UNITED STATES OF AMERICA BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

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Constellation Energy Corporation Constellation Energy Generation, LLC Calpine Corporation on behalf of its Public Utility Subsidiaries

Docket No. EC25-43-000

COMMENTS OF THE INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to Rule 211 of the Commission's Rules and Regulations,¹ Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor ("Market Monitor") for PJM Interconnection, L.L.C. ("PJM"),² submits these comments responding to the application for approval of a proposed transaction pursuant to Section 203 of the Federal Power Act and Part 33 of the Commission's Regulations in the above proceedings. ³

In the proposed transaction, Constellation Energy Corporation and Constellation Energy Generation, LLC ("Constellation") would acquire Calpine Corporation ("Calpine") and its public utility subsidiaries from Energy Capital Partners, LLC ("ECP") (the "Transaction").⁴

¹ 18 CFR § 385.211 (2024).

² Capitalized terms used herein and not otherwise defined have the meaning used in the PJM Open Access Transmission Tariff ("OATT"), the PJM Operating Agreement ("OA") or the PJM Reliability Assurance Agreement ("RAA").

³ See Application for Authorization Under Section 203 of the Federal Power Act and Requests for Confidential Treatment and Limited Waivers of Certain Filing Requirements, Docket No. EC25-43 (January 24, 2025) ("January 24th Filing").

⁴ At the time of filing, the Calpine public utility subsidiaries include: Bethpage Energy Center 3, LLC; Calpine Bethlehem, LLC; Calpine Fore River Energy Center, LLC; Calpine Mid-Atlantic Generation,

The Market Monitor provides its analysis of the proposed Transaction in a report ("Market Monitor Report"). The Market Monitor files a public version of the Market Monitor Report with redactions as an Attachment, and files separately a nonpublic confidential version.

The Market Monitor does not oppose the proposed Transaction, provided that any order approving the Transaction requires specific structural and behavioral commitments by the resulting entity, none of which creates a burden on applicants because all are designed to ensure competitive behavior. The Market Monitor provides the recommendations as an Attachment.

Constellation has a unique role in PJM markets as a result of its ownership of 18,019 MW of nuclear capacity, 59.1 percent of all nuclear capacity in PJM. The nuclear units operate at a very high capacity factor meaning that market prices at all hours directly affect Constellation's net revenues from the energy and ancillary services markets. Calpine is one of the largest owners of natural gas fired capacity in PJM, providing it with the ability to set prices in the PJM energy and ancillary services markets when it has market power.

LLC; Calpine Mid Merit, LLC; Calpine Mid-Merit II, LLC; Calpine New Jersey Generation, LLC; Calpine Northeast Development, LLC; Calpine Vineland Solar, LLC; CPN Bethpage 3rd Turbine, Inc.; Granite Ridge Energy, LLC; KIAC Partners; Nissequogue Cogen Partners; TBG Cogen Partners; Westbrook Energy Center, LLC; Zion Energy, LLC; Pine Bluff Energy, LLC; Hermiston Power, LLC; Morgan Energy Center, LLC; Calpine Gilroy Cogen, L.P.; Calpine King City Cogen, LLC; CCFC Sutter Energy, LLC; Creed Energy Center, LLC; Delta Energy Center, LLC; Geysers Power Company, LLC; Gilroy Energy Center, LLC; Goose Haven Energy Center, LLC; Johanna Energy Center, LLC; Los Esteros Critical Energy Facility, LLC; Los Medanos Energy Center, LLC; Metcalf Energy Center, LLC; Nova Power, LLC; O.L.S. Energy-Agnews, Inc.; Otay Mesa Energy Center, LLC; Pastoria Energy Facility L.L.C.; Russell City Energy Company, LLC; South Point Energy Center, LLC; Calpine Energy Services, L.P.; Calpine Community Energy, LLC; Calpine Construction Finance Company, L.P.; Calpine PowerAmerica–CA, LLC; Calpine Energy Solutions, LLC; Calpine Mid-Atlantic Marketing, LLC; CES Marketing IX, LLC; CES Marketing X, LLC; Champion Energy, LLC; Champion Energy Marketing LLC; Champion Energy Services, LLC; North American Power and Gas, LLC; North American Power Business, LLC; and Power Contract Financing, L.L.C.

Constellation and Calpine have proposed to divest 3,546 MW of the Calpine resources after the completion of the Transaction⁵. The divestiture does not ensure that structural market power in PJM will not increase. To achieve the desired reduction of market power, the purchaser of the resources cannot be one of the largest pivotal suppliers in the PJM market. The Market Monitor recommends that the purchasers not include any owner of more than three percent of PJM installed capacity.

The behavioral commitments would apply the provisions of the current agreement between Constellation and the Market Monitor to all former Calpine resources owned by Constellation both prior to and after the proposed divestitures. Additional provisions are needed given changes in the PJM market rules to address potential withholding of capacity market offers and co-located load. Given Constellation's market power in PJM, as the largest single provider of capacity and energy, the behavioral rules would ensure competitive energy market offers and would prevent physical withholding of Constellation's resources.⁶ None of the commitments creates a burden on applicants because all are designed to ensure competitive behavior.

The ownership position of ECP in Constellation after the Transaction creates market power related incentive issues despite the fact that ECP's ownership position will be less than ten percent, although the actual share is not known. Constellation has not stated whether any contract may exist that would give ECP influence on decision making after the Transaction. ECP remains a significant market participant in PJM with market power in the energy and capacity markets. The best structural option would be to not allow ECP to own any part of Constellation following the transaction. The best behavioral option would be for ECP to sign

⁵ See January 24th Filing at 24.

See In the Matter of the Merger of Exelon Corporation and Constellation Energy Group, Inc., Order No. 90084, Case No. 9271 (February 22, 2022) at 11–12. Constellation agreed to continue behavioral commitments regarding energy offer curves and operating parameters to prevent the exercise of market power, along with other behavioral commitments.

a binding document preventing ECP from knowledge of or any input into any Constellation decisions related to Constellation's assets.

The report provides an assessment of the impact of the proposed Transaction on the structure of the PJM energy and capacity markets and its implications for market power in both markets, using recent constraint defined markets. FERC's approach to merger policy has limitations, including the static definition of historic submarkets, lack of reliance on pivotal supplier analysis, and focus on the high priced side of constraints. In conducting this analysis, the Market Monitor used market data including market shares and the results from the PJM test for structural market power, the three pivotal supplier test (TPS). The Market Monitor used market data to define the relevant markets and to examine the effects of the proposed acquisitions on those markets using concentration ratios and pivotal supplier indices. The Commission has accepted and considered similar analyses when evaluating proposed mergers and acquisitions in PJM.⁷

The proposed Transaction increases structural market power in the aggregate energy market, as measured by HHI results, and it increases structural market power in local markets defined by transmission constraints, as measured by both HHI results and pivotal supplier scores. The proposed Transaction increases structural market power in the capacity market, as measured by both the HHI and pivotal supplier scores. Constellation currently has market power in the PJM energy and capacity markets, and adding Calpine will increase its market power.

See, e.g., PSEG New Haven LLC, et al., 178 FERC ¶ 61,091 (2022); PPL Corporation, RJS Power Holdings LLC, 149 FERC ¶ 61,260 (2014); NRG Energy Holdings, Inc., Edison Mission Energy, 146 FERC ¶ 61,196 (2014); Exelon Corporation, Constellation Energy Group, Inc., 138 FERC ¶ 61,167 (2012); see also Analysis of Horizontal Market Power under the Federal Power Act, 138 FERC ¶ 61,109 (2012) ("We reiterate, however, that the Commission may consider arguments that a proposed transaction raises competitive concerns that have not been captured by the Competitive Analysis Screen. Likewise, while applicants must continue to provide a Competitive Analysis Screen, we will also consider any alternative methods or factors, if adequately supported.").

Constellation's nuclear units, as well as some of its hydroelectric resources, have very little capacity that is dispatchable by PJM in the energy market.⁸ Much of this nondispatchable capacity is located in the ComEd Zone and PECO Zone, on the low price side of the constraints pertaining to the Conastone transformer along the Pennsylvania-Maryland border. These constraints affect prices throughout the PJM system. Calpine has dispatchable resources in the area around these constraints. This means that the Transaction will cause Constellation to have greater ability to increase prices in the energy market to the benefit of its large, high capacity factor generators. This increase in market power can only be mitigated through the use of the behavioral conditions proposed by the Market Monitor.

The Market Monitor does not oppose approval of the proposed transaction, provided that any order approving the transaction requires specific behavioral commitments by Constellation to prevent the exercise of market power in the energy and capacity markets.

The Market Monitor respectfully requests that the Commission afford due consideration to these comments as it resolves the issues raised in this proceeding.

Respectfully submitted,

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⁸ PJM's dispatch of hydroelectric resources is limited in the real-time energy market, even for pumped storage hydro. They are not frequently a marginal unit in determining LMP. See Monitoring Analytics, LLC, 2024 Annual State of the Market Report for PJM, Vol. II, Section 3: Energy Market at 202.

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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 Eagleville, Pennsylvania, this 25th day of March, 2025.

Afrey Maryes

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ATTACHMENT A Market Power Analysis: Constellation Acquisition of Calpine – PUBLIC



Market Power Analysis: Constellation Acquisition of Calpine

The Independent Market Monitor for PJM March 25, 2025

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Introduction

This report was prepared by PJM's Independent Market Monitor (IMM). The report provides an assessment of the impact of Constellation's proposed purchase of Calpine on the structure of the PJM energy and capacity markets and its implications for local and aggregate market power in both markets. FERC's approach to merger policy applies to acquisitions like this one. In conducting this analysis the IMM used market data including market shares and the results from the PJM test for structural market power, the three pivotal supplier test (TPS). The IMM used market data to define the relevant markets and to examine the effects of the proposed acquisitions on those markets.

Calpine owns 4,172 MW of gas and oil fired generation in the PECO, PPL, Delmarva ("DPL"), Atlantic City ("ACEC"), and ComEd Zones of PJM. Calpine is owned by Energy Capital Partners, whose purchase of ArcLight and Blackstone's Lightstone fleet is pending Commission approval. Constellation's existing assets in PJM consist of 20,194 MW of generation, including nuclear, hydro, gas fired, wind, and solar resources, mostly in the PECO, ComEd, and BGE Zones. The Constellation acquisition of Calpine increases Constellation's market power in the aggregate energy market and local energy markets, as measured by Constellation's market share and Constellation's pivotal supplier test scores. The Constellation acquisition of Calpine has a more complex impact on the structure of the overall aggregate energy market in part because the owner of Calpine, Energy Capital Partners, LLC ("ECP"), is both divesting Calpine and acquiring Lightstone. The Constellation acquisition of Calpine increases structural market power in the aggregate energy market, as measured by HHI, accounting for both ECP's divestiture of Calpine and acquisition of Lightstone. The Constellation acquisition of Calpine decreases aggregate market power as measured by the frequency of companies, other than Constellation, failing the aggregate energy market pivotal supplier test, accounting for both ECP's divestiture of Calpine and acquisition of Lightstone.¹ The Constellation acquisition of Calpine increases Constellation's structural market power in the capacity market as measured by Constellation's pivotal supplier score. The Constellation acquisition of Calpine increases structural market power in the capacity market, as measured by the HHI. Constellation currently has market power in the PJM energy and capacity markets, and adding the Calpine plants increases that market power.

The transaction includes a proposed divestiture of Calpine generation to mitigate the significant increase in structural market power in PJM that would otherwise result. The IMM recommends limitations on the potential purchasers of this capacity to ensure that the divestiture does not increase structural market power in PJM. The IMM also recommends behavioral remedies that extend the current market power mitigation agreement between Constellation and the IMM. The behavioral remedies are especially

¹ *See Darby Power, LLC, et al.,* FERC Docket No. EC24-125.

important in the up to one year period prior to divestiture. These behavioral remedies would address flaws in PJM's energy local market power mitigation rules and help ensure that Constellation cannot exercise market power as a result of the Calpine acquisition. The IMM's behavioral remedies would also protect against potential exercises of market power in the capacity market and in the aggregate energy market.

Sufficiency of PJM Market Power Mitigation

In Section 203 applications and market based rate applications, the Commission relies on the sufficiency of the market monitoring and market power mitigation provisions in the RTO's tariff to mitigate local market power within the RTO region.² If the market monitoring and market power mitigation provisions in the RTO's tariff are insufficient, detailed analysis of submarkets created by constraints within the RTO is necessary and any market power created or enhanced by the merger or acquisition requires explicit mitigation to ensure market power is not exercised.³

As the PJM markets have evolved, the IMM has identified significant flaws in the market power mitigation provisions of the PJM tariff. Some flaws permit market participants to evade the explicit intent of the PJM market power mitigation rules. Other flaws are gaps in the PJM market power mitigation rules. The overstated Market Seller Offer Cap (MSOC) in the capacity market permitted market power to be exercised for a period.⁴ The Commission issued an order in Docket EL19-47 to remedy the market power mitigation issues in the capacity market.⁵ PJM again filed to weaken the market power mitigation rules and FERC accepted the changes by permitting standalone CPQR offers without net revenue offsets and permitting segmented offer curves.⁶ Given that the Commission has just approved these rules, the IMM will challenge specific noncompetitive offers if and when they occur.

² See Market-Based Rates for Wholesale Sales of Electric Energy, Capacity and Ancillary Services by Public Utilities, Order No. 697, FERC Stats. & Regs. ¶ 31,252 at P 241 (2007), order on reh'g, Order No. 697-A, 123 FERC ¶ 61,055 (2008).

³ Order No. 697-A at P 111.

⁴ See "Analysis of the 2022/2023 RPM Base Residual Auction,"<<u>http://www.monitoringanalytics.com/reports/Reports/2022/IMM Analysis of the 20222023 RPM BRA 20220222.pdf</u>> (February 22, 2022). "Analysis of the 2022/2023 RPM Base Residual Auction - Revised," <<u>http://www.monitoringanalytics.com/reports/Reports/2023/IMM Analysis of the 20222023 RPM BRA Revised 20230113.pdf</u>> (January 13, 2023).

 ⁵ See Independent Market Monitor for PJM v. PJM, 176 FERC [61,137 (2021), reh'g denied, 177 FERC [62,066 (2021), further order on reh'g, 178 FERC [61,121 (2022), aff'd, Vistra Corp. et al. v. FERC, Case No. 21-1214 et al. (D.C. Cir August 15, 2023), cert. pending.

⁶ See PJM Interconnection, L.L.C., 190 FERC ¶ 61,117 (2025); reh'g pending, Docket No. ER25-785-000.

On October 25, 2024, the Commission ordered changes to PJM's market power mitigation process in the energy market that would remedy the flaws identified by the IMM, but PJM has failed to set an implementation date and has no specific deadline for doing so. The IMM recommends immediate implementation of the new rules. The IMM's recommended behavioral remedies for local market power in the energy market in this report resolve the same issue as the rules approved by FERC without an implementation date. But even correction of the flaws in the application of local market power mitigation rules would not address aggregate market power in the energy market, which occurs when a limited number of suppliers are pivotal for meeting daily demand, and the incentives to exercise market power. PJM has no market power mitigation in place for aggregate market power in the energy market.

Summary

The IMM analyzed the effect of the Constellation purchase of the Calpine resources on market power in the PJM aggregate energy market and local energy markets using data from 2024. The IMM analyzed the effects of the Constellation purchase of the Calpine resources on market power in the PJM Capacity Market using auction data for the 2024/2025 and 2025/2026 Base Residual Auctions. The transaction increases Constellation's structural market power in all these markets. The IMM does not oppose the transaction, subject to a requirement for defined structural and behavioral commitments by Constellation, all designed to help ensure competitive behavior.

Aggregate Energy Market

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- There are no rules in the PJM tariff to address aggregate market power in the energy market.

Local Energy Markets

- For the following constraints, Constellation would have seen an increase of 50 or more in the number of hours for which they failed the TPS in the real-time energy market for the given constraint in 2024, with the acquisition of Calpine with divestiture.
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- There are identified issues with PJM's market power mitigation rules for local market power that allow suppliers to exercise market power. The IMM's behavioral recommendations address these issues.

Capacity Market

• The IMM analyzed the 2024/2025 and 2025/2026 BRA results to measure the effect of the acquisition with divestiture on the PJM Capacity Market.

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- The IMM's behavioral recommendations do not address the issues of competitive offers in the capacity market under the most recent changes to the market power mitigation rules in the capacity market.

Structural Recommendation

Constellation and Calpine have proposed to divest 3,546 MW of the Calpine resources after the completion of the transaction.⁷ The divestiture does not ensure that structural market power in PJM will not increase as a result of the divestiture. To achieve the desired reduction of market power from the divestiture, the purchaser of the resources cannot be a large owner of generation assets in the PJM market. The IMM recommends that the purchasers not include any owner of more than three percent of PJM installed capacity.

Behavioral Recommendations

The IMM recommends behavioral conditions similar to those currently in place for Constellation, based on prior agreements with the IMM, in 2012 and 2022.⁸ ⁹ Given Constellation's market power in PJM, as the largest single provider of capacity and energy, the IMM recommends that behavioral rules apply to Constellation's energy and capacity market offers to help ensure that market power mitigation is effective in preventing the exercise of market power. None of the commitments creates a burden on applicants because all are designed to ensure competitive behavior.

Constellation has a unique role in PJM markets as a result of its ownership of 18,019 MW of nuclear capacity, 59.1 percent of all nuclear capacity in PJM.¹⁰ The nuclear units operate at a very high capacity factor meaning that market prices at all hours directly affect the

¹⁰ Total current nuclear capacity in PJM does not include the repowering of Three Mile Island / Crane Energy Center.

⁷ See Application for Authorization Under Section 203 of the Federal Power Act and Requests for Confidential Treatment and Limited Waivers of Certain Filing Requirements, Docket No. EC25-43 (January 24, 2025) ("January 24th Filing") at 24.

⁸ See In the Matter of the Merger of Exelon Corporation and Constellation Energy Group, Inc., Order No. 84698, Case No. 9271 (February 17, 2012) at 104–105 ("Order No. 84698"). Exelon and Constellation agreed to behavioral commitments regarding energy offer curves and operating parameters to prevent the exercise of market power, along with other behavioral commitments.

⁹ See In the Matter of the Merger of Exelon Corporation and Constellation Energy Group, Inc., Order No. 90084, Case No. 9271 (February 22, 2022) at 11–12. Constellation agreed to continue behavioral commitments regarding energy offer curves and operating parameters to prevent the exercise of market power, along with other behavioral commitments.

net revenues from the energy and ancillary services markets. Calpine is one of the largest owners of natural gas fired capacity in PJM, providing it with the ability to set prices in the PJM energy and ancillary services markets when it has market power. The behavioral conditions are necessary to ensure that the combined company is not able to exercise market power.

Summary of Behavioral Recommendations

- Constellation will calculate ACR/APIR capacity offers based on actual costs.
- Constellation will provide notice of retirements at least 18 months in advance.
- Constellation will provide the IMM with its full economic analysis of retirement decisions.
- Constellation will adhere to the Market Seller Offer Cap when offering uprates in the capacity market.
- Constellation will base energy offer parameters on physical resource limitations only.
- Constellation will limit energy offer markup to \$1 per MWh.
- Constellation will not use maximum emergency status in the energy market unless it has environmental or fuel limits.
- Constellation will self schedule all nuclear units at their economic maximum output.
- Constellation will continue to offer ancillary services at historic quantities.
- Constellation will offer the full ICAP MW equivalent of all their cleared UCAP capacity MW in the day-ahead and real-time energy markets every day.
- Constellation will agree not to pursue any co-location arrangements until FERC policy on co-location is clearly established and Constellation agrees to comply with that policy. Any such proposed co-location agreement will be treated as a retirement and follow the same rules for resources that plan to retire.

The detailed behavioral recommendations are included as an attachment to this report.

No Crossing Curves (No Mark Up Switching)

For energy market offers, the IMM recommends that resources should be prohibited from submitting price-based offers that intersect (or cross) the cost-based offer for the resource. Under the current behavioral commitments in place for Constellation, this issue is covered by the combination of the \$1 per MWh markup limit and the requirement that offer parameters are based on physical parameters. The current offer commitments should apply to all acquired Calpine resources.

Given the ability to submit offer curves with different markups at different output levels in the price-based offer, suppliers with market power can evade mitigation by using a low markup at low output levels and a high markup at higher output levels. Even when resources fail the TPS test, PJM frequently selects the price-based offer with the high markup based on its negative markup at low output levels. This occurs because PJM chooses between the price-based offer and the cost-based offer considering only the offers

at the economic minimum output level in the real-time market and only the offers up to the projected dispatch point in the day-ahead market.¹¹ Figure 1 shows an example of offers from a unit that has a negative markup at the economic minimum MW level and a positive markup at the economic maximum MW level. The result would be that a unit that failed the TPS test would be committed on its price-based offer, even though the price-based offer is higher than the cost-based offer at higher output levels and includes positive markups, inconsistent with the explicit goal of local market power mitigation. Frequently, resources with crossing curves committed on the price-based offer are dispatched into the high markup range of the offer curve, allowing the exercise of market power.



Figure 1 Offers with varying markups at different MW output levels

Physical Operating Parameters

For energy market offers, Constellation has committed to use operating parameters based on physical unit limitations only. This means that parameters on price-based offers should

¹¹ On October 25, 2024, in Docket ER24-2905, the Commission approved a new method for selecting among price and cost schedule that would resolve this issue, but PJM has not set an implementation date. The behavioral commitment is needed until implementation.

be identical to their parameter limited schedules. The current offer commitments should apply to all Calpine resources.

All resources in PJM are required to submit at least one cost-based offer. Cost-based offers, for a defined set of technologies, must include defined unit specific parameters, termed parameter limited schedules.

All resources that choose to make price-based offers are required to make available at least one price-based parameter limited offer with the same parameters as the cost-based offer (referred to as price-based PLS). For resources that are not capacity resources, the pricebased parameter limited schedule is used by PJM for committing generation resources when a maximum emergency generation alert is declared. For capacity resources, the price-based parameter limited schedule is used by PJM for committing generation resources when hot weather alerts and cold weather alerts are declared.¹²

The current implementation is not consistent with the goal of having parameter limited schedules, which is to prevent the use of inflexible operating parameters to exercise market power. Instead of ensuring that parameter limits apply, PJM chooses the lower of the price-based schedule and the price-based parameter limits apply, PJM chooses the lower of weather alerts. ¹³ Instead of ensuring that parameter limits apply, PJM chooses the lower of the price-based schedule and the cost-based parameter limited schedule when a resource fails the TPS test. This occurs because PJM chooses between the price-based offer and the cost-based offer sat the economic minimum output level in the real-time market and only the offers up to the projected dispatch point in the day-ahead market, and does not consider all of the physical operating parameters. The result is that PJM frequently selects price-based offer schedules with inflexible parameters for resources that have market power.

Market Seller Offer Cap

For capacity market offers, Constellation should be required to use a market seller offer cap equal to its net Avoidable Cost Rate (ACR).

The net ACR is the marginal cost of capacity and is the competitive offer for a capacity resource. The currently applicable tariff includes this rule as a result of the Commission's ruling on an IMM complaint and the affirming of that order.¹⁴ The net ACR remains the

¹² See PJM Operating Agreement, Schedule 1, Section 6.6.

¹³ On October 25, 2024 in Docket ER24-2905, the Commission approved a new method for selecting among price and cost schedule that would resolve this issue, but PJM has not set an implementation date. The behavioral commitment is needed until implementation.

See Independent Market Monitor for PJM v. PJM, 176 FERC ¶61,137 (2021), reh'g denied, 177 FERC ¶ 62,066 (2021), further order on reh'g, 178 FERC ¶61,121 (2022), aff'd, Vistra Corp. v. FERC, Case No. 21-1214 et al. (D.C. Cir. August 15, 2023), cert. denied.

competitive offer and Constellation should be required to offer net ACR as a condition of this acquisition.

Energy Market Must Offer Requirement

Constellation should be required to offer the full ICAP MW equivalent of all their cleared UCAP capacity MW in the day-ahead and real-time energy markets every day.

Co-located Load

Bilateral co-location contracts have the same effect as a retirement on PJM markets, in addition to exacerbating effects associated with back up arrangements and the shifting of the costs of transmission and ancillary services. Constellation should agree not to pursue any co-location arrangements until FERC policy on co-location is clearly established. Any such proposed co-location agreement should be treated as a retirement and follow the same rules for resources that plan to retire.

Methods of Analysis

In analyzing whether a proposed merger or acquisition is consistent with the public interest, the Commission considers the "effect of the transaction on competition, rates, and regulation of the applicant by the Commission and state commissions with jurisdiction over any party to the transaction."¹⁵ In this report, the IMM focuses on the first factor, the effect on competition, measured by the impact on the structure of relevant markets based on actual market data. The IMM evaluates the impact of the merger or acquisition using pivotal supplier analysis and concentration thresholds.

Any analysis of market structure depends on an accurate definition of the relevant markets. Market definitions depend on properly identifying and evaluating potential substitutes for a given product. Within organized markets data are available, and should be used, to define markets based on how the units are evaluated and dispatched to meet demand, based on network relationships between resources and load, relative costs, availability and operational parameters. Such an approach provides definitions of the relevant markets based on actual operational data related to the participants and the markets in which they operate.

In the IMM analysis, the definition of the relevant local markets for the time period of the analysis is based on the actual substitutability among available, relevant resources which in turn is based on the physical facts of the system and how the PJM markets defined the substitutability among available resources in the relevant markets over the analysis period. Rather than limit the analysis to a predefined range of load and price levels, the IMM has analyzed every actual relevant market defined by a constraint in the real-time look ahead tool used by PJM to identify structural market power, known as Intermediate Term Security Constrained Economic Dispatch (IT SCED). The relevant PJM submarkets

¹⁵ 18 CFR § 33.2(g) (2024).

defined in this analysis are those local energy markets created by transmission constraints within the broader PJM market that occurred for one hundred or more hours in 2024. The relevant capacity markets in this analysis are those that resulted from the actual operation of the markets for the 2024/2025 and 2025/2026 Delivery Years, the last two Base Residual Auctions run by PJM.

The IMM analysis of the relevant markets reflects the information available based on the actual operation of the PJM wholesale power markets, rather than static market definitions that ignore dynamic changes in constraints. For different resources and different time periods, market conditions would change, and the relevant identified local markets would change. The information used to prepare the analysis included in this report is highly confidential and market sensitive as it relates to specific market participants.¹⁶

While analysis of actual markets is limited by available data and actual market dynamics, the nature of PJM markets means that those market dynamics will change, in unpredictable ways. Consideration of the impacts of mergers and acquisitions must also consider changing market structures. Consolidating ownership of assets in smaller numbers of owners will always increase structural market power. Structural remedies based on the recent history of market structures cannot remedy that fact. If further concentration of ownership is accepted, strong behavioral remedies are the only way to help mitigate the impacts of increased concentration on competitive outcomes. The Commission's merger policy does not address longer term trends in concentration or define a maximum level of concentration that is consistent with competitive outcomes.

Merger Standards

For the evaluation of the impact of a merger or acquisition on competition, FERC adopted the 1992 Horizontal Merger Guidelines ("1992 Guidelines") as the analytical framework as described in the Competitive Analysis Screen relied on by the Commission.¹⁷

¹⁶ See OATT Attachment M–Appendix § I.

¹⁷ See Order Adopting Guidelines for the Submission of Documents in Electronic Form, Order No. 642, 93 FERC ¶ 61,177 mimeo at 4–5 (November 15, 2000) ("Order No. 642"); U.S. Dept. of Justice & Federal Trade Commission, "Horizontal Merger Guidelines" (1992, revised April 8, 1997). DOJ and FTC modified their guidelines in 2010, increasing their HHI and market share thresholds and expanding the criteria used to define the relevant market. U.S. Dept. of Justice & Federal Trade Commission, "Horizontal Merger Guidelines" (August 19, 2010). FERC considered whether to revise its policies to follow the DOJ and FTC 2010 modifications, but decided, after notice and inquiry, to retain the 1992 Guidelines. See Analysis of Horizontal Market Power, 138 FERC ¶61,109 (2012).

The Commission reserves the opportunity to consider alternative approaches for analyzing the impact of proposed mergers and acquisitions, including pivotal supplier analyses similar to the analysis included in this report, when evaluating proposed mergers and acquisitions in PJM.¹⁸

The 1992 Guidelines presented the enforcement policy of the Department of Justice and the Federal Trade Commission concerning horizontal mergers subject to section 7 of the Clayton Act, Section 1 of the Sherman Act, and Section 5 of the Federal Trade Commission Act. As noted in the 1992 Guidelines, "[t]he unifying theme of the Guidelines is that mergers should not be permitted to create or enhance market power or facilitate its exercise."¹⁹

The Commissions' Competitive Analysis Screen, based on the 1992 Guidelines, uses market concentration, measured by the HHI, as a basic metric of the structural competitiveness of a market. The 1992 Guidelines define three basic levels of market concentration while recognizing that "[0]ther things being equal, cases falling just above and just below a threshold present comparable competitive issues."20 A market with an HHI of less than 1000 is considered to be unconcentrated. Mergers and acquisitions resulting in HHI level less than a 1000 are not considered to have adverse competitive effects. A market with an HHI between 1000 and 1800 is considered to be moderately concentrated. A merger or acquisition resulting in a moderately concentrated market is not considered to have an adverse effect on competition if it increases the market's HHI by less than 100 points. A merger or acquisition resulting in a moderately concentrated market is considered to "potentially raise significant competitive concerns" if it increases the market's HHI by 100 points or more.²¹ A market with an HHI of 1800 or above is considered to be highly concentrated. A merger or acquisition resulting in a highly concentrated market is not considered to have an adverse effect on competition if it increases the market's HHI by less than 50 points. A merger or acquisition producing an

¹⁸ See Id. at P 38 ("We reiterate, however, that the Commission may consider arguments that a proposed transaction raises competitive concerns that have not been captured by the Competitive Analysis Screen. Likewise, while applicants must continue to provide a Competitive Analysis Screen, we will also consider any alternative methods or factors, if adequately supported."); *Exelon Corporation, Constellation Energy Group, Inc.*, 138 FERC ¶ 61,167 (2012).

¹⁹ 1992 Guidelines at 2.

²⁰ 1992 Guidelines at 15.

²¹ *Id.* at 16.

increase in the market HHI of 50 points or more in a highly concentrated market "potentially raises significant competitive concerns."²²

In a market with an inelastic demand curve, the existence of two, or three, jointly pivotal suppliers, regardless of the amount of excess capacity available, does not provide a market structure that will result in a competitive outcome. An HHI in excess of 2500 does not demonstrate market power if the relevant owners are not jointly pivotal and are unlikely to be able to affect the market price. An HHI less than 2500 does not demonstrate the absence of market power if the relevant owners are jointly pivotal and are likely to be able to affect the market price.²³

Higher concentration ratios indicate that comparatively small numbers of sellers dominate a market while lower concentration ratios mean larger numbers of sellers split market sales more equally. Lower aggregate market concentration ratios establish neither that a market is competitive nor that participants are unable to exercise market power. Higher concentration ratios do, however, indicate an increased potential for participants to exercise market power and an increased incentive to exercise market power. Despite their significant limitations, concentration ratios provide some useful information on market structure.

Notwithstanding the HHI level, a supplier may have the ability to raise market prices. If reliably meeting demand requires a single supplier, that supplier is pivotal and has monopoly power. If a small number of suppliers are jointly required to meet demand, those suppliers are jointly pivotal and have oligopoly power. The number of pivotal suppliers in the market is a more precise measure of structural market power than the HHI. The HHI is not a definitive measure of structural market power.

The residual supply index (RSI) is a measure of the extent to which one or more generation owners are pivotal suppliers in a market. A single generation owner is pivotal if the output of the owner's generation facilities is needed to meet demand. Multiple generation owners are jointly pivotal when the output of the owners' generation facilities, taken together, is needed to meet demand. When a generation owner is pivotal, it has the ability to affect market price. For a given level of market demand, the RSI compares the market supply, net of the supply controlled by one or more generation owners, to the market demand. The RSI value is calculated as a ratio, where total supply minus the supply of the tested suppliers is divided by the market demand. If the RSI is greater than 1.00, the supply of

²² Id.

²³ For detailed examples, see Joseph E. Bowring, PJM Market Monitor. "MMU Analysis of Combined Regulation Market," PJM Market Implementation Committee Meeting (December 20, 2006). <<u>http://www.monitoringanalytics.com/reports/Presentations/2006/20061220combined-regulation-market-mic.pdf</u>>.

the specific generation owner(s) is not needed to meet market demand and that generation owner(s) has a reduced ability to influence market price. If the RSI is less than 1.00, the supply owned by the specific generation owner(s) is needed to meet market demand and the generation owner(s) is a pivotal supplier with an ability to influence price. When the RSI is reported for a market, the reported RSI is for the largest supplier or identified number of the largest suppliers.

FERC indicates that a single supplier RSI of less than 1.0 is an indicator of market power.²⁴ In the PJM markets a three pivotal supplier RSI of less than 1.0 defines the existence of local market power. The three pivotal supplier test (TPS) defines market power even in the presence of market share and concentration levels that fall below 1992 Guidelines for a competitive market structure.²⁵ The TPS test uses a broader definition of competitors than FERC's single pivotal supplier approach.

Three Pivotal Supplier Test

In the IMM analysis, the basic metrics used for each market include market share, the Herfindahl-Hirschman Index (HHI), and the three pivotal supplier test (TPS), a residual supplier index used in the PJM markets to define locational market power. Market share measures the proportion of market output contributed by a supplier. Market share is calculated by dividing the output of a supplier by total market output. Concentration ratios are a summary measure of market share. The concentration ratio used here is the Herfindahl-Hirschman Index (HHI), calculated by summing the squares of the market shares of all firms in a market.

The IMM uses the three pivotal supplier test as the key measure of market structure and structural market power. The three pivotal supplier test is used in PJM markets to define the existence of local market power and as a trigger for market power mitigation. A test for local market power based on the number of pivotal suppliers has a solid basis in economics and is clear and unambiguous to apply in practice. There is no perfect test, but the three pivotal supplier test for local market power strikes a reasonable balance between the requirement to limit extreme structural market power and the goal of limiting intervention in markets when competitive forces are adequate.

The three pivotal supplier test, as implemented in PJM markets, is consistent with the Commission's market power tests, encompassed in the Delivered Price Test, which is the central calculation of the Competitive Analysis Screen required by the Commission. The three pivotal supplier test is used by PJM for market power mitigation in the real-time energy market, the day-ahead energy market, the regulation market, and the capacity market. Like the Delivered Price Test, the three pivotal supplier test considers the interaction between individual participant attributes and features of the relevant market

²⁴ See Midwest Independent Transmission System Operator, Inc., 121 FERC ¶ 61,190 at P 6 n.5 (2007).

²⁵ See AEP Power Marketing, Inc., et al., 107 FERC ¶ 61,018 at P 111 (2004) ("AEP Order").

structure. Unlike the Delivered Price Test, the three pivotal supplier test takes into account the incremental ability of resources to affect prices in a constrained area from both the loading and relief sides of the constraint. The three pivotal supplier test is an explicit test for the ability to exercise unilateral market power as well as market power via coordinated action which accounts for market shares and the supply-demand balance in the market.

The results of the three pivotal supplier test can differ from the results of the HHI and market share tests. The three pivotal supplier test can show the existence of structural market power when the HHI is less than 2500 or less than 1800. The three pivotal supplier test can also show the absence of market power when the HHI is greater than 2500. The three pivotal supplier test is more accurate than the HHI and market share tests because it focuses on the relationship between demand and the most significant aspect of the ownership structure of supply available to meet it. An HHI in excess of 2500 does not indicate market power if the relevant owners are not jointly pivotal and are unlikely to be able to affect the market price. An HHI less than 2500 does not indicate the absence of market power if the relevant owners are jointly pivotal and are likely to be able to affect the market price.²⁶

The three pivotal supplier test was designed in light of actual elasticity conditions in constrained areas in wholesale power markets in PJM. The price elasticity of demand is a critical variable in determining whether a particular market structure is likely to result in a competitive outcome. A market with a specific set of market structure features is likely to have a competitive outcome under one range of demand elasticity conditions and a noncompetitive outcome under another set of elasticity conditions. It is essential that market power tests account for actual elasticity conditions and that evaluation of market power tests neither ignore elasticity nor make counterfactual elasticity assumptions. As the Commission stated, "In markets with very little demand elasticity, a pivotal supplier could extract significant monopoly rents during peak periods because customers have few, if any, alternatives."²⁷ The Commission also stated:

In both of these models, the lower the demand elasticity, the higher the mark-up over marginal costs. It must be recognized that demand elasticity is extremely small in electricity markets; in other words, because electricity is considered an essential service, the demand for it is not very responsive to price increases. These models illustrate the

²⁶ For detailed examples, see Joseph E. Bowring, PJM Market Monitor, "MMU Analysis of Combined Regulation Market," PJM Market Implementation Committee Meeting (December 20, 2006) <<u>http://www.monitoringanalytics.com/reports/Presentations/2006/20061220combined-regulation-market-mic.pdf</u>>.

²⁷ AEP Order at P 72.

need for a conservative approach in order to ensure competitive outcomes for customers because many customers lack one of the key protections against market power: demand response.²⁸

The three pivotal supplier test is a reasonable application of the Delivered Price Test to the case of local markets that are defined by actual conditions in a market based on security-constrained, economic dispatch with locational market pricing and extremely inelastic demand. The three pivotal supplier test explicitly incorporates the relationship between supply and demand in the definition of pivotal, and it provides a clear test for whether excess supply is adequate to result in an adequately competitive market structure.

The three pivotal supplier test is also a reasonable application of the Delivered Price Test in the capacity market. The definition of local markets is more clear in the PJM capacity market design than in the energy market design. As in the energy market, potential local markets (LDAs) are defined, and the market clearing reveals price separation based on actual market conditions including locational supply and demand and locational import limits (CETO).

TPS Test: Defining the Relevant Market

The goal of defining the relevant market is to include those producers that actually compete to determine the market price. Conversely, the goal of defining the relevant market is to exclude those units that are not meaningful competitors and therefore do not have an impact on the clearing price. The existence of market power within that defined market depends on the ability of the producer to raise price while continuing to sell its output. A producer cannot successfully increase the market price above the competitive level if competitors would replace its output when it did so.

The Commission definition of the relevant market includes all suppliers with cost-based offers less than or equal to 1.05 times the clearing price. The Commission definition means that, if the marginal unit sets the clearing price based on an offer of \$200 per MWh, all units with cost-based offers less than, or equal to, \$210 per MWh are defined to have a competitive effect on the offer of the marginal unit. These units are all defined to be meaningful competitors in the sense that it is assumed that their behavior constrains the behavior of the marginal and inframarginal units. The TPS definition of the relevant market includes all suppliers with cost-based offers less than or equal to 1.50 times the clearing price. The three pivotal supplier definition means that, if the marginal unit sets the clearing price based on an offer of \$200 per MWh, all units with costs less than, or equal to, \$300 per MWh are defined to have a competitive effect on the offer of the marginal unit. These units are all defined to have a competitive effect on the offer of the marginal unit sets the clearing price based on an offer of \$200 per MWh, all units with costs less than, or equal to, \$300 per MWh are defined to have a competitive effect on the offer of the marginal unit. These units are all defined to be meaningful competitors in the sense that

²⁸ *Id.* at P 103.

it is assumed that their behavior constrains the behavior of the marginal and inframarginal units. The three pivotal supplier test incorporates a definition of meaningful competitors that is at the extreme high end of inclusive. It is questionable whether a unit with a competitive offer price of \$300 offer meaningfully constrains the offer of a \$200 unit. This broad market definition is combined with the recognition that multiple owners can be jointly pivotal. The three pivotal supplier test includes three pivotal suppliers while the Commission test includes only one pivotal supplier.

The three pivotal supplier test is designed to test the relevant market. For example, in the case of the market for out of merit generation needed to relieve a constraint in real time, the three pivotal supplier test examines the market specifically available to provide that relief. Under these conditions, the three pivotal supplier test measures the degree to which the supply from three generation suppliers is required in order to meet the demand to relieve a constraint, as defined by PJM's market solution software. The market demand is the amount of incremental, effective MW required to relieve the constraint.²⁹ The market demand is calculated as the difference between the defined MW limit on flow across the constraint and the flow in an economic dispatch solution if the limit did not exist (unconstrained flow). The market supply consists of the incremental, effective MW of supply available to relieve the constraint. This includes resources that can ramp up or start up to provide relief for the constraint as well as resources that can ramp down to provide relief for the constraint. The sign of the distribution factor (dfax) of a resource with respect to the defined constraint indicates whether a resource would relieve the constraint by increasing or decreasing output. A resource with a positive dfax with respect to a constraint provides relief by reducing its output, and a resource with a negative dfax with respect to the same constraint provides relief by increasing its output. For purposes of the test, incremental effective MW are attributed to specific suppliers on the basis of their control of the assets in question. Generation capacity controlled directly or indirectly through affiliates or through contracts with third parties are attributed to a single supplier.

Unlike structural tests that define markets by geographic proximity, the TPS test makes explicit and direct use of the incremental, effective MW of supply available to relieve the constraint at a distribution factor greater than, or equal to, the dfax used by PJM in operations. Only the supply that is part of the market as defined by the reality of the

²⁹ A unit's contribution toward effective, incrementally available supply is based on the distribution factor (dfax) of the unit relative to the constraint and the unit's incrementally available capacity over current load levels, if the capacity in question is available within the period that the relief will be needed. Effective, incrementally available MW from an unloaded 100 MW 15-minute start combustion turbine (CT) with a dfax of -0.05 to a constraint would be 5 MW relative to the constraint in question. Effective, incrementally available MW from a 200 MW steam unit, with 100 MW loaded, a 50 MW ramp rate and a dfax of -0.5 to the constraint would be 25 MW.

electric network, as measured by unit characteristics and distribution factors is included in the three pivotal supplier test. That supply is included only to the extent that it is incremental, effective MW of supply available at a price less than, or equal to, 1.5 times the clearing price that would result from the intersection of demand (constraint relief required) and the incremental supply available to resolve the constraint.

Constraints: Defining the Relevant Market

In its Order Reaffirming the 1992 Guidelines, the Commission stated:

The Commission will remain flexible in its approach and will reevaluate whether a previously recognized submarket continues to exist if the evidence shows that the persistent transmission constraints that led to the recognition of that submarket are no longer present. We clarify that we will not require applicants to submit a DPT for an identified submarket if the applicants do not have overlapping generation within the submarket and lack firm transmission rights to import capacity into that market.³⁰

Constellation's Delivered Price Test considers the PJM RTO market and does not contemplate any submarkets other than those recognized in previous 203 and Market Based Rates proceedings. It is not reasonable to ignore real submarkets as they evolve in PJM. In addition, patterns of congestion and constraints will continue to be dynamic in PJM. It is important to analyze existing submarkets but also to address the fact that market power is persistent and may be actionable in submarkets that do not yet exist. The IMM analyzed all submarkets based on historic market data. The IMM analysis shows that Constellation has local market power in PJM and that local market power will increase with the Calpine acquisition.

The broader point about congestion is that it is dynamic and unpredictable. Submarkets in one period may not be submarkets in subsequent periods. The analysis of market power and of mergers should reflect these basic facts. Local market power may not exist in one period and may exist in the next. Local market power may exist in one period and not exist in the next. It is essential that merger reviews recognize that increased concentration of ownership creates the potential for market power beyond the specific facts of a specific period. It is essential for that reason to have clear, workable and enforceable rules for market power mitigation that can address the dynamic reality of PJM markets.

The analysis provided by Constellation includes a discussion of submarkets in PJM that are no longer relevant, showing that the PJM East and 5004/5005 submarkets no longer meet the Commission's definition of a submarket. However, the analysis does not consider the predominant binding constraints in the PJM market in the last several years,

³⁰ See Analysis of Horizontal Market Power, 138 FERC ¶ 61,109 at P 43 (2012).

which have been the constraints around the Conastone transformer, along the Pennsylvania/Maryland border in the BGE Zone. Both Constellation and Calpine have resources in this critical area. The failure of recent Section 203 filings to include this submarket in the market power analysis demonstrates a critical issue with the historically defined submarket approach.

The constraints defining the Conastone area submarket are shown in Table 1. The names of the facilities all include either Conastone or Peach Bottom in either the monitored or contingent facility. PJM defines constraints by the facility for which the constraint flows are calculated, the monitored facility, and, for contingency constraints, also by the facility which may be lost in the contingency situation.

Monitored Facility	Contingent Facility
CONASTON 500-2 XFORMER H 500 KV	L500.Brighton-Conastone.5011
CONASTON-PEACHBOT 5012 B 500 KV	BASE
CONASTON-NORTHWES 2322 B 230 KV	L500.Brighton-Conastone.5011
CONASTON 500-4 XFORMER H 500 KV	L500.Brighton-Conastone.5011
CONASTON-NORTHWES 2322 B 230 KV	L230.Conastone-Northwest.2310
CONASTON 500-4 XFORMER H 500 KV	BASE
CONASTON 500-4 XFORMER H 500 KV	TEMP:DBL.Conastone.500-2+Brighton.Conastone.5011
CONASTON-NORTHWES 2322 B 230 KV	BASE
CONASTON-PEACHBOT 5012 A 500 KV	BASE
NOTTINGHM 2-3 SER DEV A 230 KV	L500.Conastone-PeachBottom.5012
NOTTINGHM 2-3 SER DEV A 230 KV	L500.PeachBottom.BusTie.1
NOTTINGHM 2-3 SER DEV A 230 KV	500/230.Conastone.500-4
NOTTINGH-PEACHTAP 220-08 B 230 KV	TEMP: TMI-PeachBot 5007 & PeachBot-Conastone 5012
NOTTINGH-PEACHTAP 220-08 B 230 KV	L500.Conastone-PeachBottom.5012
NOTTINGHM 2-3 SER DEV A 230 KV	L500.Brighton-Conastone.5011
NOTTINGHM 2-3 SER DEV A 230 KV	L500.Hunterstown-Conastone.5013
NOTTINGHM 2-3 SER DEV A 230 KV	L500.PeachBottom-TMI.5007
NOTTINGHM 2-3 SER DEV A 230 KV	TEMP.DBL.500/230.Conastone.500-4 + 230 Coop-Gracet
GRACETON-MANOR GRA-MANO A 230 KV	500/230.Conastone.500-4
GRACETON-SAFEHARB 2303 A 230 KV	L230.OtterCreek-Conastone.2302
GRACETON-SAFEHARB 2303 A 230 KV	L500.Conastone-PeachBottom.5012
GRACETON-SAFEHARB 2303 A 230 KV	500/230.Conastone.500-4
GRACETON-SAFEHARB 2303 A 230 KV	L500.Hunterstown-Conastone.5013
GRACETON-SAFEHARB 2303 A 230 KV	TEMP:CONA-PBOTTOM 5012 + HUNTRSTWN-CONA 5013
GRACETON-SAFEHARB 2303 A 230 KV	TEMP.Cooper-Nottingham + Conastone-PeachBottom

Table 1 Monitored and contingency facilities for Conastone area constraints

Of these constraints, Conastone Transformer, Conastone - Northwest and Nottingham are in the top 10 constraints associated with the highest congestion costs in PJM for 2024. Figure 2 shows the locations of the top 10 constraints by total congestion costs on a contour map of the real-time, load-weighted average CLMP in 2024. Graceton – Manor and Graceton – Safe Harbor are not in the map, because they are not in the top 10 constraints for 2024. Graceton is just east of Conastone in BGE, and the Graceton to Manor and Graceton to Safe Harbor lines run north from Graceton into Pennsylvania. The Yorkana constraint is also near the Conastone area.

The load-weighted average congestion component of LMP ("CLMP") is highest in the purple areas of Figure 2, including BGE, PepCo, much of Dominion, and the Delmarva Peninsula. These are the locations with the highest prices in PJM. On the other side of the Conastone constraints, CLMP is negative. Much of Pennsylvania is yellow and green on the map, showing a large area with lower than average prices due to the same constraints.



Figure 2 Location of the top 10 constraints by total congestion costs: 2024 ³¹

The constraints bind, and the associated prices separate on either side of the constraints, throughout the year, with high or low load. Figure 3 shows the hours when the constraints included in Table 1 were binding in 2024 and the hourly PJM load. The bars in the graph show the hours when the constraints were binding. The gray bars show constraints with the monitored facility including Conastone. The orange bars show constraints with the monitored facility including Nottingham. The green bars show constraints was binding in 2,814 hours, 32.0 percent of hours in 2024. The dark blue plot of hourly PJM load against the status of the constraints demonstrates that these constraints bind during peak market conditions, as well as off peak conditions.

³¹ See Monitoring Analytics, LLC, 2024 Annual State of the Market Report for PJM, Vol. II, Section 11: Congestion and Marginal Losses at Figure 11-7.





Energy Market Results

Aggregate Market Power

The IMM analyzed the impact of the proposed transaction on aggregate energy market concentration using actual generation data for 2024.

Table 2 shows all units owned by Calpine within PJM, the control zone where they are located, the summer rating, the fuel type and the technology type. Table 2 also shows the total summer ratings for Calpine units that are subject to the proposed divestiture plan and Calpine units that will be retained by Constellation after the completion of the transaction.

³² All data included in Figure 3 graph is publicly available in PJM DataMiner, <<u>http://dataminer2.pjm.com/</u>>.

		Control	Summer		
	Unit Name	Zone	Rating (MW)	Fuel	Technology
Calpine Units Subject to Divestiture	Bethlehem Energy Center	PPL	1,134	Natural Gas	CC
	Edge Moor Energy Center	DPL	707	Natural Gas	Steam
	Hay Road Energy Center	DPL	1,136	Dual Fuel	CC
	York Energy Center Unit 1	PECO	569	Dual Fuel	CC
Total			3,546		
Calpine Units Retained by Constellation	Bayview Energy Center	DPL	13	Dual Fuel	СТ
	Christiana Energy Center	DPL	50	Dual Fuel	CT
	Crisfield Energy Center	DPL	10	Dual Fuel	СТ
	Cumberland Energy Center	ACEC	187	Dual Fuel	CT
	Delaware City Energy Center	DPL	18	Dual Fuel	СТ
	Sherman Avenue Energy Center	ACEC	87	Dual Fuel	CT
	Tasley Energy Center	DPL	30	Dual Fuel	СТ
	Vineland Solar Energy Center	ACEC	4	Solar	Solar
	West Energy Center	DPL	15	Oil	СТ
	York Energy Center Unit 2	PECO	835	Natural Gas	CC
	Zion Energy Center	ComEd	<u>5</u> 46	Natural Gas	CT
Total			1,795		

Table 2 Calpine units: to be retained by Constellation and to be divested

The concentration metrics are the market share for energy and the HHI for energy in the aggregate PJM market. The IMM also uses a pivotal supplier screen for the day-ahead energy market.

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Table 3 Constellation's average hourly market share of PJM generation with divestiture

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Table 4 Energy market HHI with divestiture: 2024

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To assess the number of aggregate pivotal suppliers in the day-ahead energy market, the IMM determines, for each supplier, the MW available for economic commitment that were already running or were available to start between the close of the day-ahead energy market and the peak load hour of the operating day. The available supply is defined as

MW offered at a price less than 150 percent of the applicable locational marginal price. Generating units, import transactions, economic demand response, and virtual supply ("INCs"), are included for each supplier. Demand is the total MW required by PJM to meet physical load, cleared load bids, export transactions, and virtual demand ("DECs"). A supplier is pivotal if PJM would require some portion of the supplier's available economic capacity in the peak hour of the operating day in order to meet demand. Suppliers are jointly pivotal if PJM would require some portion of the joint suppliers' available economic capacity in the peak hour of the operating day in order to meet demand.

When Constellation is a pivotal supplier in the energy market, it has the ability to raise prices in the energy market which benefits the inframarginal energy that it owns. There are no market power mitigation rules to address aggregate market power in the PJM energy market. Acquiring Calpine would increase Constellation's aggregate market power, increasing its incentive and ability to raise prices. For this analysis, the Lightstone fleet is assigned to Energy Capital Partners for both the preacquisition and postacquisition cases, and the proposed divestitures are assigned to a new owner.

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Table 5 PJM Day-ahead energy market pivotal supplier frequency with divestiture:2024

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Local Market Power

The IMM also analyzed the energy market results for the relevant submarkets defined by actual binding constraints for 2024. The analysis identifies constraints for which Constellation has market power, as shown by failures of the TPS test.

The TPS test considers incremental, effective MW available to provide relief to binding constraints in the energy market. Constellation's fleet frequently has incremental, effective MW available to provide constraint relief in PJM's energy market meaning that Constellation has local market power as measured by TPS test failures.

Table 6 identifies the constraints on the PJM system that were binding for more than 100 hours during 2024. It provides the number of hours for which Constellation failed the TPS Test and the number of hours for which Constellation would have failed the TPS Test with the acquisition.

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Table 6 Constraints where Constellation had market power as determined by the realtime energy market TPS test with divestiture: 2024

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Local Market Power and Nondispatchable Resources

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Capacity Market Results

Market Design

The Reliability Pricing Model (RPM) Capacity Market design was implemented in the PJM region on June 1, 2007. The RPM Capacity Market is a forward-looking, annual, locational market, with a must offer requirement for Existing Generation Capacity Resources and mandatory participation by load, with performance incentives, that includes clear market power mitigation rules and that permits the direct participation of demand-side resources. Recent changes to the market power mitigation rules include ending the categorical exemption from the must offer requirement for intermittent and storage resources.³³ Capacity storage resources include hydroelectric, flywheel and battery storage. Intermittent resources include wind, solar, landfill gas, run of river hydroelectric, and other renewable resources. Demand resources remain exempt from the must offer requirement. In addition, the Commission recently approved the inclusion of standalone CPQR offers with no net revenue offset and segmented offers based on CPQR, both of which were opposed by the Market Monitor as undermining market power mitigation.³⁴

Under RPM, capacity obligations are annual. Base Residual Auctions (BRA) are held for delivery years that are three years in the future, although recent events have resulted in

³³ See 190 FERC ¶ 61,117.

³⁴ See id.

shorter lead times for BRAs. Effective with the 2012/2013 Delivery Year, First, Second and Third Incremental Auctions (IA) are held for each delivery year if there is time available.³⁵

RPM prices are locational by LDA and may vary depending on transmission constraints between LDAs and local supply and demand conditions within LDAs.³⁶ Existing generation that qualifies as a capacity resource must be offered into RPM auctions, except for resources owned by entities that elect the fixed resource requirement (FRR) option. Participation on the demand side by LSEs is mandatory, except for those entities that elect the FRR option. Load must buy all cleared capacity. There is an administratively determined demand curve that defines scarcity pricing levels and that, with the supply curve derived from capacity offers, determines market prices in each BRA. Under RPM there are explicit market power mitigation rules that define the must offer requirement, that define structural market power using the three pivotal supplier test, that define offer caps, that define the minimum offer price, and that have flexible criteria for competitive offers by new entrants. Market power mitigation is effective only when these definitions are up to date and accurate. Demand resources may be offered directly into RPM auctions and receive the clearing price without mitigation. Demand resources may exercise market power under the existing rules.

The capacity market is, by design, always tight in the sense that total supply is generally only slightly larger than demand.³⁷ The capacity market, following the implementation of

³⁵ See 126 FERC ¶ 61,275 at P 86 (2009).

³⁶ Transmission constraints are local capacity import capability limitations (low capacity emergency transfer limit (CETL) margin over capacity emergency transfer objective (CETO)) caused by transmission facility limitations, voltage limitations or stability limitations.

³⁷ Recent reports by the Market Monitor explain many of the current issues in the capacity market design. See "Analysis of the 2025/2026 RPM Base Residual Auction - Part A," (September 20, ("IMM 2024) BRA Report Part A″). https://www.monitoringanalytics.com/reports/Reports/2024/IMM Analysis of the 2025202 6 RPM Base Residual Auction Part A 20240920.pdf>; "Analysis of the 2025/2026 RPM Base Residual Auction - Part B," (October 15, 2024) ("IMM BRA Report Part B") <https://www.monitoringanalytics.com/reports/Reports/2024/IMM_Analysis_of_the_2025202 6 RPM Base Residual Auction Part B 20241015.pdf>; "Analysis of the 2025/2026 RPM Base Residual Auction - Part C," (November 6, 2025) ("IMM BRA Report Part C") https://www.monitoringanalytics.com/reports/Reports/2024/IMM Analysis of the 2025202 6 RPM Base Residual Auction Part C 20241106.pdf>; "Analysis of the 2025/2026 RPM Base Residual Auction - Part D," (December 6, 2024) ("IMM BRA Report Part D") https://www.monitoringanalytics.com/reports/Reports/2024/IMM Analysis of the 2025202 6 RPM Base Residual Auction Part D 20241206.pdf>; "Analysis of the 2025/2026 RPM Base Residual Auction - Part E," (January 31, 2025) ("IMM BRA Report Part E") <https://www.monitoringanalytics.com/reports/Reports/2025/IMM Analysis of the 2025202 6 RPM Base Residual Auction Part E 20250131.pdf>; "Analysis of the 2025/2026 RPM Base

PJM's approach to the ELCC definition of capacity, is much tighter. Local LDA markets may have different supply demand balances than the aggregate market. Demand is inelastic because the market rules require loads to purchase the system capacity requirement. The result is that any supplier that owns more capacity than the typically small difference between total supply and the defined demand is individually pivotal and therefore has structural market power. Any supplier that, jointly with two other suppliers, owns more capacity than the difference between supply and demand either in aggregate or for a local market is jointly pivotal and therefore has structural market power.

The market design for capacity leads, almost unavoidably, to structural market power in the capacity market. Given the basic features of the PJM Capacity Market, including significant market structure issues, inelastic demand, tight supply-demand conditions, the relatively small number of nonaffiliated LSEs and supplier knowledge of aggregate market demand, the potential for the exercise of market power is high. Market power is and will remain endemic to the existing structure of the PJM Capacity Market.

Nonetheless, a competitive outcome can be ensured by appropriate market power mitigation rules. Attenuation of those rules would mean that market participants would not be able to rely on the competitiveness of the market outcomes. The market power rules are not perfect and, as a result, competitive outcomes require continued improvement of the rules and ongoing monitoring of market participant behavior and market performance.

The capacity market currently has explicit market power mitigation rules designed to permit competitive, locational capacity prices based on limiting the exercise of market power. The capacity market construct has been consistent with the appropriate market design objectives of permitting competitive prices to reflect local scarcity conditions based on explicitly limiting market power. The capacity market design provides that competitive prices can reflect locational scarcity while not relying on the exercise of market power to achieve that design objective by limiting the exercise of market power via the application of the three pivotal supplier test and the resultant offer capping. The efficacy of the market power mitigation rules under recent rule changes remains to be seen and cannot be assumed. The modifications to the nature of the demand curve by PJM also create significant issues and have resulted in market prices above the competitive level.³⁸

On February 20, 2025, FERC issued an order accepting proposed rules in Docket No. ER25-785-000 which became effective February 21, 2025, beginning with the 2026/2027 Delivery

Residual Auction - Part F," (February 4, 2025) ("IMM BRA Report Part F") <<u>https://www.monitoringanalytics.com/reports/Reports/2025/IMM_Analysis_of_the_2025202</u> <u>6 RPM Base Residual Auction Part F_20250204.pdf</u>>.

³⁸ See IMM BRA Report Part A, IMM BRA Report Part B and IMM BRA Report Part C.

Year. The rule changes include elimination of the categorical RPM must offer exemption for Intermittent Resources, Capacity Storage Resources, and Hybrid Resources; modifying the Market Seller Offer Cap definition to include unit specific standalone Capacity Performance Quantifiable Risk (CPQR); and modifying the Market Seller Offer Cap definition to include segmented unit specific offer caps. The filing highlights the fact that market power mitigation rules are uncertain. The inclusion of offers based on standalone CPQR and segmented offers both undermine market power mitigation.³⁹

Market Analysis

The analysis of the impact of the Constellation acquisition of Calpine on the capacity market examines the locational markets defined by the underlying economics of the market including supply and demand curves and transmission constraints. Each transmission zone is a Locational Deliverability Area (LDA) which can be a separate submarket if PJM models the zone as an LDA and market conditions result in binding transmission constraints and associated price separation in an auction. There are, in addition, several defined subzonal LDAs, including PSEG North, DPL South, and ATSI Cleveland.

For the defined submarkets, market concentration and HHI levels were calculated on a preacquisition and a postacquisition basis for each market.

As in the energy market, to the extent that total RTO demand for capacity can be met without any constraints binding, the optimal solution is defined by the intersection of the aggregate supply and demand curves. However, if the next increment of demand for capacity in an LDA cannot be met by the next economic increment of total supply and must be met by higher cost supply within the LDA, then the transmission constraint is binding and there is a separate market created. That separate market is defined by the incremental demand that must be met by capacity within the LDA and the higher cost incremental supply within the LDA available to meet that demand.

The ability to exercise market power in the LDA is determined by the ownership structure of the incremental supply and the relationship between incremental supply and incremental demand. The incentive to exercise market power in the LDA is a function of the ownership structure of all capacity in the LDA. Regardless of offer price and regardless of whether the capacity was incremental, all capacity in a constrained LDA receives the higher constrained clearing price. The ability to exercise market power can be measured most accurately by the TPS test while the HHI provides a measure of the incentive to exercise market power.

³⁹ See Comments of the Independent Market Monitor for PJM, Docket No. ER25-785-000 (January 10, 2025); Answer and Motion for Leave to Answer of the Independent Market Monitor for PJM, Docket No. ER25-785-000 (February 18, 2025); Request for Rehearing of the Independent Market Monitor for PJM, Docket No. ER25-785-000 (March 19, 2025).

When the capacity market clears as a single market, total RTO supply and demand determine the clearing price and all resources receive the single market clearing price. When an LDA within the RTO clears as a separate market, the incremental locational supply available to meet the locational demand determines the clearing price for the LDA. All capacity resources in the LDA receive the single locational market clearing price, regardless of whether the capacity resources are incremental.

When there are multiple LDAs that clear as separate markets and the LDAs are not overlapping, the logic is exactly the same for each LDA separately and its relationship to the rest of RTO.⁴⁰ ⁴¹ When the LDAs are nested, the analysis becomes more complex.

For this analysis, the actual sell offer prices and offered MW quantities in the 2024/2025 and 2025/2026 RPM BRAs were used.⁴²

Aggregate Market: HHI

Table 7 shows pre and post Constellation Calpine acquisition HHIs, with divestiture, for the 2024/2025 and 2025/2026 RPM Base Residual Auctions, including all modeled LDAs for each BRA. The HHIs in Table 7 measure concentration of ownership for all cleared capacity in the identified LDAs.

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Table 7 Preacquisition and postacquisition HHI with divestiture

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Locational Markets: TPS

The pivotal supplier analysis uses the pre and postacquisition with divestiture Three Pivotal Supplier test scores to measure the change in market power for the RTO and

⁴⁰ See "Analysis of the 2023/2024 RPM Base Residual Auction," <<u>https://www.monitoringanalytics.com/reports/Reports/2022/IMM Analysis of the 20232024 RPM Base Residual Auction 20221028.pdf</u>> (October 28, 2022).

⁴¹ See the "Analysis of the 2024/2025 RPM Base Residual Auction," (October 30, 2023) <<u>https://www.monitoringanalytics.com/reports/Reports/2023/IMM_Analysis_of_the_2024202</u> <u>5 RPM Base Residual Auction 20231030.pdf</u>>.

⁴² If the ownership of assets changed between the conduct of the BRA and the present, the current parent company ownership was used in both the preacquisition and postacquisition cases.

LDAs. The Lightstone resources are attributed to ECP in both the preacquisition and postacquisition cases. Table 8 shows the preacquisition and postacquisition with divestiture TPS scores for Constellation and ECP.

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The market for a constrained LDA is defined by the incremental supply available to meet the incremental demand when locational incremental demand must be met by capacity resources within the LDA. The RTO market is defined to include all supply that is not incremental supply in a constrained LDA. The RTO market includes all MW that resulted in the clearing price for the rest of RTO.

The three pivotal supplier (TPS) test measures the degree to which the incremental supply from three suppliers of capacity is required in order to meet the incremental demand in an LDA. The demand consists of the incremental MW of capacity required to relieve a constraint or clear a market. The supply consists of the incremental MW of supply available to relieve the constraint or clear the market.

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Table 8 Preacquisition and postacquisition with divestiture TPS results forConstellation and ECP

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Attachment B IMM Structural and Behavioral Recommendations

1. Proposed Structural Conditions

a. Constellation commits not to sell any divested units to the following companies, all of which own greater than three percent of PJM installed capacity as of December 31, 2024: LS Power Group, Vistra Energy Corp., ArcLight Capital Partners, LLC, Talen Energy, Dominion Energy, Inc., American Electric Power Company, Inc., or any of their subsidiaries.

2. Proposed Behavioral Conditions

Sections 2(a), 2(b), 2(c), and 2(d) below apply to generating units owned or controlled by Constellation, including any units acquired or constructed, including any units planned for divestiture to another company, and which are either located in PJM or sell into PJM.

a. Capacity/Retirements

- i. For all of its generating units Constellation will calculate its RPM auction Market Seller Offer Caps, as that term is defined in Attachment DD of the PJM Tariff, using the methods set forth in Attachment DD of the PJM Tariff. If Constellation uses a unit-specific Avoidable Cost Rate, Constellation will calculate the Avoidable Project Investment Recovery Rate ("APIR") using actual Constellation-approved capital and outage spend budgets, updated at the time of each auction to reflect the current best information. With respect to all non-APIR elements, Constellation will use the actual expenses for the twelve-month period preceding the month in which the data is due. These estimates will be updated at the time of subsequent RPM incremental auctions as more current data becomes available.
- ii. Absent catastrophic failure or significant regulatory changes which make continued operation of the unit uneconomic, Constellation will provide to PJM and the IMM 18 months written notice before retiring any generating unit owned by Constellation; provided, however, that if after such announcement, PJM determines that there are no reliability issues associated with the retirement of the unit which would cause PJM to request that Exelon enter into a reliability must run agreement, then Constellation may, at its option and in its sole discretion, accelerate the retirement date, if permitted under PJM Market Rules, as defined in the PJM Open Access Transmission Tariff ("Tariff"). Nothing herein shall alter the IMM's Tariff-defined requirement to determine whether there are market power issues associated with the retirement or limit any related actions, as defined in the Market Rules, by the IMM.
- iii. Absent catastrophic failure or significant regulatory changes which make continued operation of the unit uneconomic, Constellation will not give notice to retire a unit unless Constellation's economic analysis shows that the unit is expected to be uneconomic, with economic defined as projected net revenues

minus projected avoidable costs. As part of the written notice to PJM and the IMM, Constellation will provide the IMM with Constellation's full economic analysis supporting the retirement decision. In this context, "full economic analysis" means the information presented to the ultimate decision maker as to whether to retire a generating unit, including any assumptions or calculations that provide the basis for the information presented.

b. Energy Market Offers

- i. Subject to the provisions of Section 2(b)(ii) below, for all non-nuclear units owned or controlled by Constellation, Constellation's post-merger marketbased offers will be consistent with the physical capabilities of the units, e.g. actual unit minimum and maximum (no block loading), ramp rates and minimum run times.
- ii. With respect to each non-nuclear unit owned or controlled by Constellation, Constellation will continue to set notification and start up times such that the total amount of time between notice and synchronization to the grid is a function only of the physical capability of each unit. Constellation will not adjust the notification and/or start-up time for any unit based on any factor other than the physical capability of the unit without prior review and approval of the IMM. Constellation also will comply with any new PJM rules applicable to unit notification and start-up time to the extent that such rules are more stringent than the provisions of this Settlement.
- iii. For all units owned or controlled by Constellation, in addition to its obligations set forth in the previous Sections 2(b)(i) and 2(b)(ii), Constellation's maximum market-based offers as of the date of the closing of the merger and for the term of this Settlement Agreement will be developed as follows: (1) unit costs determined daily in accordance with Schedule 2 of the PJM Operating Agreement, the PJM Cost Development Guidelines as set forth in PJM Manual No. 15, and the fuel cost policies that passed the IMM's market power review, plus (2) the higher of ten percent of such costs or the applicable percentage of cost permitted under the PJM Market Rules to the extent a unit is a frequently mitigated unit, plus (3) an adder not to exceed \$1.00/MWh.
- No unit or part of a unit will be offered as "Max Emergency" except as necessary to comply with environmental limits or fuel limits as defined by the PJM Market Rules.
- v. Each nuclear unit for which Constellation has the authority to determine offers will be self-scheduled/must run at Economic Maximum ("Ecomax") unless reduced in response to negative prices, physical limitations of the unit, or transmission limitations.

- vi. All capacity resources will offer the full ICAP MW equivalent of their cleared UCAP MW in the day-ahead and real-time energy markets every day.
- vii. Constellation will agree not to pursue any co-location arrangements until FERC policy on co-location is clearly established. Any such proposed co-location agreement should be treated as a retirement and follow the same rules for resources that plan to retire.

c. Ancillary Services Offers

Absent significant regulatory change that alters the obligation of existing units to make offers into the various reserve markets, Constellation will continue to offer regulation and synchronized reserve ancillary services and reserves from units owned by Constellation as of the date of this Settlement Agreement, in same manner and quantities that have been historically offered into these markets.