasted severe winter weather event
- Prepare units that have been off line for lengthy periods of time for start-up and operation during severe winter weather events

To refer to the events of Winter Storm Elliott as *déjà vu* all over again would be an understatement.¹⁸

12. With this history in mind, Winter Storm Elliott presented PJM operators with extremely high rates of generator outages and derates related to extreme cold weather and fuel supply problems—problems that the training, guidelines, and most importantly, the Capacity Performance market-based framework¹⁹ were supposed to solve. PJM operators had to deal with these facts and could not assume that, if the next generator(s) tripped, sufficient generation would be able to come on line at the times needed to stabilize the system with enough energy plus reserves. The risk was too high.
13. The seriousness of generation failures during a decade of cold weather events and lack of preparedness, has led NERC to issue an unprecedented level 3 alert “to target a critical risk,

¹⁶ See Generating Unit Winter Weather Readiness, at 3-5.

¹⁷ See PJM Manual 14D: Generator Operational Guidelines, Attach. N: Cold Weather Preparation Guideline and Checklist, at 148-54 (Rev. 62, Dec. 21, 2022).

¹⁸ Yogi Berra purportedly made this statement following back-to-back home runs by Mickey Mantle and Roger Maris in 1961.

¹⁹ See *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208 (Capacity Performance Order), *order on reh’g & compliance*, 155 FERC ¶ 61,157 (Capacity Performance Rehearing and Compliance Order), *pet’n for rev. denied sub nom. Advanced Energy Mgmt. All. v. FERC*, 860 F.3d 656 (D.C. Cir. 2017).

cold weather preparations for extreme weather events to reliability.”²⁰ Of the eight Essential Actions, six require responses by Generator Owners. These actions include (1) calculating the Extreme Cold Weather Temperature (ECWT), as defined in the Alert and in new standard EOP-12-1, for each plant; (2) identifying the cold weather preparedness plan the critical components and freeze protection measures to be implemented for the next winter season; (3) identifying which units are capable of operating at the ECWT, which units require additional freeze protection and which can be implemented prior to next winter; (4) identifying units that experienced a Generator Cold Weather Event during the 2022-2023 winter and (a) identify the cause; (b) determine applicability to similar units; (c) determine corrective actions that can be implemented prior to next winter; and (d) identify temporary operating limitations; and (5) providing information to the relevant Reliability Coordinators, Balancing Authorities and Transmission Operators.²¹ While I am not implying that the PJM generators should have been in compliance with Reliability Standard EOP-012-1, which the Commission did not approve until after the events of Winter Storm Elliott,²² generators certainly were aware of the requirements prior to the start of the 2022-2023 winter season.

14. The ComEd Zone Generators contend that PJM was required to curtail all non-firm exports prior to initiating capacity-related emergency procedures.²³ The Coalition of PJM Capacity Resources (Coalition) makes this same argument.²⁴ This is a faulty interpretation of the PJM OATT and PJM Manual 13. The ComEd Zone Generators and the Coalition are arguing that PJM has no flexibility in the steps it takes before a Performance Assessment Interval (PAI) is triggered. In the first instance, both Complainants come to this conclusion by misreading the PJM OATT and PJM Manual 13. While the ComEd Zone Generators correctly cite the definition of Emergency Action, which encompasses “*any* emergency action for locational or system-wide capacity shortages,”²⁵ the ComEd Zone Generators go on to argue that, because “PJM did not take *all* steps before taking Emergency Actions that triggered the PAIs,” the penalties should not have been triggered.²⁶ For example, the

²⁰ NERC Board of Trustees Agenda, Agenda Item 6b (Mar. 11, 2023).

²¹ NERC, Essential Actions to Industry, Cold Weather Preparations for Extreme Weather Events III (May 15, 2023), <https://www.nerc.com/pa/rrm/bpsa/Alerts%20DL/Level%203%20Alert%20Essential%20Actions%20to%20Industry%20Cold%20Weather%20Preparations%20for%20Extreme%20Weather%20Events%20III.pdf>.

²² See *N. Am. Elec. Reliability Corp.*, 182 FERC ¶ 61,094. A number of the Complainants voted against approval of EOP-12-1. See Ballot Name: 2021-07 Extreme Cold Weather Grid Operations, Preparedness, and Coordination EOP-012-1, <https://sbs.nerc.net/BallotResults/Index/649>.

²³ Complaint of ComEd Zone Generators at 21-22, Docket No. EL23-54 (Apr. 4, 2023).

²⁴ Complaint of the Coalition of PJM Capacity Resources (Coalition Complaint) at 27-33, Docket No. EL23-55 (filed Apr. 4, 2023).

²⁵ Complaint of ComEd Zone Generators at 18, Docket No. EL23-54 (Apr. 4, 2023) (citing PJM OATT, § 1, Definitions, Definitions E – F) (emphasis added).

²⁶ Complaint of ComEd Zone Generators at 19 (emphasis added).

ComEd Zone Generators, the Coalition and the Nautilus Entities argue that Section 2.3.2 of PJM Manual 13 *requires* that “prior to entering into capacity related Emergency Procedures, PJM *must* ‘curtail all non-Firm exports.’”²⁷ The Coalition repeats this argument and also claims, erroneously, that Section 2.3.2 requires PJM to issue an Energy Emergency Alert Level 1 (EEA 1).²⁸ But Section 2.3.2 says no such thing.

15. Inventing a requirement to take *all* steps prior to taking Emergency Actions is contrary to the express language of Section 2.3.2 of PJM Manual 13. First, Section 2.3.2 explicitly states, “[d]ue to system conditions and the time required to obtain results, PJM dispatchers may find it necessary to vary the order of application to achieve the best overall system reliability.”²⁹ Section 2.3.2 goes on to state that the actions taken prior to entering into capacity related emergency procedures are “the most probable sequence” and, depending on the severity of the capacity deficiency, “it is unlikely that some Steps would be implemented.”³⁰ Moreover, as I explain below, such a reading is inconsistent with the flexibility that PJM operators must have to deal with emergencies, especially those faced by PJM during Winter Storm Elliott.
16. The operators have to make decisions based on current conditions, expected conditions, and the uncertainty of various elements of the system with an eye to preventing loss of load. They must have flexibility. For example, given the quickly changing weather and the large amount of gas-fired generation then unavailable, inaccurate and untimely information provided by generators, the fact that neighboring regions did not have excess capacity to supply to PJM if additional PJM generation tripped, and the uncertainty of the level of load, maintaining non-firm exports when PJM had additional resources to do so must be considered Good Utility Practice.³¹ If some generators that were delivering energy had tripped or were forced to derate, or load unexpectedly increased, PJM could then

²⁷ Complaint of ComEd Zone Generators at 21 (underlining in original, italics added); *see also* Complaint of Coalition Complaint at 25, 27, Docket No. EL23-55 (filed Apr. 4, 2023); Complaint of Nautilus Entities at 42, 56 and Affidavit of Christopher H. Jordan at P 42, Docket No. EL23-53 (filed Mar. 31, 2023).

²⁸ Coalition Complaint at 25, 27.

²⁹ PJM Manual 13, § 2.3.2, at 28.

³⁰ *Id.*

³¹ The “Good Utility Practice” standard has been in place for decades and applies to all FERC-jurisdictional transmission providers. The PJM OATT includes the standard definition of “Good Utility Practice” as “any of the practices, methods and acts engaged in or approved by a significant portion of the electric utility industry during the relevant time period, or any of the practices, methods and acts which, *in the exercise of reasonable judgment in light of the facts known at the time the decision was made*, could have been expected to accomplish the desired result at a reasonable cost consistent with good business practices, reliability, safety and expedition. Good Utility Practice is not intended to be limited to the optimum practice, method, or act to the exclusion of all others, but rather is intended to include acceptable practices, methods, or acts generally accepted in the region; including those practices required by Federal Power Act section 215(a)(4).” PJM OATT, § 1, Definitions, Definitions G – H (emphasis added).

interrupt non-firm exports and utilize the energy from the remaining generators that are on-line to maintain service to PJM load.³² Similarly, PJM operators had to consider the probability that generators would not start when called upon or that start-up would be delayed. This concern was not theoretical. When PJM called for resources to support the peak the morning of December 24, approximately 6,000 MW of steam generation did not come on-line at the expected time to support the load.³³ Furthermore, PJM found numerous instances of generators either not providing accurate data on availability or not updating data. PJM only found out about generators inability to run, to start when needed, or derates when PJM called on those generators to operate. This lack of accurate information increased the difficulty for PJM to serve the load.³⁴ PJM was in a position of having to make critical operating decisions but could not trust the information provided by many generators. Having generation running and synchronized, as well as additional generation available for such contingencies is, by definition, Good Utility Practice.

17. The conditions in ERCOT during Winter Storm Uri are an example of what can happen under similar extreme cold conditions. During a three-hour period, the load in ERCOT increased and over 6,000 MW of generation was lost.³⁵ As stated in the February 2021 Cold Weather Report, “[d]ue to the unrelenting generating unit losses during this period, the actions ERCOT BA operators took to restore Physical Responsive Capability and maintain normal frequency (initially, calling on demand response, then ordering small blocks of firm load shed) could not keep up, and frequency continued to drop. ERCOT BA operators were forced to shed larger blocks of firm load, and within minutes of one another, to restore frequency.”³⁶ PJM operators could not allow a similar situation to occur. They had to be proactive, not reactive.
18. Dr. Sotkiewicz’s analogy to the airline safety instruction concerning putting on your mask before helping others is incorrect.³⁷ PJM operators did, in fact, keep the PJM system reliable and helped keep their neighbors reliable. Furthermore, to the extent reserve levels

³² As it turns out, the concerns of PJM operators were well founded. Between the evening of Friday, December 23, when 34,500 MW of generation were forced out, and the morning of Saturday, December 24, another 12,500 MW of generation were forced off line. Other generation issues raised the total amount of “missing” generation to 57,000 MW on the morning of December 24. See PJM, Winter Storm Elliott, Frequently Asked Question 3 (updated Apr. 12, 2023), <https://www.pjm.com/-/media/markets-ops/winter-storm-elliott/faq-winter-storm-elliott.ashx>.

³³ PJM Presentation to Market Implementation Committee “Winter Storm Elliott” at 12 (Jan. 11, 2023), <https://www.pjm.com/-/media/committees-groups/committees/mic/2023/20230111/item-0x---winter-storm-elliott-overview.ashx>; Christopher Pilon Aff., Ex. PJM-004 at PP 26.

³⁴ Pilon Aff. at PP 47-65.

³⁵ See February 2021 Cold Weather Report, Figs. 69-70, at 130-31.

³⁶ *Id.* at 133.

³⁷ Sotkiewicz Aff., Ex. CZG-0004, at PP 123-24; Coalition Complaint, Attach. 4, Aff. of Paul M. Sotkiewicz, Ph.D, at P 152.

in PJM were below what Dr. Sotkiewicz believes were required, PJM temporarily shared the oxygen in their masks with their neighbors when it was safe to do so, rather than allowing them to pass out.

19. Dr. Sotkiewicz's argument that PJM violated its tariff and NERC Standards by continuing with non-firm exports during Emergency Actions is incorrect for several reasons.
20. First, Dr. Sotkiewicz repeats the mistaken interpretation that section 2.3.2 of Manual 13 *requires* PJM to curtail *all* non-firm energy exports prior to initiating Emergency Action.³⁸ As I stated above,³⁹ this interpretation is incorrect.
21. Second, Dr. Sotkiewicz, in support of the ComEd Zone Generators, takes a similar inflexible reading of the PJM Operating Agreement and Tariff sections that state PJM "shall curtail deliveries to an External Market Buyer if necessary to maintain appropriate reserve levels."⁴⁰ The Coalition makes this same argument.⁴¹ Again, Dr. Sotkiewicz and the Coalition assume that the term "appropriate reserve levels" leaves no room for PJM to assist its neighbors when it can while retaining the ability to recall non-firm transactions when necessary. In fact, PJM Manual 13 contemplates this situation stating that "[i]f the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM."⁴²
22. Third, Dr. Sotkiewicz's claim that while PJM can "come to the aid of neighboring control areas [sic]" PJM put its system "in a jeopardized reliability situation . . . by extending PAIs through December 24"⁴³ ignores PJM's obligations to support other Reliability Coordinators. The Coalition goes further and contends that "PJM was *obligated, then, not to assist other zones* after it entered into its own emergency."⁴⁴ Complainants' arguments disregard Requirement R7 of NERC Reliability Standard IRO-014-3, which states that "[e]ach Reliability Coordinator *shall* assist Reliability Coordinators, if requested and able,

³⁸ *Id.* at P 122. Dr. Sotkiewicz, in support of the Coalition goes further and claims that Section 2.3.2 of PJM Manual 13 "mandated" that PJM curtail all non-firm exports and "reasonably allowed" PJM to recall daily firm exports. *See* Coalition Complaint, Attach. 4: Sotkiewicz Aff., at P 72.

³⁹ *See supra* PP 15.

⁴⁰ Sotkiewicz Aff., Ex. CZG-0004, at P 100 (citing parallel provisions in PJM OATT, Attach. K – App'x § 1.10.6(c) and PJM Operating Agreement, Schedule 1, § 1.10.6(c)).

⁴¹ Coalition Complaint at 32-33.

⁴² Manual 13, § 2.3.2 at p. 32.

⁴³ Sotkiewicz Aff., Ex. CZG-0004, at P 99. Although Manual 13 uses the term "control areas," I assume Dr. Sotkiewicz is referring to neighboring Reliability Coordinators or possibly Reliability Balancing Authorities as NERC has assigned functions formerly performed by control area functions to specific registered entities to whom the standards are applicable.

⁴⁴ Coalition Complaint at 32 (*italics added*).

provided that the requesting Reliability Coordinator has implemented its emergency procedures, unless such actions cannot be physically implemented or would violate safety, equipment, regulatory, or statutory requirements.”⁴⁵ This is exactly what PJM did – assisted TVA (the Reliability Coordinator for TVA and LGE/KU) and VACAR-South (the Reliability Coordinator for Duke Progress and Duke Carolinas).

23. There is no question that these neighboring systems were implementing emergency steps, up to and including firm load interruptions under Energy Emergency Alert Level 3 (EEA 3),⁴⁶ and that PJM was able to assist. These EEA 3 actions and load-shedding are well-documented by NERC,⁴⁷ the Department of Energy,⁴⁸ and the Reliability Coordinator Information System (RCIS).⁴⁹

Emergency Energy Alerts Level 3⁵⁰

⁴⁵ NERC Standard IRO-014-3 – Coordination Among Reliability Coordinators (2015).

⁴⁶ NERC defines EEA 3 to mean that “Firm Load Interruption is imminent or in progress.” NERC, Attachment 1-EOP-011-1 (Energy Emergency Alerts) at 12, <https://www.nerc.com/pa/Stand/Reliability%20Standards/EOP-011-1.pdf>.

⁴⁷ See NERC, Winter Storm Elliott: Bulk Power System Awareness Observations, at 5-8 (Mar. 22, 2023) (listing preparatory actions, EEA 3 actions, and load shed quantities in neighboring Balancing Authorities), https://www.nerc.com/comm/RSTC/AgendaHighlightsandMinutes/RSTC_Meeting_Materials_Package_March_22_2023.pdf.

⁴⁸ U.S. Dep’t of Energy, OE-417 Electric Emergency and Disturbance Report – Calendar Year 2022, at 37 (showing SERC (Tennessee) shedding 100 MW or more of firm load on Dec. 23 and SERC (South Carolina and North Carolina) shedding 1,960 MW of firm load on Dec. 24), <https://www.oe.netl.doe.gov/download.aspx?type=OE417PDF&ID=83>.

⁴⁹ See PJM, RCIS-EEA 12/20/2022 00:00 – 12/26/2022 00:00. Specifically, PJM’s neighboring Reliability Coordinators—including TVA and VACAR South—declared EEA3 and lower levels of system emergencies during Winter Storm Elliott. Specifically, TVA declared EEA-3 for the TVA BA at 06:15 on 12/23; and for the LGE/KU BA at 1456 on 12/23. The TVA BA went down and then back to EEA3 at 17:21 on 12/23. Similarly, VACAR South declared EEA-3 for Dominion South Carolina at 05:59 on 12/24, for Duke Energy Carolinas at 06:17 on 12/24, for Duke Energy Progress at 06:40 on 12/24, and for South Carolina Public Service Authority at 07:20 on 12/24.

⁵⁰ NERC, Winter Storm Elliott, *supra* note 47, at 7.

Reliability Coordinator	Balancing Authority	Fri	Sat	Sun
Tennessee Valley Authority	TVA BA	●	●	
Tennessee Valley Authority	LG&E/KU	●	●	
VACAR South	Duke Energy Carolinas		●	
VACAR South	Duke Energy Progress		●	
VACAR South	Dominion South Carolina		●	
VACAR South	Santee Cooper		●	●

24. NERC summarized the load loss as follows:⁵¹

Friday, December 23		
06:12	TVA BA	1,270
09:31	Memphis Light Gas and Water*	200
16:18	TVA BA	3,200
14:36	LG&E/KU	350
Saturday, December 24		
06:10	Duke Energy Carolina	1,000
06:15	Dominion South Carolina	86.3
06:35	Duke Energy Progress	961
Total (all reports) load shed		7,067.3 MW

* TVA BA is the Balancing Authority for MLGW.

25. Had PJM not provided assistance, PJM’s neighboring Reliability Coordinators would have been required to shed additional firm load with possible devastating consequences. For example, between around 16:11 on December 23, TVA told PJM dispatchers several times that if PJM were to curtail roughly 2,500 MW of exports, “that would put [TVA] back into an EEA3, essentially shedding loads”⁵² and that doing so would “put the bulk electric grid at risk.”⁵³ Later, around 17:11, TVA, when discussing curtailing those transactions, told PJM “we’re trying to keep people alive over here.”⁵⁴ For PJM not to provide assistance when it was able would have been a violation of Requirement R7 which documents one of the most important obligations of operating entities in an interconnection – to assist others

⁵¹ *Id.* at 8 (showing over 5,000 MW of load shed in the TVA BA and LG&E/KU BA on December 23 and over 2,000 MW of load shed in the Duke Carolina, Duke Progress and Dominion Carolina BAs on December 24).

⁵² Transcript, Tennessee Valley Authority Call to PJM (Dec. 23, 2022) (on file with author) P 0206 at 13-14.

⁵³ *Id.* P 0208 at 11-12.

⁵⁴ *Id.* p. 74 at 1-2.

when they are able to without endangering their own reliability. The Violation Severity Level of not complying with Requirement R7 is “Severe.” Unlike most other NERC Standards, there are no lesser degrees of non-compliance. The standard is clear – help your neighbors if you can without endangering your system.

26. As FERC reiterated when it approved the first version of IRO-014, one of the purposes of this standard is to “preserve the reliability benefits of interconnected operation.”⁵⁵ In spite of Dr. Sotkiewicz’s assertions, it is clear to me that PJM operated in accordance with Good Utility Practice while maintaining the reliability of the PJM system under very stressful conditions.
27. The Coalition claims that NERC Reliability Standard EOP-011-2 [sic] and PJM Manual 13 require PJM to issue an EEA1 “before Emergency Actions are taken.”⁵⁶ But this ignores the express language of Attachment 1 – EOP-011-1 which explicitly states “The Reliability Coordinator may declare whatever alert level is necessary, and need not proceed through the alerts sequentially.”⁵⁷
28. The Coalition also makes an amorphous claim that PJM violated Requirement R1 of NERC Reliability Standard IRO-001-4 which states that “[e]ach Reliability Coordinator shall act to address the reliability of its Reliability Coordinator Area.” It argues that “PJM had an obligation to use its position to operate a reliable grid. It did not.”⁵⁸ In spite of the fact that unlike many of its neighbors, PJM did not shed load,⁵⁹ the Coalition bases its conclusion on *post hoc* conclusions as to actions that PJM should have taken, such as scheduling long-lead generation further in advance.⁶⁰ Similarly, the Coalition’s claims that “PJM “inserted uncertainty into a situation when certainty was needed” and “gave incomplete or inaccurate guidance to the available resources” including exactly whether, when and for how long generators would be needed.⁶¹ But, as stated in more detail in P 29 below, Complainants’ arguments in each case are made after the fact, knowing all the events that have transpired, rather than looking at the decision PJM made in real-time faced with many uncertainties. PJM was facing uncertainties about available generation as generators were failing before the operators eyes in spite of over 10 years of notice concerning winter weather readiness and uncertainty as to load levels in the face of “a

⁵⁵ *Mandatory Reliability Standards for the Bulk-Power System*, 118 FERC ¶ 61,218 at P 993 (2007).

⁵⁶ Coalition Complaint at 38-39. EOP-011-1 was in effect during Winter Storm Elliott. The current version, EOP-011-2, did not become effective until April 1, 2023. If EOP-011-2 had been in effect at the time of Winter Storm Elliott, the registered entities comprising the Coalition would have been subject to Requirements R7 and R8 concerning cold weather preparedness.

⁵⁷ See Attachment 1 – EOP-011-1, Emergency Energy Alerts, § B.

⁵⁸ Coalition Complaint at 39.

⁵⁹ See *supra* P 7.

⁶⁰ Coalition Complaint at 39-40.

⁶¹ *Id.* at 41-42.

historic extratropical cyclone [that] created winter storm conditions including blizzards, high winds, snowfall, and record cold temperatures.⁶² The Coalition’s claim that PJM operators should have had perfect foresight simply cannot be squared with the standard of Good Utility Practice which makes clear that actions are judged “*in light of the facts known at the time the decision was made.*”⁶³

29. The ComEd Zone Generators argue that PJM did not operate in a reasonable manner based on their own *post hoc* economic analysis months after Winter Storm Elliott has passed.⁶⁴ The essence of their argument is that, because not enough bad things actually happened, the actions of PJM’s operators to be prepared for foreseeable contingencies were not only wrong, but also a violation of PJM’s tariffs and manuals.⁶⁵ Complainants’ approach in each case is fundamentally misguided. This type of *post hoc* economic analyses and other varieties of “Monday morning quarterbacking” are irrelevant to the question of whether operators acted reasonably and in accordance with Good Utility practice with the knowledge they had at the time they had to make decisions. While post event analyses are useful to better understand the event, and can be used to improve rules and processes *going forward*, they cannot upset real-time decisions.⁶⁶
30. The ComEd Zone Generators contend that PJM should not have taken Emergency Actions in the ComEd Zone because there was no capacity deficiency within the ComEd Zone.⁶⁷ The Coalition makes a similar argument that (1) because PJM Manual 13 *allows* PJM to target Emergency Actions to specific zones; and (2) because “PJM had never issued an RTO-wide PAI in the history of its emergency procedures,” PJM’s decision to implement Emergency Actions for the entire RTO were “unprecedented and unreasonable.”⁶⁸ The

⁶² See NERC, Winter Storm Elliott: Bulk Power System Awareness Observations, at 3.

⁶³ See *supra* note 31.

⁶⁴ Complaint of ComEd Zone Generators at 19; Harvey Aff., Ex. CZG-0001, at P 78.

⁶⁵ For an extreme example based on after-the-fact simulations, the NTSB determined that US Air 1549 could have returned to LaGuardia following the loss of both engines if the aircraft had “been turned toward the airport immediately after the bird strike.” However, the National Transportation Safety Board also found that “[t]he immediate turn did not reflect real-world considerations.” See NTSB, Accident Report NTSB/AAR-10/03, Loss of Thrust in Both Engines After Encountering a Flock of Birds and Subsequent Ditching on the Hudson River, US Airway Flight 1549, § 2.3.2, at 89 (May 4, 2010).

⁶⁶ Good Utility Practice is analogous to the Commission’s prudence standard, which rejects the type of *post hoc* analysis pushed by the ComEd Zone Generators here. See, e.g., *Big Sandy Peaker Plant, LLC v. PJM Interconnection, L.L.C.*, 154 FERC ¶ 61,216 at P 50 (2016); *PPL EnergyPlus, LLC v. PJM Interconnection, L.L.C.*, 117 FERC ¶ 61,338 at P 33 (2006); see also *Midcontinent Indep. Sys. Operator, Inc.*, 144 FERC ¶ 61,129 at P 37 (2018).

⁶⁷ Complaint of ComEd Zone Generators at 31 (citing Harvey Aff., Ex. CZG-0001, at P 65). The Coalition makes a similar, albeit more generic argument, focusing on Virginia versus Ohio and Kentucky. Coalition Complaint at 35-37.

⁶⁸ Coalition Complaint at 35.

Coalition further argues that PJM (1) did not distinguish temperature differences between zones covering Ohio and Kentucky from Virginia;⁶⁹ and (2) did not provide adequate justification for its “economically inefficient decision to apply the Emergency Action orders to the entire RTO.”⁷⁰ Nautilus Entities focus on conditions at specific times in Maryland and New Jersey, where its generators are located.⁷¹

31. These arguments are deeply flawed. During Winter Storm Elliott, PJM faced unprecedented operating conditions in the form of rapidly failing generators, inaccurate and untimely information from generators, fuel supply problems, increasing load, and continuing uncertainty. It is absurd to suggest that because PJM had not issued an RTO-wide PAI in the past, it was unreasonable to do so under the conditions presented in Winter Storm Elliott. Moreover, Dr. Harvey’s own testimony concedes that prior to PJM Capacity Performance rules, PJM did, in fact, declare RTO-wide capacity emergencies.⁷² PJM operators are not handcuffed by the past, but must address the system conditions they actually face. Nor must PJM operate in a Balkanized manner where PJM must not consider generation available in some specific areas (Illinois, Virginia, Maryland and New Jersey). The opposite is true. PJM operates as a centrally dispatched Balancing Area that dispatches its aggregate generation resources to serve the aggregate load in the RTO. PJM has an obligation to ensure the reliability of each of its control zones and its entire system.⁷³ Because PJM *may* limit Emergency Actions to specific zones does not mean that under every and all conditions PJM *must* tie its hands and take risks to the reliability of the rest of PJM.
32. As I noted above, PJM Manual 13 section 2.3.2 states, “[d]ue to system conditions and the time required to obtain results, PJM dispatchers may find it necessary to vary the order of application *to achieve the best overall system reliability*.”⁷⁴ This is consistent with Good Utility Practice and the need for system operators to maintain flexibility to address emergencies in real-time. PJM operators needed to make decisions in real-time to ensure that the load was served in the entire RTO. Because of the large increase in failures of (mostly) gas-fired generation, PJM operators needed to ensure that all generation, other than those on approved planned and maintenance outages, were available on-line or at least available to run when needed. The fact that specific zones were not at some point short of generation did not relieve PJM operators from acting in the best interest of the entire RTO, as is their obligation. Recall that between the evening of December 23 and the morning of

⁶⁹ *Id.* at 35-36.

⁷⁰ *Id.* at 37.

⁷¹ Complaint of Nautilus Entities at 43-44.

⁷² PJM declared an Emergency Generation Action during the 2014 Polar Vortex. *See* Ex. CZG-0003, Tbl. C-10, at 6-7; Harvey Aff., Ex. CZG-0001, at PP 92-93 (“[B]efore the establishment of PJM’s capacity performance rules [emergency declarations] were also *generally* limited to a subset of PJM zones.”) (emphasis added).

⁷³ *See* McGlynn Aff., Ex. PJM-005.

⁷⁴ PJM Manual 13, § 2.3.2, at 28 (emphasis added).

December 24, PJM had seen a significant increase in unavailable generation. One just has to look at how quickly the situation deteriorated in ERCOT during Winter Storm Uri to understand PJM's need to continue emergency conditions RTO-wide until PJM had assurance that the emergency had passed.

33. In effect, the ComEd Zone Generators are saying that PJM should have rolled the dice, wagering that generation from their units would not be needed for the duration of the emergency because the Complainants' *post hoc* analysis suggests those units were not arguably needed to supply load to the ComEd Zone. The key flaw in this approach is that it treats the successful performance by *other* generators as a given; however, the PJM operators had no such luxury when they were managing the emergency in real time. Had events transpired differently, and one or more units had tripped, the consequences would have fallen on PJM's customers.⁷⁵ Once again, Good Utility Practice, especially during extremely stressed conditions, requires maximum flexibility on the part of system operators.
34. The ComEd Zone Generators assert that because transmission was constrained east of the ComEd Zone, bringing the ComEd Zone Generators' resources on line could not have helped to increase the supply of energy available to other PJM zones in the east. As discussed below, they are incorrect. Moreover, the *post hoc* argument by Dr. Harvey⁷⁶ presents an incomplete and misleading view of the operating situation. First, even if transmission was constrained east of ComEd at particular times, PJM operators had to be prepared to have sufficient generation available in other time periods and also in the event of foreseeable contingencies that would have required increases in generation in the ComEd Zone.⁷⁷ For example, Dr. Harvey is literally correct when he states that "from the standpoint of transmission flows from ComEd to eastern PJM, a load reduction in [the] ComEd [zone] has the same effect on net exports from the zone as an increase in ComEd [zone] generation output."⁷⁸ But PJM operators had to be concerned about the converse situation—an unexpected increase in load in the ComEd Zone, which, to use Dr. Harvey's language, would have the same effect on net exports from the ComEd Zone as a decrease in generation in the ComEd Zone, which would relieve the constraints. Second, PJM system operators had to be concerned that more generation, possibly even large nuclear units, would trip, causing the same impact.⁷⁹ The fact that those contingencies were

⁷⁵ See Bryson Aff., Ex. PJM-006 at P 24.

⁷⁶ See Harvey Aff., Ex. CZG-0001, at P 65.

⁷⁷ See Bryson Aff., at P 38 (PJM operators need to consider future time frames).

⁷⁸ Harvey Aff., at P 64.

⁷⁹ All nuclear units in the ComEd Zone operated at full output during Winter Storm Elliott. See, U.S. Nuclear Regulatory Commission, Power Reactor Status Report for 2022 (specifically for the Braidwood, Byron, Dresden, LaSalle and Quad Cities units on December 23, 24 and 25), <https://www.nrc.gov/reading-rm/doc-collections/event-status/reactor-status/2022/index.html>. However, PJM operators had seen that at 2:22 am on December 24 a large nuclear unit had tripped in Eastern PJM. See U.S. Nuclear Regulatory Commission, Event Notification Report for Dec. 27, 2022 (Event No. 56286 showing Salem Unit 2 tripped at 02:22 EST on Dec. 24, 2022),

avoided does not mean that PJM operators should not have had more generation available to deal with severe and changing conditions.

35. Third, ComEd Zone Generators ignore the fact that, had their units been available, PJM could have increased the generators on-line within the ComEd Zone. Doing so would have given PJM more assurance of avoiding start-up risk that it had already encountered.⁸⁰ Finally, had as much as 5,000 MW of generation in the ComEd Zone been available, PJM could, at various times, have utilized that generation to address the needs within PJM and could have redispatched generation within the ComEd Zone to relieve transmission constraints.⁸¹
36. I would make a final point in response to an argument made in a related Winter Storm Elliott complaint proceeding that I think is relevant here. Mr. Berardesco, on behalf of Lee County Generating Station, LLC, in Docket No. EL23-57-000, contends that PJM's Operating Instruction for Lee County to enter into a forced outage was inconsistent with NERC's definition. While Mr. Berardesco correctly states NERC's definition of Forced Outage in NERC's Glossary of Terms Used in NERC Reliability Standards,⁸² he never explains why this definition applies to anything other than reliability standards. As the title of the Glossary explicitly states, these terms are for use in NERC Reliability Standards, not anything else.⁸³ However, PJM has not incorporated the NERC definition of Forced Outage as part of its Capacity Performance mechanism.
37. This concludes my affidavit.
38. I hereby certify under penalty of perjury that the foregoing statements are true and correct to the best of my knowledge, information, and belief:

Executed on: May 26, 2023

/s/ Steven T. Naumann
Steven T. Naumann

<https://www.nrc.gov/reading-rm/doc-collections/event-status/event/2022/20221227en.html>. As I stated in P 33, while the *post hoc* analysis by the ComEd Zone Generators had the luxury of knowing that these units performed, PJM operators could not make that assumption in real-time.

⁸⁰ See *supra*, note 32; Bryson Aff. at P 27.

⁸¹ See McGlynn Aff. at PP 69-72. While the analysis detailed by Mr. McGlynn was performed after Winter Storm Elliott, it simply confirms the obvious – that having the additional generation within the ComEd Zone would have provided PJM operators with additional flexibility to mitigate transmission constraints and provide energy to PJM zones to the east.

⁸² See Declaration of Charles A. Berardesco on Behalf of Lee County Generating Station, LLC at P 4, Docket No. EL23-57 (filed Apr. 5, 2023).


⁸³ Following immediately after the document title, NERC states “[t]his Glossary lists each term that was defined in one or more of NERC’s continental-wide or Regional Reliability Standard.”

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation,)	
Complainant,)	
)	
v.	)	Docket No. EL23-66-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	
)	
Invenergy Nelson LLC,)	
Complainant,)	
)	
v.	)	Docket No. EL23-67-000
)	
PJM Interconnection, L.L.C.,)	
Respondent.)	
)	

VERIFICATION

I, **Steven T. Naumann**, pursuant to 28 U.S.C. § 1746, state, under penalty of perjury, that I am the Steven T. Naumann referred to in the foregoing document entitled “Affidavit of Steven T. Naumann on Behalf of PJM Interconnection, L.L.C.,” that I have read the same and am familiar with the contents thereof, and that the facts set forth therein are true and correct to the best of my knowledge, information, and belief.

DocuSigned by:

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Steven T. Naumann

Exhibit PJM-007.1

Curriculum Vitae of Steven T. Naumann

Steven T. Naumann

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Skokie, IL 60076
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708.404.6829

Mr. Naumann is a self-employed consultant. Until his retirement at the end of February 2019, Mr. Naumann served as Vice President, Transmission and NERC Policy for Exelon Business Services Company. In that role, he provided to the electric delivery utilities owned by Exelon Corporation advice and guidance on regulatory issues relating to system planning, design, operation, reliability and resiliency, as well as rates, terms, and conditions of service that are subject to federal regulation or that concern boundaries and classifications of assets, services, and authority between the Federal Energy Regulatory Commission and state regulators.

EDUCATION

Chicago-Kent College of Law
Chicago, IL
J.D. 1988

Rensselaer Polytechnic Institute
Troy, NY
M. Engineering, Electric Power Engineering, 1972
B.S., Electric Power Engineering, 1971

PROFESSIONAL REGISTRATION

Registered Professional Engineer – Illinois
Admitted to Illinois Bar

WORK EXPERIENCE

Sept. 2019 – April 2023: Protect Our Power, Chief Technical Advisor

2003 – 2019 Exelon Corporation: Vice President

March 2012 – February 2019: Vice President, Transmission and NERC Policy. Responsible for developing policy for Exelon on transmission pricing, cost allocation, and high-level transmission planning policy nationwide. Directed the development of policy issues involving NERC. Executive interface with EEI, NERC and DOE on transmission policy, reliability and security issues. Testified at FERC, DOE and the Illinois Commerce Commission on transmission, reliability and security issues.

February 2003 – March 2012: Vice President, Wholesale Market Development. Executive responsibilities for development of markets nationwide, senior interface with NERC and was one of a team of Exelon executives involved in development of RTO policy, including the integration of ComEd into the PJM, completed in May 2004. Directed the development of Exelon policy on numerous market issues related to PJM, MISO, and the Southwest Power Pool, and in other areas of the country. These issues included questions of capacity requirements, generation retirements, station power, ancillary services markets, reliability must run rules, reactive power compensation, transmission cost allocation and general market structure and development.

2003 – 2019: Representative to Outside Organizations.

- Chairman and Vice Chairman of the NERC Member Representatives Committee (“MRC”)
- Vice Chairman of the MAIN Board of Directors
- Interim Board of Directors of ReliabilityFirst Corporation
- Senior Executive Working Group supporting the ESCC

- NERC Stakeholders Committee and NERC MRC representing investor-owned utilities
- EEI Reliability Executive Advisory Committee
- EEI Energy Delivery Public Policy Executive Advisory Committee

1975 – 2003 Commonwealth Edison Company: Various engineering, management and executive positions: Commonwealth Edison Company

October 1999 – February 2003: Vice President, Transmission Services. Executive responsibility for transmission service provided by ComEd, including the interconnection of new generation to the ComEd transmission system, and executive responsibilities for ISO and later regional transmission organization (“RTO”) development.

January 1996 – October 1999: Director of T&D Regulatory Services. Directed the work of the T&D Regulatory Services Department which included the preparation and filing of tariffs and service agreements with FERC, administering those tariffs, and providing cost justifications where required. Responsible for administering ComEd’s Open Access Transmission Tariff (“OATT”) and for determining the propriety of rate discounts for transmission services and interpreting the tariff.

Served as a member of the NERC Interconnected Operations Services Working Group that issued a report in March 1997 providing additional technical information on ancillary services and other services needed for reliability of the interconnected system. Member of the Commercial Practices Working Group that provided an industry forum to discuss and resolve business practice issues related to the operation of bulk power electric systems in

North America. MAIN representative on the Interim Market Interface Committee, and the investor-owned utilities representative on the Market Interface Committee.

January 1995 – December 1995: Director of Market Analysis, Wholesale Marketing Department. Directed market analyses in support of ComEd's wholesale sales. Also served as a representative on the Real-Time Information Networks "What" Group, that provided information and a report to FERC on what information should be posted on the electronic information-sharing system that became known as the OASIS.

1993 – December 1994: Director, Interconnection Planning Section. Supervised the engineers performing interconnection studies, including the ComEd portion of MAIN studies, analysis of the transmission system in response to requests for bulk power sales, purchases and wheeling, and analysis of impacts of parallel flows on ComEd's transmission system. Served as the representative of the Northern Illinois subregion of MAIN to the MAIN Transmission Task Force Steering Committee. This Committee was responsible for directing MAIN regional and interregional studies, reviewing such studies, and recommending approval of such studies to the MAIN Engineering Committee. Served as Chairman of the MAIN Transmission Assessment Studies Group, responsible for conducting seasonal transmission assessment studies; Chairman of the MAIN Future Systems Studies Group, responsible for conducting future interchange and extreme disturbance studies; and the MAIN-ECAR-TVA Coordination and Data Exchange Committee, responsible for devising procedures for exchanging information on transfers and identifying actions to take during transmission system emergencies.

1990 – 1993: Head of Technical Studies Section. Directed engineers performing dynamic and transient analyses, as well as interconnection planning studies, including ComEd's participation in MAIN studies.

1988 – 1990: Research Engineer on the staff of the Vice President of Engineering, which included managing DOE research contracts and managing company patent program.

September 1980 – 1988: Assistant head of Technical Studies. Directed junior engineers and performed dynamic and transient analyses of the ComEd system and surrounding systems as well as reactive or voltage planning of the ComEd transmission system.

September 1978 – August 1980: Assigned to the Mid-America Interconnected Network ("MAIN"), formerly one of the regional reliability councils of NERC. Responsible for interconnection and extreme disturbance studies performed by MAIN, as well as monitoring of interconnected operations. Supervised the MAIN Coordination Center, including all engineering and operations functions.

December 1975 – August 1978: Engineer in Technical Studies Section of the System Planning Department. Performed stability, dynamic, transient switching, and other detailed studies of the ComEd transmission system. Staff assistant to Vice President of Engineering.

July 1975 – December 1975: Engineer assigned to a six-month “Graduate Development Program.” Rotating engineering assignments including transmission, distribution, generation and testing.

1971 – 1975 1 Lt/2 Lt, United States Air Force

June 1972 – June 1975: Base Electrical Engineer, 64 Civil Engineering Squadron/3500 Air Base Group, Reese AFB, TX. Responsible for all base electrical design and construction.

September 1971 – June 1972: Assigned as graduate student

Other Experience

Chicago-Kent College of Law Board of Advisors 2009-2020

Testimony

Before Congress

Senate Committee on Homeland Security & Governmental Affairs, “Protecting Cyberspace as a National Asset: Comprehensive Legislation for the 21st Century,” June 15, 2010

House Subcommittee on Emerging Threats, Cybersecurity, and Science and Technology, Committee on Homeland Security, “Securing the Modern Electric Grid from Physical and Cyber Attacks,” July 21, 2009

House Subcommittee on Energy and Air Quality, Committee on Energy and Commerce, “Protecting the Electric Grid from Cyber-Security Threats,” Sept. 11, 2008

Before the Illinois Supreme Court

Illinois Landowners Alliance, NFP, et al., v. Illinois Commerce Commission, Docket Nos. 121302, 121304, 121305, 121308 cons. (Affidavit, May 3, 2017)

Before the Federal Energy Regulatory Commission

Commonwealth Edison Co., Docket No. ER19-1478 (Testimony filed March 29, 2019)

Delaware Public Service Commission and Maryland Public Service Commission v. PJM Interconnection, L.L.C., Docket No. EL15-95 (Sept. 17, 2018) (Affidavit)

Reliability Technical Conference, Docket No. AD18-11 (July 31, 2018) (Comments)

PJM Interconnection, L.L.C., Docket No. ER17-1420 (Affidavit, August 25, 2017)

PJM Interconnection, L.L.C., Docket No. ER17-718, *et al* (Staff Workshop June 13, 2017)

Review of Generator Interconnection Agreements and Procedures, Docket No. RM16-12; *American Wind Energy Association*, RM15-21 (Technical Conference, May 13, 2016)

PJM Interconnection, L.L.C., Docket No. ER15-1344; *Potomac Electric Power Co.*, Docket No. ER15-1387 (Technical Conference, Nov. 12, 2015)

Northern Indiana Public Service Co. v. Midcontinent Independent System Operator, Inc. and PJM Interconnection, L.L.C., Docket No. EL13-88-000 (Technical Conference, June 15, 2015)

Reliability Technical Conference, Docket No. AD14-9 (June 10, 2014) (Prepared Remarks)

Duquesne Light Co. and PJM Interconnection, L.L.C., Docket No. ER13-90-002 (Declaration, Second Declaration)

Staff Technical Conference on Geomagnetic Disturbances to the Bulk-Power System, Docket No. AD12-13 (Technical Conference, April 30, 2012) (Prepared Remarks)

Reliability Monitoring, Enforcement and Compliance Issues, Docket No. AD11-1 (Technical Conference, Nov. 18, 2010) (Prepared Remarks)

PJM Interconnection L.L.C., Docket No. EL05-121-006 (Direct and Reply Affidavits)

Midwest Independent Transmission System Operator, Inc., Docket No. ER08-637-000, ER08-637-001, ER08-637-004, ER08-637-005 (Technical Conference on Market Coordination Service)

PJM Interconnection, L.L.C., Docket Nos. ER06-456-006, ER06-954-002, ER06-1271-001, ER07-424-000, EL07-57-000 (Cross Answering Testimony)

OATT Reform Technical Conference, Docket Nos. RM05-17-000, RM05-25-000 (Oct. 12, 2006)

PJM Interconnection, L.L.C., Docket Nos. ER05-1410-000, EL05-148-000 (Technical Conference on RPM, June 8, 2006)

Midwest Independent Transmission System Operator, Inc., Docket Nos. ER05-6, EL04-135, EL02-111, EL03-212 (Answering Testimony)

PJM Interconnection L.L.C., Docket No. EL05-121-000 (Direct and Cross-Answering Testimony)

Joint Boards on Security Constrained Economic Dispatch, Docket No. AD05-13-000 (PJM/MISO, Nov. 21, 2005)

The New PJM Companies, Docket No. ER03-262-009 (Direct and Rebuttal Testimony)

Midwest Generation EME, LLC, Docket Nos. ER04-190-000, EL04-22-000 (Affidavit)

Electricity Market Design and Structure, Docket No. RM01-12-000, *RTO Markets and Design: Optional RTO Markets* (Oct. 15, 2001), *Transmission Rights and Financial Rights* (Feb. 5, 2002)

Commonwealth Edison Co. and PECO Energy Company, Docket No. EC00-26-000 (Direct Testimony)

Commonwealth Edison Company, Docket No. ER01-2992-000 (Direct Testimony)

American Electric Power Co. and Central and South West Corp., Docket Nos. EC98-40-000, ER98-2770-000 and ER98-2786-000 (withdrawn)

Inquiry Concerning the Commission's Policy on Independent System Operators, Docket Nos. PL98-5-000 (Apr. 16, 1998); PL98-5-004 (June 4, 1998)

Midwest Independent Transmission System Operator, Inc., Docket Nos. ER98-1438-000, EC98-24-000 (Direct and Rebuttal Testimony)

IES Utilities, Inc., Docket Nos. EC96-13-000, ER96-1236-000, and ER96-2560-000 (Answering and Rebuttal Testimony)

Promoting Wholesale Competition Through Open Access, Non-discriminatory Transmission Services by Public Utilities, Ancillary Services Technical Conference (Oct. 26, 1995)(Obligation to Offer and Obligation to Take Ancillary Services)

Commonwealth Edison Company, Docket Nos. ER93-777-000, ER95-1545-000, ER95-1539-000, and ER95-371-000.

Before the U.S. Department of Energy

DOE Workshop on Electric Transmission Development and Siting Issues (Nov. 15, 2018)

Pre-Congestion Study Regional Workshops for the 2009 National Electric Congestion Study (Sept. 17, 2008), transcript at http://www.congestion09.anl.gov/documents/docs/Transcript_Pre_2009_Congestion_Study_Chicago.pdf

Before the Illinois Commerce Commission

NextEra Energy Transmission MidAtlantic, LLC, Docket No. 18-0843 (Direct Testimony and Rebuttal Testimony)(filed but not admitted into evidence – application withdrawn with prejudice)

Commonwealth Edison Co., Petition Concerning the Implementation of a Demonstration Distribution Microgrid (Docket No. 17-0331)(Rebuttal and Surrebuttal)

Commonwealth Edison Co., Application for a Certificate of Public Convenience and Necessity, pursuant to Section 8-406.1 of the Illinois Public Utilities Act, and an Order pursuant to Section 8-503 of Illinois Public Utilities Act, to Construct, Operate and Maintain a new 345 kilovolt transmission line in Ogle, DeKalb, Kane and DuPage Counties, Illinois, (Docket No. 13-0657) (Direct, Rebuttal, Surrebuttal; Surrebuttal on Reopening; Direct, Supplemental Direct and Rebuttal on Rehearing)

Rock Island Clean Line LLC, Docket No. 12-0560 (Direct, Cross-Rebuttal and Rebuttal testimony)

Commonwealth Edison Company, Application for an amendment to a Certificate of Public Convenience and Necessity granted in ICC Docket Nos. 89-0215 and 92-0185, authorizing and directing the Petitioner to construct, operate and maintain two 345,000-volt underground electric transmission lines in Cook County, Illinois (Docket No. 11-0692)(Surrebuttal Testimony)

Illinois Power Agency, Petition for Approval of the 220 ILCS 5/16-111.5(d) Procurement Plan, Docket No. 11-0660 (Verification)

Commonwealth Edison Company, Petition for Approval of Initial Procurement Plan, Docket No. 07-0528 (Affidavit)

Investigation of Rider CPP of Commonwealth Edison Company, and Rider MV of Central Illinois Light Company d/b/a AmerenCILCO, of Central Illinois Public Service Company d/b/a AmerenCIPS, and of Illinois Power Company d/b/a AmerenIP, pursuant to Commission Orders regarding the Illinois Auction, Docket No. 06-0800 (Rebuttal Testimony)

Commonwealth Edison Company, Proposed tariffs filed pursuant to Article IX of the Public Utilities Act defining a competitive supply procurement process and, pursuant to Section 16-112(a) of the Act, establishing a market value methodology to be effective post-2006; providing for Power Purchase Options and for recovery of transmission charges post-2006; and enabling subsequent restructuring of rates and unbundling of prices for bundled service pursuant to Sections 16-109A and 16-111(a) of the Act, Docket No. 05-0159 (Direct, Rebuttal and Surrebuttal Testimony)

Electric Policy Meeting, FERC's Standard Market Design Hearing (Oct. 15, 2002)

Commonwealth Edison Company, Petition for approval of delivery services tariffs and tariff revisions and residential delivery services implementation plan, and for approval of certain other amendments and additions to its rates, terms, and conditions, Docket No. 01-0423 (Rebuttal and Surrebuttal Testimony)

Commonwealth Edison Company, Petition for expedited approval of implementation of a market-based alternative tariff, to become effective on or before May 1, 2000, pursuant to Article IX and Section 16-112 of the Public Utilities Act, Docket No. 00-0259 (Rebuttal Testimony)

South Beloit Water, Gas & Electric Company, Delivery Services Implementation Plan submitted pursuant to Section 16-105 of the Illinois Public Utilities Act, Docket Nos. 99-0124, 99-0125, 99-0132, 99-0133 (Direct Testimony)

Commonwealth Edison Company, Petition for approval of delivery services tariffs and delivery services implementation plan, and for approval of certain other amendments and additions to its rates, terms, and conditions, Docket No. 99-0117 (Direct, Rebuttal and Surrebuttal Testimony)

Commonwealth Edison Company, Petition for Order Concerning Delineation of Transmission and Local Distribution Facilities, Docket No. 98-0894 (Direct and Rebuttal Testimony)

Central Illinois Light Company, Central Illinois Public Service Company, Commonwealth Edison Company, Illinois Power Company, and Union Electric Company, Docket No. 98-0818 (Prepared Testimony)

Commonwealth Edison Company, Application of Commonwealth Edison Company, for a Certificate of Public Convenience and Necessity, under Section 8-406 of the Illinois Public Utilities Act to construct, operate and maintain a new electric transmission line in Will County, Illinois Docket No. 98-0745 (Rebuttal Testimony)

Docket No. 98-0649 (ARES Certification): *Investigation concerning certain tariff provisions proposed under Section 16-108 of the Public Utilities Act and related issues*, Docket No. 98-0680 (Rebuttal Testimony)

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CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Washington, D.C., this 9th day of June 2023.

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