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

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| PSEG Fossil LLC | ) | |
| PSEG Fossil Sewaren Urban | ) | |
| Renewal LLC | ) | |
| PSEG Keys Energy Center LLC | ) | Docket No. EC21-128-000 |
| PSEG Energy Resources & Trade LLC | ) | |
| | ) | |
| Parkway Generation, LLC | ) | |
| Parkway Generation Essex, LLC | ) | |

## 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 applications for approval of certain transactions pursuant to Section 203 of the Federal Power Act[1] and Part 33 of the Commission's Regulations in the above proceedings.

The proposed transaction involves the sale by PSEG Power LLC of 100 percent of the company interests in the PSEG Fossil LLC, PSEG Fossil Sewaren Urban Renewal Entity LLC, and PSEG Keys Energy Center LLC, including the Essex Generating Station, to wholly owned indirect subsidiaries of ArcLight Capital Partners, LLC ("ArcLight").

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

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1 18 CFR § 385.211 (2021).

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").

The Market Monitor's report provides an assessment of the impact of ArcLight Capital's ("ArcLight") proposed purchase of Public Service Enterprise Group Incorporated's ("PSEG") fossil fueled generation units on PJM wholesale electricity markets including the energy market, the capacity market and the regulation market. In conducting this analysis for the real-time energy market the IMM used the results from the PJM test for structural market power (three pivotal supplier test) and generator market offer data. The IMM used the 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.[3]

The ArcLight acquisition increases overall energy market concentration in PJM by a small amount and to a larger degree in certain locations defined by transmission constraints, as indicated by both HHI results and pivotal supplier scores. The ArcLight acquisition increases market power, as measured by both the HHI and the TPS score, in the capacity market.

The Commission has previously approved the 5004/5005, AP South, and PJM East submarkets as relevant markets for which applicants need to provide competitive analysis screens to evaluate the impact of purchases filed under Section 203 for market power. Under the Commission approach, submarkets must be evaluated even when the transmission constraints that originally defined the submarkets do not continue to define

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[3] *See, e.g., 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.").

active submarkets.[4] But the PJM energy market is dynamic. Submarkets are dynamic. The Commission approach should reflect that dynamic nature of locational markets and require the analysis of currently relevant submarkets in all market power submissions.[5] Current data from the PJM Real-Time Energy Market show that at least some of the existing defined submarkets are not relevant submarkets and that there are additional submarkets. Based on the dynamic nature of the PJM market, an ongoing evaluation of relevant submarkets in PJM should be required.[6]

The Market Monitor does not oppose approval of the proposed acquisitions. Reforms to the Market Seller Offer Cap in Docket EL19-47 allow the applicants to rely on PJM market power mitigation in the capacity market. But the applicants cannot rely on PJM market power mitigation in the energy market to address local market power without reforms to PJM's offer capping process. Reforms to energy market power mitigation under Docket EL21-78 are required before applicants can rely on energy market power mitigation to address local market power.

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4 138 FERC ¶ 61,109 at P 43 (2012).

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

6 *See, e.g.,* Monitoring Analytics, LLC., *State of the Market Report for PJM: 2019*, Vol. II, Section 11: Congestion and Marginal Losses at Table 11-29.

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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Dated: November 1, 2021

**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 1st day of November, 2021.

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# ATTACHMENT

PUBLIC

Monitoring Analytics

# Market Power Analysis: ArcLight Capital's Acquisition of PSEG Fossil Generation

The Independent Market Monitor for PJM

November 1, 2021

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# Table of Contents

## Introduction

This report was prepared by PJM's Independent Market Monitor (IMM). The report provides an assessment of the impact of ArcLight Capital's ("ArcLight") proposed purchase of Public Service Enterprise Group Incorporated's ("PSEG") fossil fueled generation units on PJM wholesale electricity markets including the energy market, the capacity market and the regulation market. In conducting this analysis for the real-time energy market the IMM used the results from the PJM test for structural market power (three pivotal supplier test) and generator market offer data. The IMM used the 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 ArcLight acquisition increases overall energy market concentration in PJM by a small amount and to a larger degree in certain locations defined by transmission constraints, as indicated by both HHI results and pivotal supplier scores. The ArcLight acquisition increases market power, as measured by both the HHI and the TPS score, in the capacity market.

## Summary

The Commission has previously approved the 5004/5005, AP South, and PJM East submarkets as relevant markets for which applicants need to provide competitive analysis screens to evaluate the impact of purchases filed under Section 203 for market power. Under the Commission approach, submarkets must be evaluated even when the transmission constraints that originally defined the submarkets do not continue to define active submarkets.[1] But the PJM energy market is dynamic. Submarkets are dynamic. The Commission approach should reflect that dynamic nature of locational markets and require the analysis of currently relevant submarkets in all market power submissions. Current data from the PJM Real-Time Energy Market show that at least some of the existing defined submarkets are not relevant submarkets and that there are additional submarkets. Based on the dynamic nature of the PJM market, an ongoing evaluation of relevant submarkets in PJM should be required.[2]

The IMM provides analysis of the impact of the proposed ArcLight acquisitions on the structure of the PJM markets and its implications for market power. The metrics quantify the impact of the proposed ArcLight acquisitions on the market structure of constraint defined markets within PJM. The analysis concludes that the proposed ArcLight acquisitions would increase concentration in specific, locational energy markets. **{BEGIN CUI//PRIV}** [redacted]

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1 138 FERC ¶ 61,109 at P 43 (2012).

2 *See, e.g.*, Monitoring Analytics, LLC., *State of the Market Report for PJM: 2019*, Vol. II, Section 11: Congestion and Marginal Losses at Table 11-29.

[redacted] {END CUI//PRIV}

The IMM does not oppose approval of the proposed acquisitions. The IMM recommends that {BEGIN CUI//PRIV} [redacted] {END CUI//PRIV} and more broadly recommends that the Commission require regular updates on relevant submarkets in the PJM energy market. The Market Monitor would be willing to provide a standard update to the Commission based on agreed upon metrics.

## Sufficiency of PJM Market Power Mitigation

In analyzing Section 203 applications and market based rates, applicants may submit competitive screen results using the RTO as the relevant geographic market. The Commission relies on the sufficiency of the market monitoring and mitigation provisions in the RTO's tariff to mitigate local market power within the RTO region.[3] 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 should require explicit mitigation.[4]

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 Commission has issued an order in Docket EL19-47 to remedy the market power mitigation issues in the capacity market. The capacity market Market Seller Offer Cap has been corrected, so that ArcLight can appropriately rely on market power mitigation in the capacity market. The Commission initiated a proceeding in Docket EL21-78 to remedy the market power mitigation issues in the energy market. Until the issues with parameter mitigation and offer capping are corrected for resources that fail the Three Pivotal Supplier (TPS) test in the energy market, ArcLight cannot rely on market power mitigation in the PJM energy market to address structural market power. The Commission has initiated a proceeding in Docket EL21-78 to address these issues. {BEGIN CUI//PRIV} [redacted] {END CUI//PRIV}

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3 Order No. 697 at P 241.

4 Order No. 697- A at P 111.

## Methods of Analysis

In analyzing whether a proposed merger is consistent with the public interest, the FERC 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."[5] 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 using pivotal supplier analysis and concentration thresholds, including those defined in FERC's Competitive Analysis Screen.[6]

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 networked 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 markets 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 its 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 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 2020 and 2021 and where the units to be acquired provided relief MW in 50 or more hours. The relevant capacity markets are those

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5 18 CFR § 33.2(g) (2011).

6 18 CFR § 33.3; *see also Revised Filing Requirements Under Part 33 of the Commission's Regulations*, Order No. 642, FERC Stats. & Regs. ¶ 31,111 (2000) ("Order No. 642"); *Transactions Subject to FPA Section 203*, Order No. 669, FERC Stats. & Regs. ¶ 31,200 (2005) ("Order No. 669"), *order on reh'g*, Order No. 669-A, FERC Stats. & Regs. ¶ 31,214 ("Order No. 669-A"), *order on reh'g*, Order No. 669-B, FERC Stats. & Regs. ¶31,225 (2006) ("Order No. 669-B"); *Inquiry Concerning the Commission's Merger Policy Under the Federal Power Act: Policy Statement*, Order No. 592, 77 FERC ¶61,263 (*mimeo*), FERC Stats. & Regs. ¶ 31,044 (1996), *reconsideration denied*, Order No. 592-A, 79 FERC ¶61,321 (1997) ("Merger Policy Statement"); *FPA Section 203 Supplemental Policy Statement*, FERC Stats. & Regs. ¶ 31,253 (2007).

that resulted from the actual operation of the markets for the 2021/2022 and 2022/2023 Delivery Years.

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. The information used to prepare the analysis included in this report is highly confidential and market sensitive as it relates to specific market participants.[7]

## Merger Standards

For the evaluation of the impact of a merger on competition, FERC adopted the 1992 Horizontal Merger Guidelines ("1992 Guidelines") as the analytical framework for analyzing the impact of mergers on competition as described in the Competitive Analysis Screen relied on by the Commission.[8]

The Commission reserves the opportunity to consider alternative approaches for analyzing the impact of proposed mergers, including analyses similar to the analysis included in this report, when evaluating proposed mergers in PJM.[9]

The 1992 Guidelines outlined 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."[10]

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7 *See* OATT Attachment M–Appendix § I.

8 *See* Order No. 642 *mimeo* at 4–5; U.S. Dept. of Justice & Federal Trade Commission, "Horizontal Merger Guidelines" (1992), as revised (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 it policies to follow the DOJ and FTC 2010 modifications, but decided, after notice and inquiry, to retain the 1992 Guidelines. *Analysis of Horizontal Market Power under the Federal Power Act*, 138 FERC ¶61,109 (2012) ("Order Reaffirming the 1992 Guidelines").

9 *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).

10 1992 Guidelines at 2.

FERC's 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 "[o]ther things being equal, cases falling just above and just below a threshold present comparable competitive issues."[11] A market with an HHI of less than 1000 is considered to be unconcentrated. Mergers 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 in or 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 in or 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.[12] A market with an HHI of 1800 or above is considered to be highly concentrated. A merger in or 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 producing an increase in the market HHI of 50 points or more in a highly concentrated market "potentially raises significant competitive concerns."[13]

The IMM has performed its energy market analysis on the basis of actual market data that evaluates local market power in the PJM Real-Time Energy Market during the period from October 1, 2020 through September 30, 2021. The IMM has performed its capacity market analysis on the basis of the modeled and constrained LDAs in the 2021/2022 and 2022/2023 RPM Base Residual Auctions. The IMM has performed its regulation market analysis on the basis of the actual hourly cleared markets in October 1, 2020 through September 30, 2021.

## *Market Based Rate Authority Metrics*

The FERC's Market-Based Rates Order, Order No. 697, defines the market structure characteristics that must be met for a market participant to be granted market based rates for three years.[14] Order No. 697 indicates that an individual seller market share in excess of 20 percent is an indicator of market power and that an HHI of 2500 is an indicator of

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11 1992 Guidelines at 15.

12 *Id.* at 16.

13 *Id.*

14 *Market-Based Rates For Wholesale Sales Of Electric Energy, Capacity And Ancillary Services By Public Utilities*, Order No. 697, 119 FERC ¶ 61,295 (2007) ("Order No. 697").

market power.[15] Order No. 697 also uses the residual supplier index (RSI), a pivotal supplier metric, to define market structure.[16]

The Commission adopted market power screens and tests in the Order No. 697.[17] Order No. 697 defined two indicative screens and the more dispositive delivered price test ("Delivered Price Test or DPT"). The Delivered Price Test for market power defines the relevant market as all suppliers who offer at or below the clearing price times 1.05 and, using that definition, applies pivotal supplier, market share and market concentration analyses. These tests are failed if, in the relevant market, the supplier in question is pivotal, has a market share in excess of 20 percent or if the Herfindahl-Hirschman Index (HHI) exceeds 2500. Order No. 697 recognized that there are interactions among the results of each screen under the Delivered Price Test and that some interpretation is required and, in fact, is encouraged.[18]

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. The 20 percent market share and the HHI screen are also weak screens for structural market power on a stand-alone basis. A market share in excess of 20 percent does not demonstrate market power if the holder of that market share is not jointly pivotal and is unlikely to be able to affect the market price. A market share less than 20 percent does not demonstrate the absence of market power if the holder of that market share is jointly pivotal and is likely to be able to affect the market price. 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.[19]

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

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15 Order No. 697 at P 111.

16 Order No. 697 at PP 106–109.

17 *Id.*

18 *Id.*

19 For detailed examples, see Joseph E. Bowring, PJM Market Monitor. "IMM Analysis of Combined Regulation Market," PJM Market Implementation Committee Meeting (December 20, 2006).

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 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. As with concentration ratios, the RSI is not a bright line test.

FERC indicates that a single supplier RSI of less than 1.0 is an indicator of market power.[20] 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.[21]

## 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 cleared supply in a market. Concentration ratios are a summary measure of market share. The concentration ratio

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

21 AEP Order at P 111.

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. The three pivotal supplier test is an application of the Delivered Price Test to the real-time energy market, the day-ahead energy market, the regulation market and the Reliability Pricing Model (RPM) capacity market. The three pivotal supplier test is also consistent with the Delivered Price Test in that it tests for the interaction between individual participant attributes and features of the relevant market structure. 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 and the maximum market share is less than 20 percent. The three pivotal supplier test can also show the absence of market power when the HHI is greater than 2500 and the maximum market share is greater than 20 percent. 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. A market share in excess of 20 percent of supply does not indicate market power if the holder of that market share is not jointly pivotal to meet demand, and is unlikely to be able to affect the market price. A market share less than 20 percent of supply does not indicate the absence of market power if the holder of that market share is jointly pivotal to meet demand and is likely to be able to affect the market price. Similarly, 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.[22]

The three pivotal supplier test was designed in light of actual elasticity conditions in load pockets 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."[23] 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 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. [24]

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.

## *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 or could actually compete to determine the market

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[22] For detailed examples, see Joseph E. Bowring, PJM Market Monitor, "IMM Analysis of Combined Regulation Market," PJM Market Implementation Committee Meeting (December 20, 2006).

[23] AEP Order at P 72.

[24] *Id.* at P 103.

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 firm to raise price while continuing to sell its output. A firm 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 which have costs 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 costs less than, or equal to, $210 per MWh 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 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 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 three pivotal supplier test incorporates a definition of meaningful competitors that is at the extremely 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 consists of the incremental, effective MW required to relieve the constraint.[25] 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

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[25] A unit's contribution toward effective, incrementally available supply is based on the 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.

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 the output. A resource with positive dfax with respect to a constraint provides relief by reducing the output, and a resources 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 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 electric network as measured by unit characteristics and distribution factors is included in the three pivotal supplier test, to the extent that it is incremental, effective MW of supply that is 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 (at P 43), 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.

The PJM submarkets used to perform the Delivered Price Test do not represent currently prevailing patterns of congestion in the PJM market. Congestion patterns are dynamic and change with the relative costs of generation by fuel type and technology and by new entry and by retirements. The prevailing flow of energy in 2020 and 2021 was from north to south, not the west to east as was the case for much of PJM's history. In 2020 and 2021, the constraints in the area of the Pennsylvania/Maryland border, such as TMI, Conastone, Graceton – Safe Harbor, Bagley-Raphel Road, and Bagley – Graceton, defined the most significant limiting elements on the economic flow of energy in PJM. These binding constraints occurred throughout the year, and especially at competitively significant times

during the summer peak hours of 2021 and in February 2021. The submarkets defined by the AP South, 5004/5005, and PJM East interfaces existed infrequently in 2020 and 2021 because the identified constraints did not bind. These submarkets were relevant in prior years and prior analyses, but have not been meaningful submarkets under recent market conditions.[26] Table 3 includes the constraint hours for the submarkets identified by the IMM using the TPS test results and those used for the Delivered Price Test.

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.

## Defining Submarkets

In the current PJM energy and capacity markets, the BGE and PEPCO Zones define the most significant submarket consistently having the highest prices and persistent market concentration. This has been the case since at least 2016.[27] The historic submarkets used to analyze transactions in the PJM market are largely irrelevant to the market in 2021. Table 3 shows that the 5004/5005, AP South, and PJM East submarkets were rarely binding in the twelve months ending September 2021. Reliance on a static list of defined submarkets for purposes of defining market power is not consistent with the dynamic nature of PJM markets. The list of submarkets should be dynamic, evolving with market conditions.

There are a set of transmission constraints that limit the import of power from the rest of PJM into the BGE and PEPCO Zones.

## Energy Market Results

The IMM analyzed the impact of the transaction on the aggregate energy market concentration using actual generation data for the 12 month period from October 1, 2020, through September 30, 2021. The concentration metrics are the market share for energy and the HHI for energy in the aggregate PJM market.

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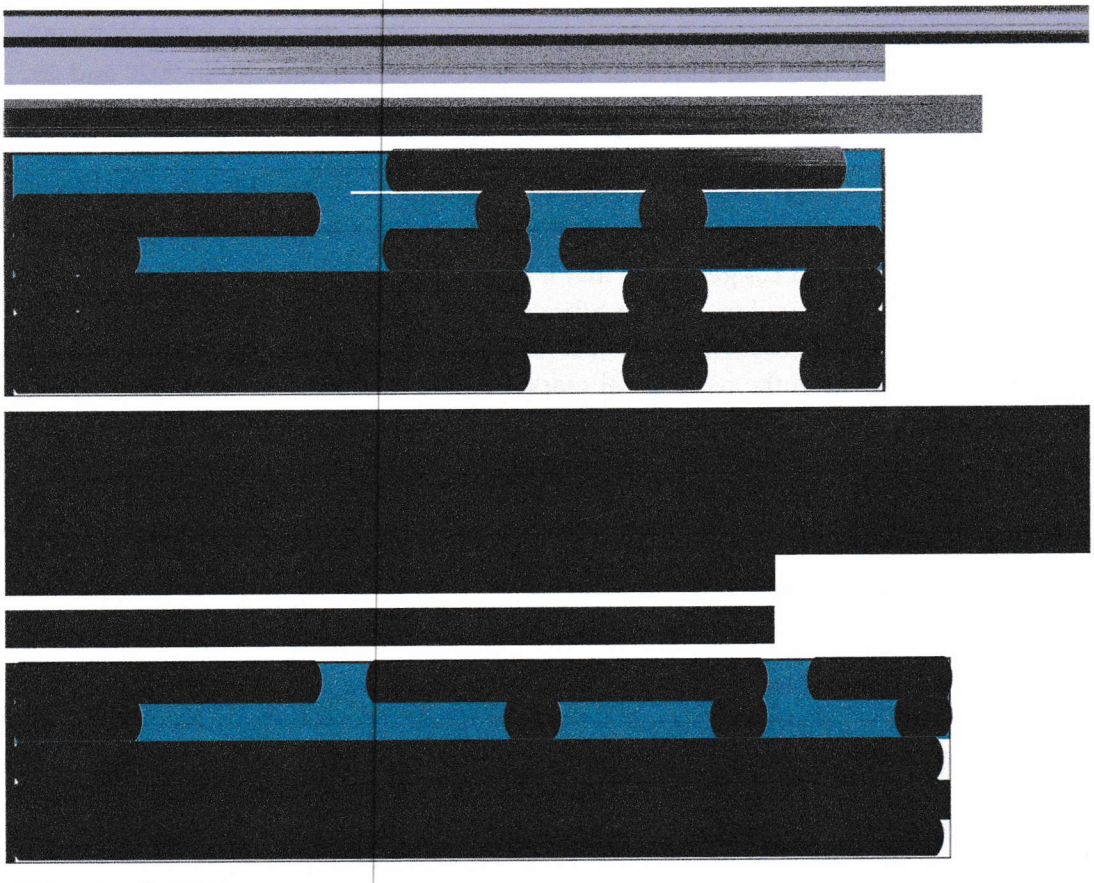
26 *See PPL Corporation, RJS Holdings LLC*, 149 FERC ¶ 61,260 at P 97 (2014).

27 *See* State of the Market Reports for PJM, 2016 through 2020, Section 3: Energy Market.



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The IMM also analyzed the energy market results for the relevant submarkets defined by actual binding constraints for the period from October 1, 2020, through September 30, 2021.

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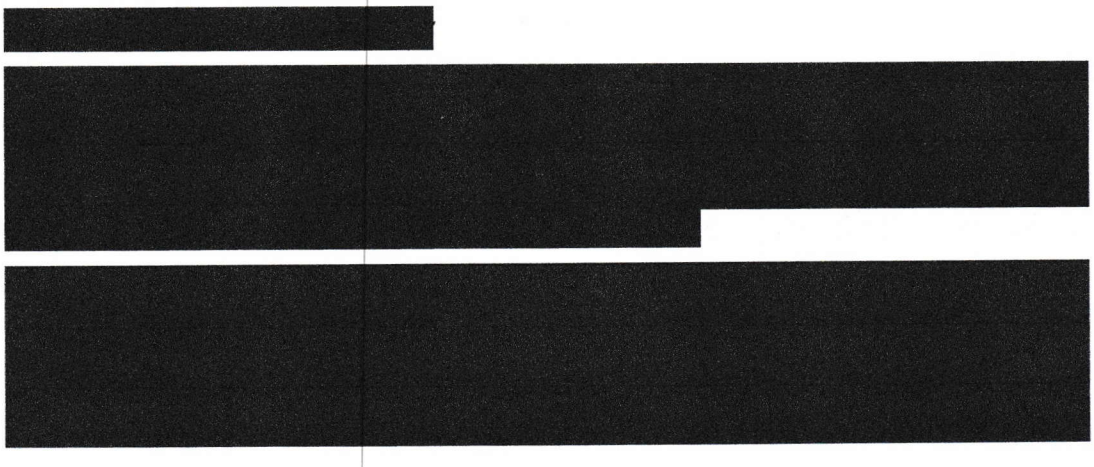

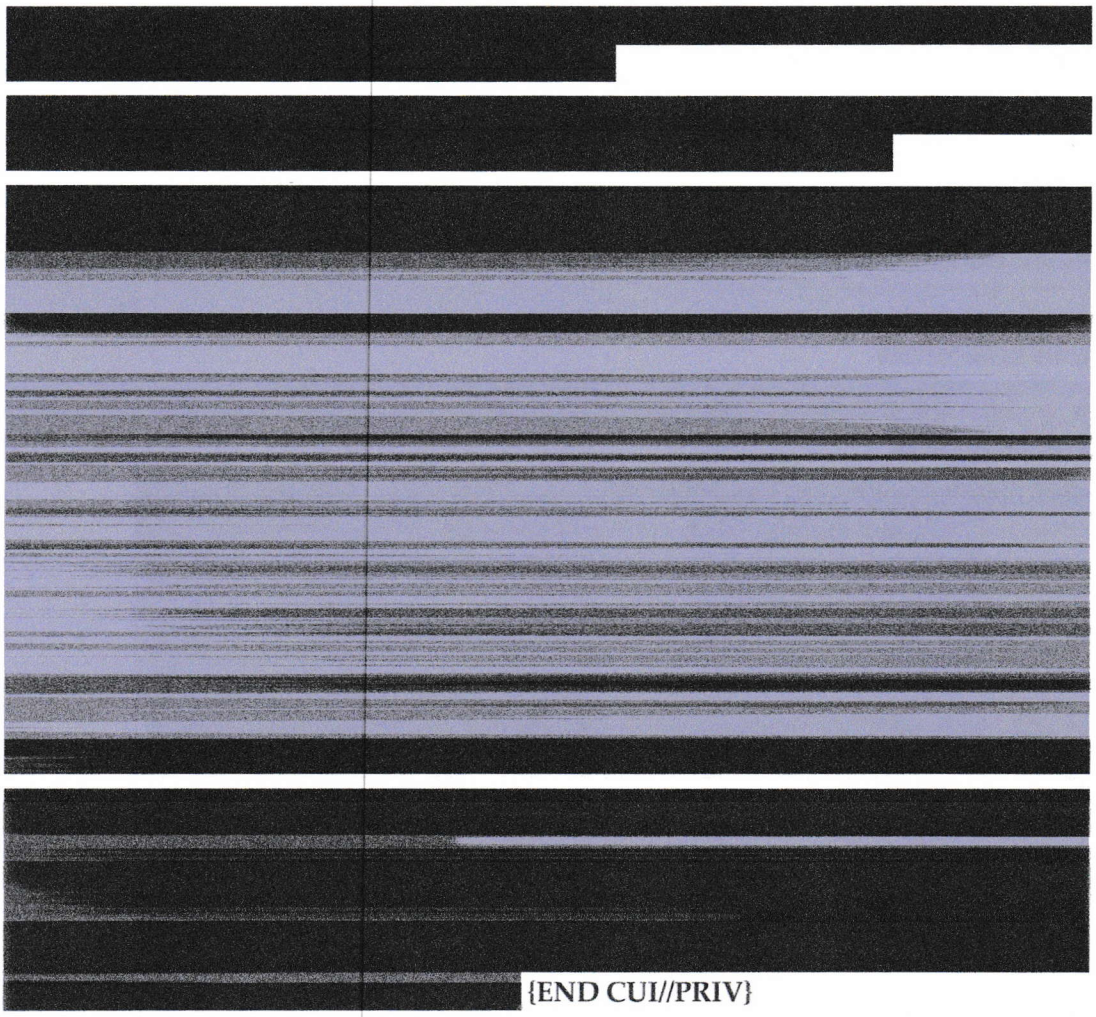

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## TPS Test Analysis

The analysis of the impact of the merger on the energy market focuses on constraints that occurred in 2020 and 2021 in the PJM Real-Time Energy Market. PJM's three pivotal supplier test evaluates structural market power and triggers market power mitigation based on such constraints in the energy market. The relevant constraints are defined based on the incremental, effective MW of relief supply available to relieve each constraint, from either the raise help or lower help side of the constraint, based on the actual results of the TPS test. This definition of the market allows the identification of resource owners in a position to exercise market power by directly affecting locational prices when a transmission constraint binds.

A constraint is included in the analysis only if at least one of the units involved in the transaction had incremental effective MW of supply for the constraint in 50 or more hours and the constraint bound for 100 or more hours in the real-time energy market in the

period from October 1, 2020, through September 30, 2021, and if the change in average HHI post ArcLight acquisition is greater than or less than zero.[28] The constraints are ranked by total congestion costs in the results tables.

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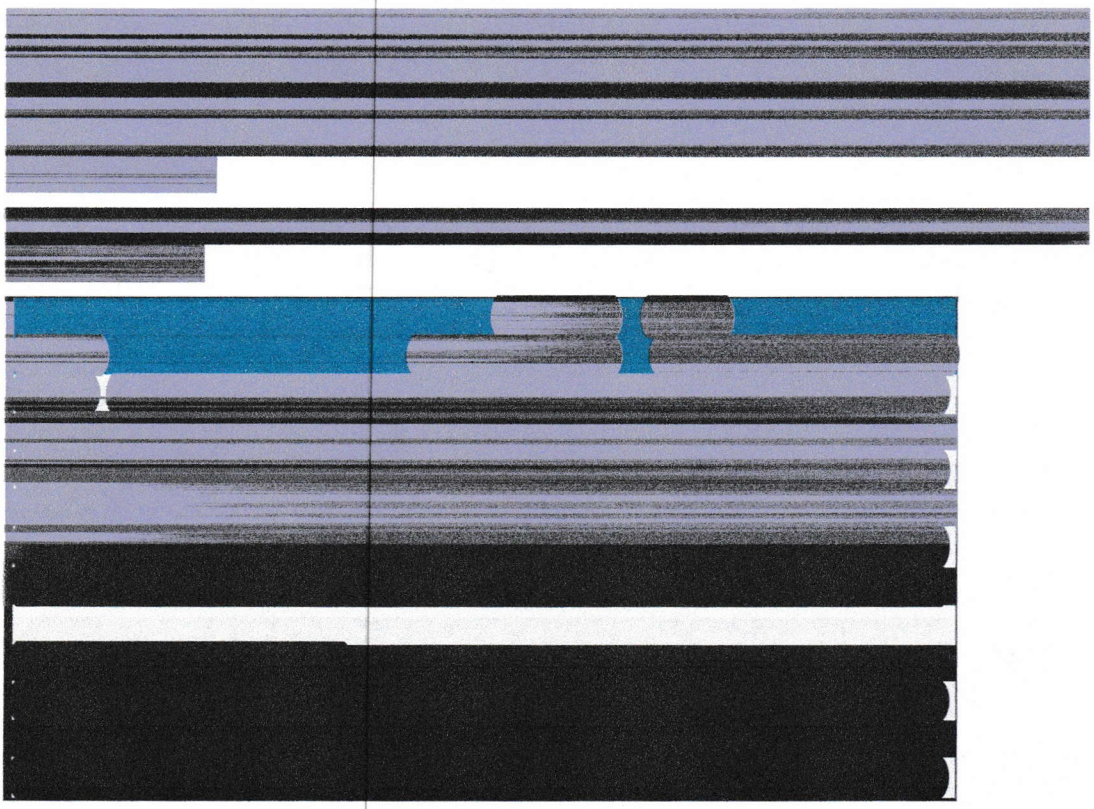

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The supply for constraint relief is defined the same way it is calculated in the three pivotal supplier (TPS) test implemented in PJM's Real-Time Energy Market. The TPS test for the real-time energy market is currently evaluated in the Intermediate Term Security Constrained Economic Dispatch (IT SCED) tool that solves the energy market for four different look ahead times. Each of these look ahead times is called a target time. When IT SCED identifies a binding constraint for one or more target times, the supply defined for each target time consists of the sum of incremental, effective MW of relief from all available online units and offline units capable of starting consistent with the target time

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28 If the change of HHI is greater than -0.5 and less than 0.5, it is rounded to zero.

29 When a specific facility is constrained for one or more five minute intervals within an hour in the LPC solution case, it is counted as one real-time constraint hour. *See* the *2019 State of the Market Report for PJM*, Volume II, Section 11, "Congestion and Marginal Losses."

compared to an unconstrained solution. Each unit's supply is calculated as the difference between its unconstrained dispatch MW and the constrained dispatch MW adjusted by the unit's dfax for that particular constraint. The constrained dispatch MW of a unit consists of ramp limited MW that are available at a price less than or equal to the sum of the system marginal price (SMP) and 1.5 times the congestion component attributed to that constraint (1.5 times constraint shadow price times unit dfax). The resulting measure of effective relief is termed the relevant effective supply in the market for the relief of the defined constraint. Results are provided for peak hours, off peak hours and all hour periods.

### *Summary Results for Specific Constraints*

For the relevant constraints, the TPS score, market concentration and HHI levels are calculated on a pre and a post ArcLight acquisition basis for each target time. There can be multiple target times in an hour and there can be hours with no target times. Market hours are defined based on IT SCED target times using the time at the beginning of the hour. For example, for target times at 10:00, 10:15, 10:30 and 10:45, the market results are averaged as hour beginning 10:00.

## Pivotal Supplier Analysis

Table 4 and Table 6 show, for October 2020 through September 2021, by constraint, the number of market hours that one or more market participants failed (failed market hours) the three pivotal supplier test, and the number of market hours ArcLight failed the TPS test (pre and post acquisition) for at least one IT SCED target time in that hour. Table 5 and Table 7 show pre and post ArcLight average TPS scores.[30] Table 4 and Table 5 provide the results for peak hours for the pre and post ArcLight acquisition. Table 6 and Table 7 provide the results for off peak hours for the pre and post ArcLight acquisition.

A TPS score of less than 1.0 indicates that the supplier being tested failed the market power test and is subject to mitigation under the PJM market rules. A reduction in the TPS score as a result of the acquisition indicates that the acquisition has made ArcLight more pivotal in meeting the demand in the defined market. The absence of a change in the number of hours in which ArcLight is pivotal is not necessarily an indicator that the acquisition does not have an anticompetitive effect on the tested market. For example, if ArcLight had a TPS score of less than 1.0 in a market hour prior to the acquisition (indicating a TPS failure for the hour) and a lower TPS score post acquisition, this would indicate that the acquisition increased the market power of ArcLight. But there would be

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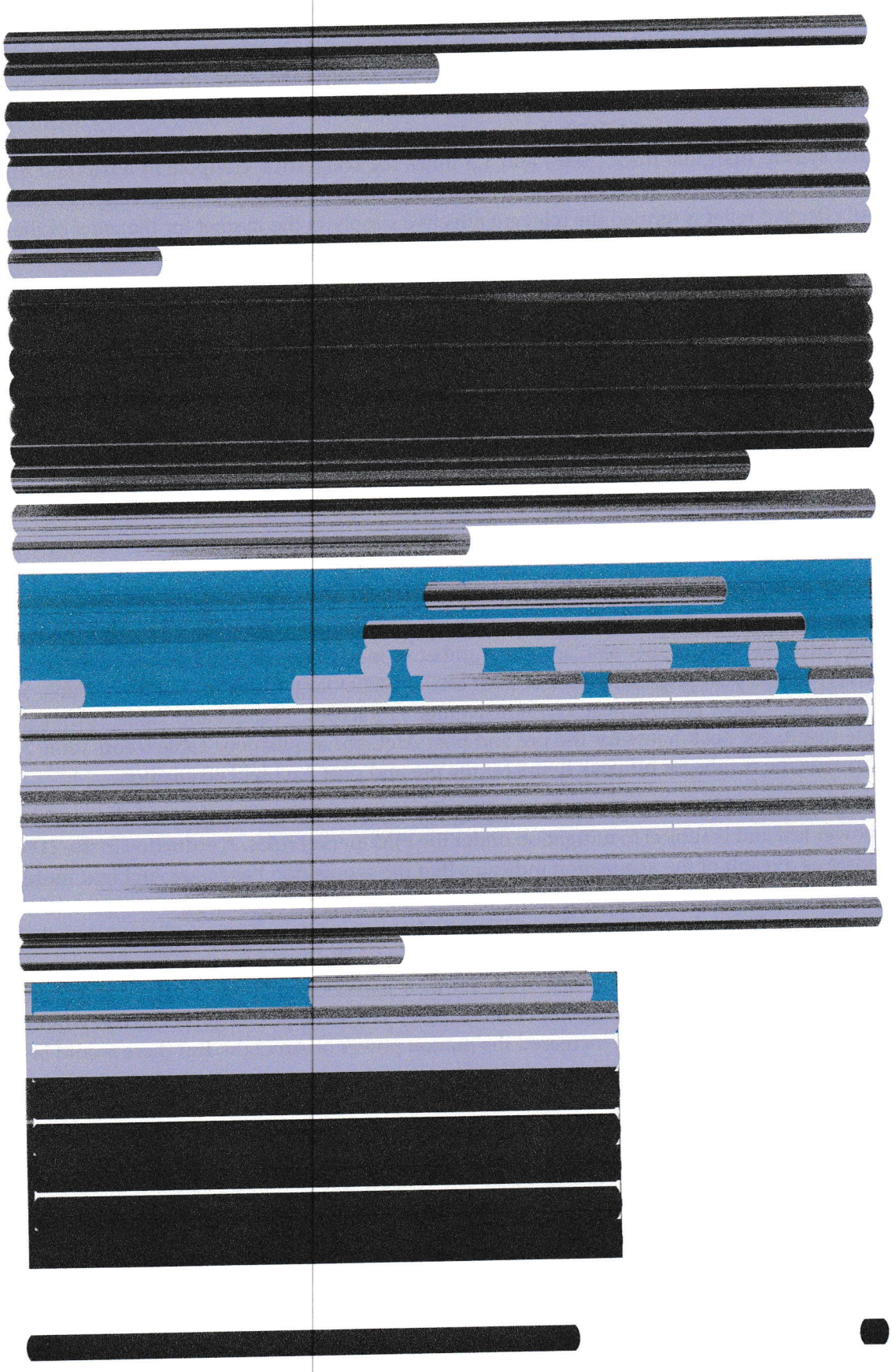
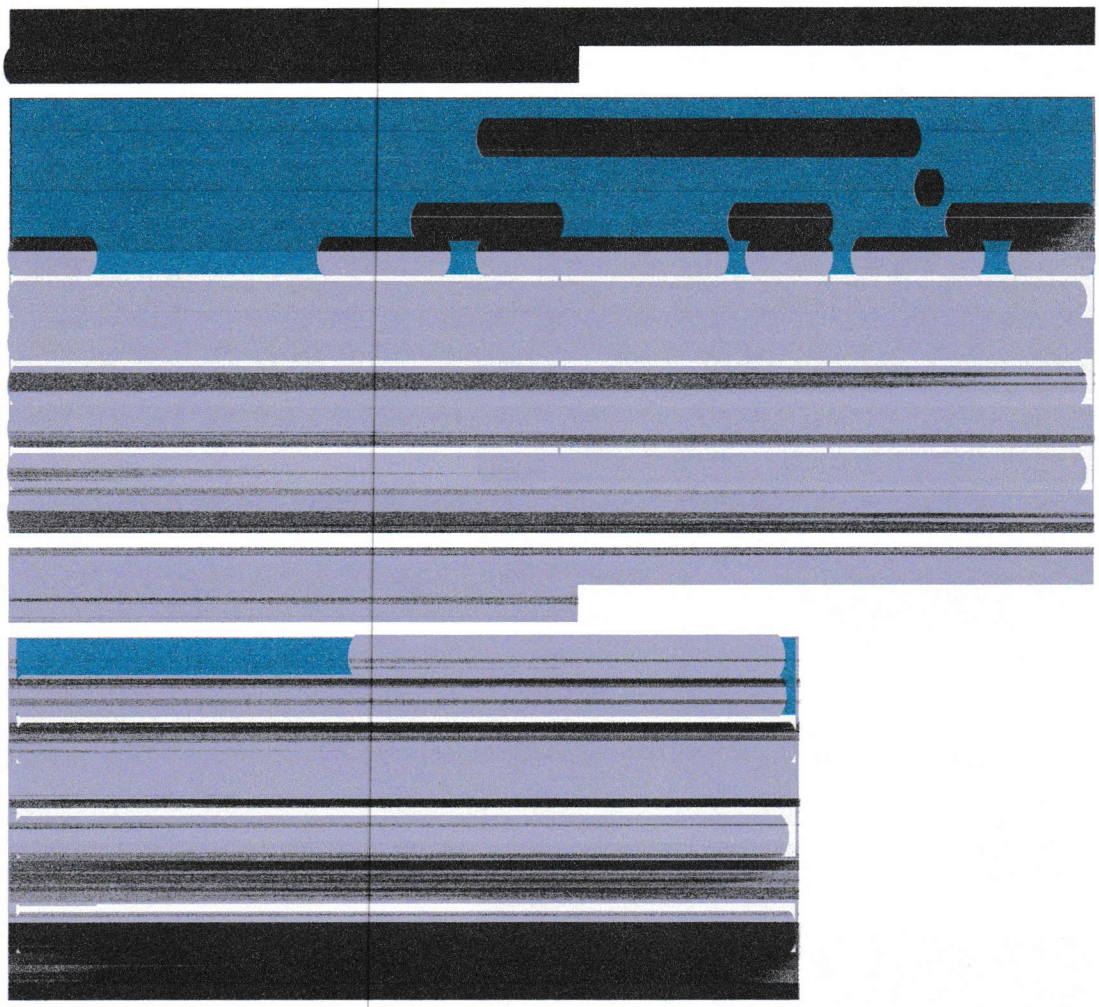
30 The TPS score is the residual supply index (RSI) for three suppliers together. RSI is the ratio of the residual supply to the demand for a product. In the TPS score, residual supply is the total supply for constraint relief available minus the supply from three suppliers (the two largest suppliers and the supplier being evaluated). The demand is the incremental relief needed for each constraint, calculated as the difference between the unconstrained flow and the limit on the constraint.





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## Summary HHI Analysis

Table 8, Table 9 and Table 10 show the minimum, average, maximum and median pre and post ArcLight acquisition HHIs for each constraint for which the units involved in the transaction provided relief supply from October 2020 through September 2021. Table 8 provides the results for peak hours, Table 9 provides the results for off-peak hours and Table 10 provides the results for all hours.

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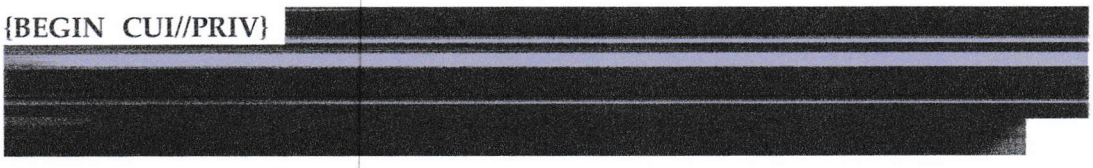

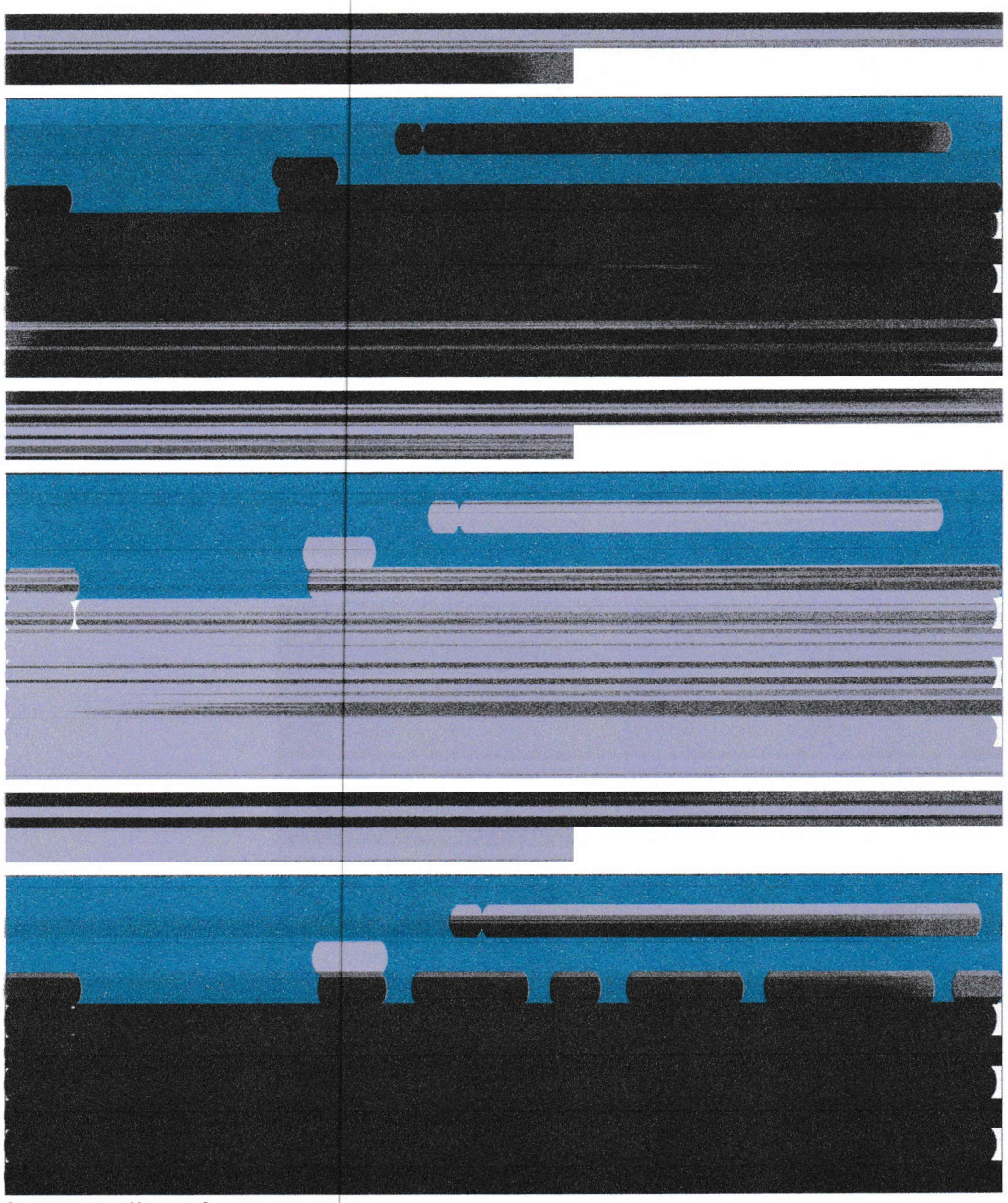

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## Specific Constrained Market HHI Results

Table 11 provides, for the specified constraints under the ArcLight acquisition, by pre and postacquisition HHI category, the number of market hours where the proposed ArcLight acquisition, had it already been in place, would have increased the HHI by 50 or less, more than 50 and less than or equal to 100, and more than 100 points, and failed the thresholds in the 1992 Guidelines.

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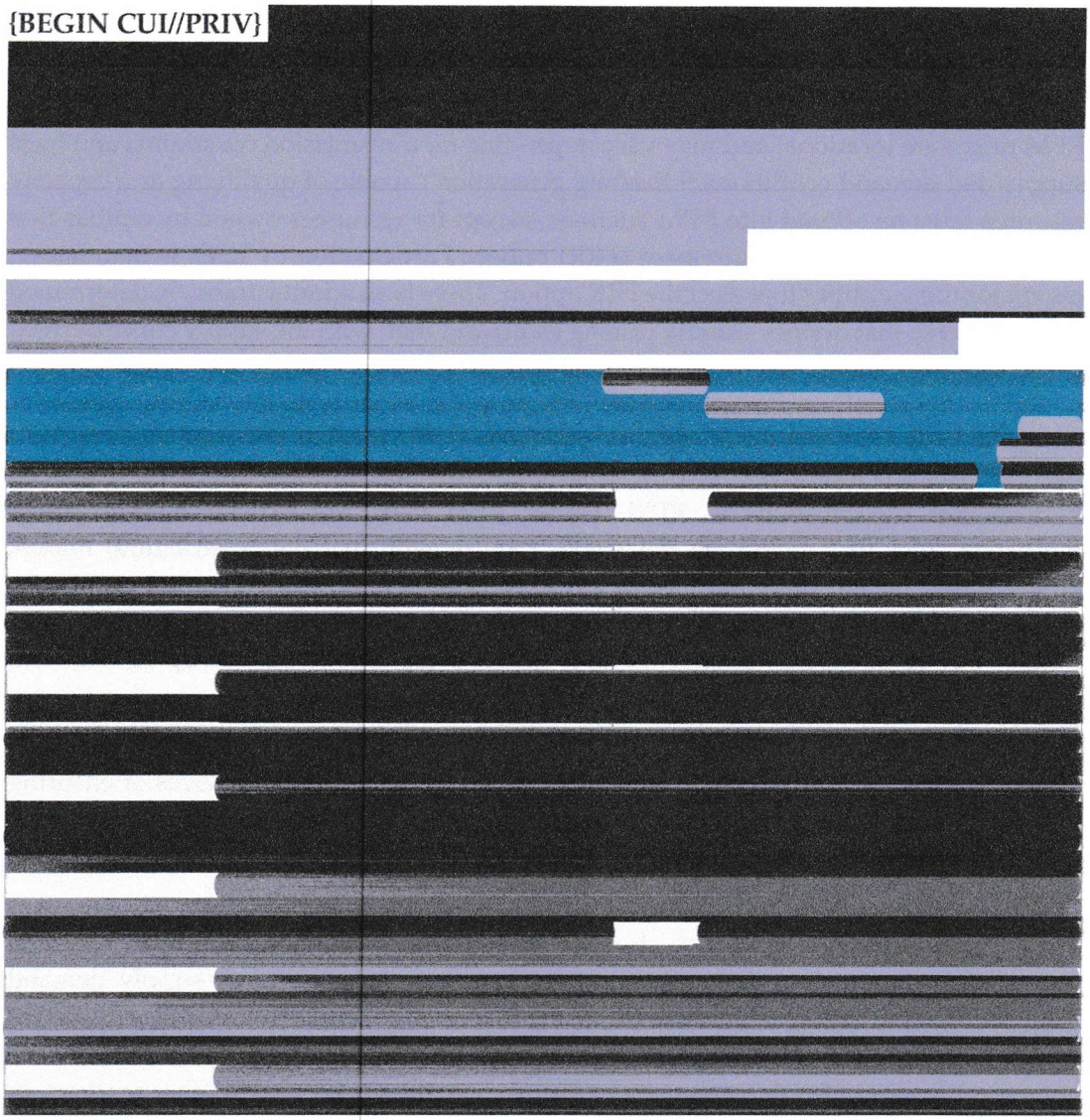

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## Capacity Market Results

The Reliability Pricing Model (RPM) Capacity Market design was implemented in the PJM region on June 1, 2007. The Reliability Pricing Model (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.

Under RPM, capacity obligations are annual. Base Residual Auctions (BRA) are held for delivery years that are three years in the future. Effective with the 2012/2013 Delivery Year, First, Second and Third Incremental Auctions (IA) are held for each delivery year.[31]

RPM prices are locational and may vary depending on transmission constraints and local supply and demand conditions.[32] Existing generation capable of qualifying 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 by LSEs is mandatory, except for those entities that elect the FRR option. 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. RPM rules provide performance incentives for generation, including the requirement to submit generator outage data and the linking of capacity payments to the level of unforced capacity, and the performance incentives have been strengthened significantly under the Capacity Performance modifications to RPM. Under RPM there are explicit market power mitigation rules that define the must offer requirement, that define structural market power based on the marginal cost of capacity, 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 and energy efficiency resources may be offered directly into RPM auctions and receive the clearing price without mitigation.

The RPM capacity market design explicitly addresses the underlying issues of ensuring that competitive prices can reflect local scarcity while not relying on the exercise of market power to achieve the design objective, and of explicitly limiting the exercise of market power.

The capacity market is, by design, always tight in the sense that total supply is generally only slightly larger than demand. Local markets may have different supply demand balances than the aggregate market. While the market may be long at times, that is not the equilibrium state. Capacity in excess of demand is not sold and, if it does not earn or does not expect to earn adequate revenues in future capacity markets, or in other markets, or does not have value as a hedge, may be expected to retire, provided the market sets appropriate price signals to reflect the availability of excess supply. The demand for capacity includes expected peak load plus a reserve margin, and points on the demand curve, called the Variable Resource Requirement (VRR) curve, exceed peak load plus the reserve margin. Thus, the reliability goal is to have total supply equal to or slightly above the demand for capacity. The level of purchased demand under RPM has generally

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

32 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.

exceeded expected peak load plus the target reserve margin, resulting in reserve margins that exceed the target. Demand is almost entirely inelastic because the market rules require loads to purchase their share of the system capacity requirement. The level of elasticity incorporated in the RPM demand curve, called the Variable Resource Requirement (VRR) curve, is not adequate to modify this conclusion. 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 assured 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. However, 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.

RPM has explicit market power mitigation rules designed to permit competitive, locational capacity prices while limiting the exercise of market power. The RPM construct is consistent with the appropriate market design objectives of permitting competitive prices to reflect local scarcity conditions while explicitly limiting market power. The RPM 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 Commission modified the market seller offer cap (MSOC) by setting it equal to each resource's net avoidable cost rate, ensuring that offer capping results in competitive RPM prices.[33]

## Markets

The analysis of the impact of the ArcLight acquisition 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

[33] 176 FERC ¶ 61,137 (September 2, 2021).

Locational Deliverability Area (LDA) which can be a separate market if PJM models the zone as an LDA and market conditions result in price separation in an auction. There are, in addition, several subzonal LDAs, including PSEG North, DPL South, and ATSI Cleveland.

For the defined markets, 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 supply, regardless of location, 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 incremental supply within the LDA available to meet that demand, above that which would have cleared at the RTO price.

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.

When the capacity market clears as a single market, total RTO supply and demand determine the clearing price and all resources receive the clearing price. The market definition is clear. 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 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.[34] When the LDAs are nested, the analysis becomes more complex.

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[34] See "Analysis of the 2021/2022 RPM Base Residual Auction - Revised," at Attachment A <http://www.monitoringanalytics.com/reports/Reports/2018/IMM_Analysis_of_the_20212022_RPM_BRA_Revised_20180824.pdf> (August 24, 2018).

## Analysis

For this analysis, the actual sell offer prices and offered MW quantities in the 2021/2022 and 2022/2023 RPM BRAs were used.[35]

## Total Market Analysis

### HHI Analysis

The HHI values are a measure of the incentive to exercise market power.

Table 12 shows pre and post ArcLight acquisition HHIs for the 2021/2022 and 2022/2023 RPM Base Residual Auctions, including all modeled LDAs for each BRA. The HHIs in Table 12 measure concentration of ownership for all cleared capacity in the identified LDAs. {BEGIN CUI//PRIV}

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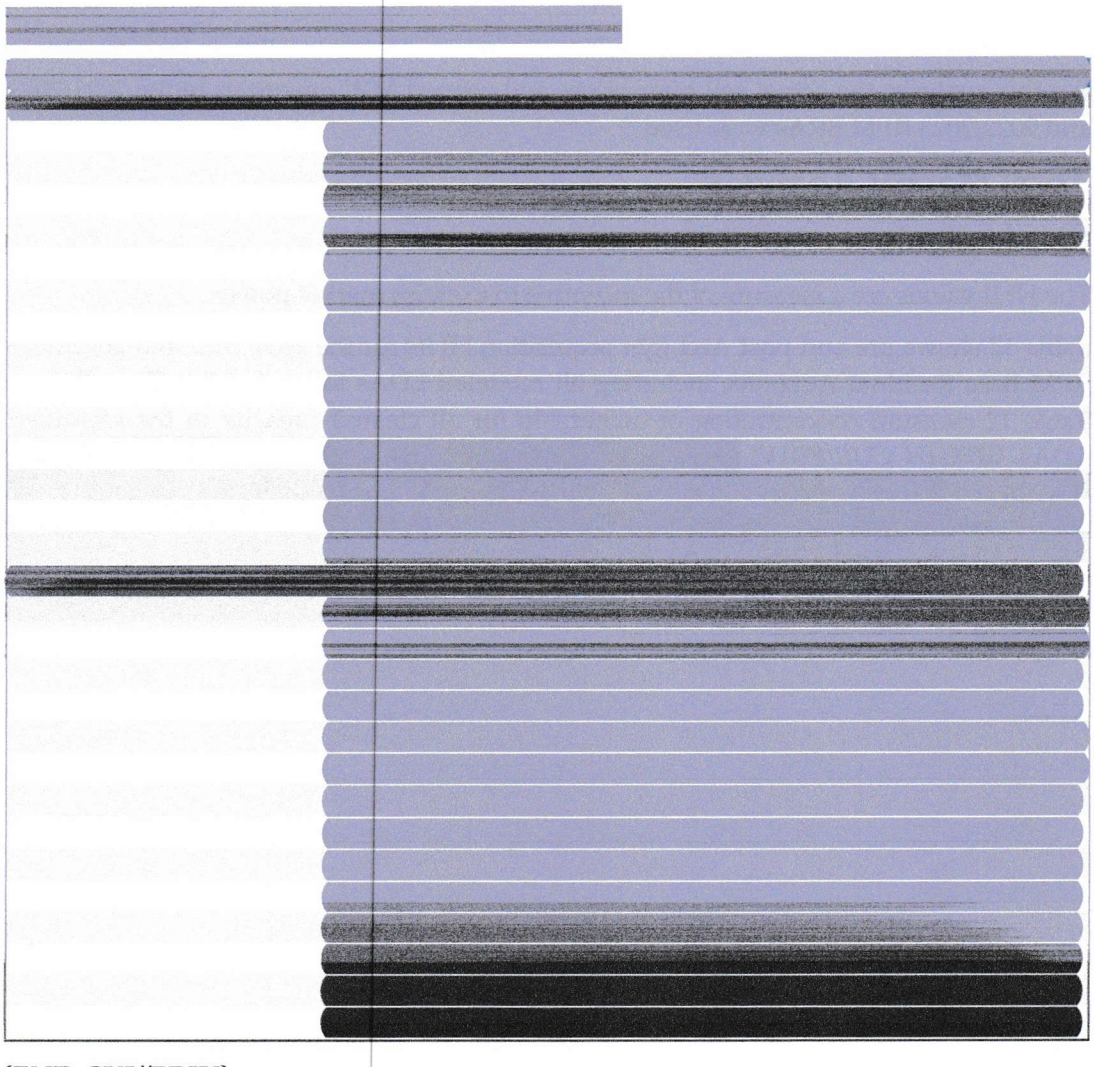
[35] It the ownership of assets changed between the operation of the BRA and the present, the current parent company ownership was used in both the preacquisition and postacquisition cases.



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## *Incremental Market Analysis*

### Pivotal Supplier Analysis

The incremental analysis addresses the ability of owners to exercise market power. The results show that ArcLight's market power increases by a small amount for the PJM RTO in the capacity market.

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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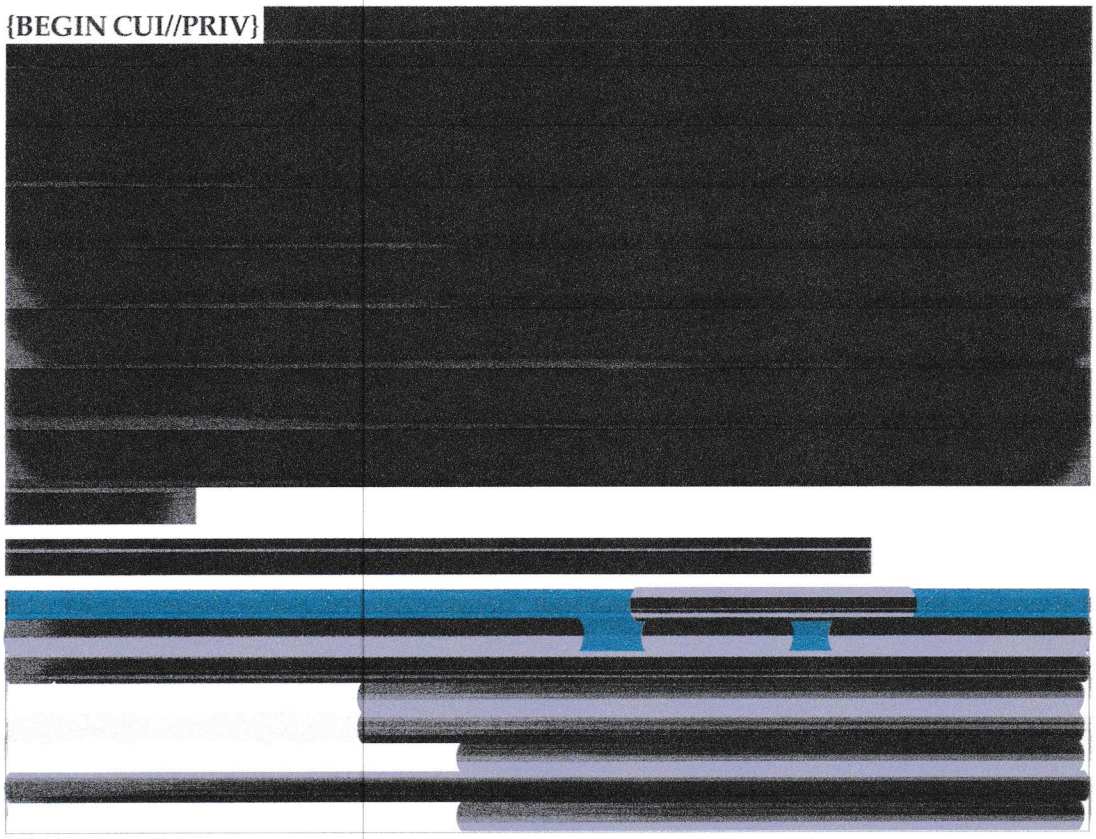

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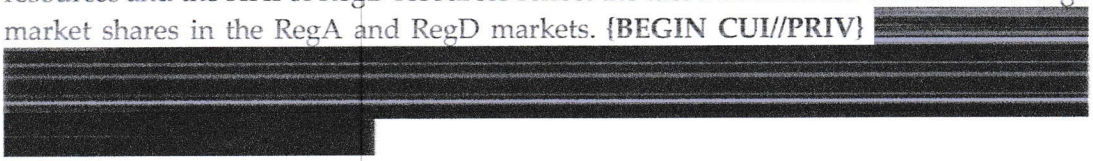
## Regulation Market Results

Table 14 shows the change in the HHI for RegA, RegD and the entire regulation market, for the period from October 1, 2020, through September 30, 2021. The average HHI of RegA resources was 2285 which is highly concentrated, and the average HHI of RegD resources was 1649 which is moderately concentrated. The weighted average HHI of all regulation resources was 1234, which is moderately concentrated. The HHI of RegA resources and the HHI of RegD resources reflect the fact that different owners have large market shares in the RegA and RegD markets. {BEGIN CUI//PRIV}



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