



Monitoring
Analytics

Potential Impacts of the Creation of Ohio FRRs

The Independent Market Monitor for PJM
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Summary

The Independent Market Monitor for PJM (IMM or MMU) analyzed the impacts of the creation of Fixed Resource Requirement (FRR) entities in Ohio. FRR entities elect to not participate in the PJM Capacity Market and to use the FRR option to satisfy their capacity obligations. Under the FRR option, Load Serving Entities (LSEs) in Ohio would need to meet their FRR capacity obligations through owned generation, if any, and bilateral contracts with the owners of capacity, primarily within the AEP, ATSI, DEOK and DAY Zones but also including resources from outside Ohio, subject to import limits. The IMM analyzed six scenarios. Separate Locational Deliverability Areas (LDAs) for DEOK and DAY were not analyzed because of their relatively small load obligations. The load obligations of DEOK and DAY together account for 28 percent of the total load obligation of Ohio.

Of the four zones in Ohio, only DAY Zone is entirely within Ohio, while AEP, ATSI and DEOK Zones are partly in Ohio. The AEP Zone is not a modeled LDA and is part of the Rest of RTO LDA, which is a part of the RTO parent LDA. The ATSI Zone includes the ATSI Cleveland LDA and the Rest of ATSI LDA, all of which are part of the RTO parent LDA. The DEOK Zone is identical to the DEOK LDA and is a part of the RTO parent LDA. The DAY Zone is identical to the DAY LDA and is a part of RTO parent LDA.

In Scenario 1, the IMM assumes that an FRR is established that includes all of Ohio and that the FRR procures the entire Ohio capacity obligation at a rate equal to the weighted average net Cost of New Entry (CONE) times B offer caps applicable to the LDAs in Ohio (\$230.14 per MW-day) for the 2021/2022 PJM Reliability Pricing Model (RPM) Base Residual Auction (BRA). The IMM concludes that under Scenario 1, net load charges for Ohio under the FRR alternative would increase by \$843.3 million or 47.9 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 2, the IMM assumes that an FRR is established that includes all of Ohio and that the FRR procures the entire Ohio capacity obligation at a rate equal to the weighted average clearing prices in the 2021/2022 RPM BRA applicable to the LDAs in Ohio (\$152.94 per MW-day). The IMM concludes that under Scenario 2, the net load charges for Ohio under the FRR alternative would decrease by \$29.8 million or 1.7 percent compared to the results of the 2021/2022 RPM BRA.

For both Scenarios 1 and 2, the IMM also analyzed the impacts on the RTO, excluding Ohio. In both scenarios, the Rest of RTO clearing price would decrease by \$77.01 per MW-day to \$62.99 per MW-day, or 55.0 percent compared to the results of the 2021/2022 RPM BRA. In both scenarios, the MAAC clearing price would decrease by \$70.02 per MW-day to \$69.98 per MW-day, or 50.0 percent. In both scenarios, the clearing price of the part of the ATSI LDA remaining in the PJM Capacity Market would decrease by \$108.34 per MW-day to \$62.99 per MW-day, or 63.2 percent. Net load charges for the RTO excluding Ohio would be lower by \$1,980.4 million or 26.0 percent compared to the 2021/2022 RPM BRA net load charges.

In Scenario 3, the IMM assumes that an FRR is established for the Ohio portion of the AEP Zone (AEP/Ohio FRR) and that the FRR procures the entire AEP/Ohio capacity obligation at a rate equal to the 2021/2022 net CONE times B offer cap for AEP (\$233.91 per MW-day). The rest of Ohio remains in the PJM Capacity Market. The IMM concludes that under Scenario 3 net load charges for AEP/Ohio under the FRR alternative would increase by \$304.8 million or 58.4 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 4, the IMM assumes that an FRR is established for the Ohio portion of the AEP Zone (AEP/Ohio FRR) and that the FRR procures the entire AEP/Ohio capacity obligation at a rate equal to the clearing price in the 2021/2022 RPM BRA (\$140.00 per MW-day). The IMM concludes that under Scenario 4 the net load charges for AEP/Ohio under the FRR alternative would decrease by \$27.2 million or 5.2 percent compared the results of the 2021/2022 RPM BRA.

For both Scenarios 3 and 4, the IMM also analyzed the impacts on the RTO, excluding the AEP/Ohio FRR. In both scenarios, the Rest of RTO clearing price would decrease by \$32.94 per MW-day to \$107.06 per MW-day, or 23.5 percent compared to the results of the 2021/2022 RPM BRA. In both scenarios, the DEOK clearing price would decrease by \$11.53 per MW-day to \$128.47 per MW-day, or 8.2 percent. Among Ohio LDAs, the clearing price in DAY and DEOK LDAs would decrease. Net load charges for the RTO excluding the AEP/Ohio FRR would be lower by \$1,015.9 million or 11.5 percent compared to the 2021/2022 RPM BRA net load charges.

For both Scenarios 3 and 4, the IMM also analyzed the net impact on Ohio. In both Scenarios 3 and 4, the net load charges for Ohio, excluding the AEP/Ohio FRR, would decrease by \$152.5 million or 12.3 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 3, the net load charges for all Ohio, including the AEP/Ohio FRR, would increase by \$152.3 million or 8.7 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 4, the net load charges for all Ohio, including the AEP/Ohio FRR, would decrease by \$179.7 million or 10.2 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 5, the IMM assumes that an FRR is established for the Ohio portion of the ATSI LDA (ATSI/Ohio FRR) and that the ATSI/Ohio FRR procures the entire ATSI/Ohio FRR capacity obligation at a rate equal to the 2021/2022 net CONE times B offer cap for ATSI (\$226.70 per MW-day). The rest of Ohio remains in the PJM Capacity Market. The IMM concludes that under Scenario 5, net load charges for the ATSI/Ohio FRR under the FRR alternative would increase by \$277.9 million or 35.8 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 6, the IMM assumes that an FRR is established for the Ohio portion of the ATSI LDA (ATSI/Ohio FRR) and that the ATSI/Ohio FRR procures the entire ATSI/Ohio

capacity obligation at a rate equal to the clearing price in the 2021/2022 RPM BRA (\$171.33 per MW-day). The IMM concludes that under Scenario 6 the net load charges for the ATSI/Ohio FRR under the FRR alternative would increase by \$20.3 million or 2.6 percent compared the results of the 2021/2022 RPM BRA.

For both Scenarios 5 and 6, the IMM also analyzed the impacts on the RTO, excluding the ATSI/Ohio FRR. In both scenarios, the Rest of RTO clearing price would decrease by \$45.28 per MW-day to \$94.72 per MW-day, or 32.3 percent compared to the results of the 2021/2022 RPM BRA. The clearing price of the portion of the ATSI LDA remaining in the PJM Capacity Market clearing price would decrease by \$76.61 per MW-day to \$94.72 per MW-day, or 44.7 percent compared to the results of the 2021/2022 RPM BRA. The DEOK clearing price would decrease by \$11.53 per MW-day to \$128.47 per MW-day, or 8.2 percent. In both scenarios, the net load charges for the RTO excluding the ATSI/Ohio LDA would be lower by \$1,479.2 million or 17.2 percent compared to the 2021/2022 RPM BRA net load charges.

For both Scenarios 5 and 6, the IMM also analyzed the impact on Ohio. In both scenarios, the net load charges for Ohio, excluding the ATSI/Ohio FRR, would decrease by \$276.1 million or 28.1 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 5, the net load charges for all Ohio, including the ATSI/Ohio FRR, would increase by \$1.8 million or 0.1 percent compared to the results of the 2021/2022 RPM BRA.

In Scenario 6, the net load charges for all Ohio, including the ATSI/Ohio FRR, would decrease by \$255.8 million or 14.5 percent compared to the results of the 2021/2022 RPM BRA.

Table 1 presents a summary of the results for all six scenarios including the impact on net load charges: for the defined FRRs; for Ohio excluding the defined FRRs; for all of Ohio including the defined FRRs and the non FRR portions of Ohio; and for the rest of the PJM market, where the rest of the PJM market includes the non FRR portions of Ohio when relevant.

Table 1 Scenario summary

Scenario	FRR		Rest of Ohio		Ohio		Rest of PJM Market	
	Change	Percent	Change	Percent	Change	Percent	Change	Percent
1	\$843,328,946	47.9%	NA	NA	\$843,328,946	47.9%	(\$1,980,441,172)	(26.0%)
2	(\$29,798,897)	(1.7%)	NA	NA	(\$29,798,897)	(1.7%)	(\$1,980,441,172)	(26.0%)
3	\$304,772,167	58.4%	(\$152,503,017)	(12.3%)	\$152,269,150	8.7%	(\$1,015,892,699)	(11.5%)
4	(\$27,192,616)	(5.2%)	(\$152,503,017)	(12.3%)	(\$179,695,633)	(10.2%)	(\$1,015,892,699)	(11.5%)
5	\$277,933,265	35.8%	(\$276,088,792)	(28.1%)	\$1,844,473	0.1%	(\$1,479,162,903)	(17.2%)
6	\$20,322,498	2.6%	(\$276,088,792)	(28.1%)	(\$255,766,294)	(14.5%)	(\$1,479,162,903)	(17.2%)

Based on the analysis, the creation of an Ohio FRR, an AEP/Ohio FRR or an ATSI/Ohio FRR, is likely to increase payments for capacity by customers in Ohio. It is expected that the actual price for capacity in Ohio would be the result of a negotiation between the

owners of the required capacity, and the State of Ohio.¹ The price for capacity resources could substantially exceed the capacity market clearing price and the capacity market offer cap. Ultimately, the actual cost of an FRR will result from the details of the FRR plan. Based on public details to date about FRR plans that indicate an intent to pay above market prices to preferred resources, the price for capacity resources under an FRR plan could exceed even the higher cost sensitivity in this report.

Creation of an FRR creates market power for the small number of local generation owners from whom generation must be purchased in order to meet the reliability requirements of the FRR entities. All participants in the Ohio, AEP/Ohio, and ATSI/Ohio FRRs fail the one and three pivotal supplier test which reinforces the conclusion that there is structural market power in each case. A fundamental point about the FRR approach is that the FRR approach is a nonmarket approach. In the FRR approach, there is no PJM IMM market monitoring of offer behavior by generation owners, there are no market rules governing offers, and there are no market rules requiring competitive behavior. In the absence of a competitive market that includes the FRR area(s), there is no competitive market reference point to define what a competitive offer would be from the FRR generation owners in a bilateral negotiation or what the competitive market price would be. Prior market results do not define a competitive outcome in subsequent periods because market dynamics and market outcomes may change significantly. As a result, even the higher estimates of the cost impact to the customers of Ohio from the creation of an FRR are likely to be conservatively low. The costs of subsidies for individual units are in addition to the direct FRR costs.

The assumption that a state could price discriminate among internal resources (pay some resources high prices and other resources low prices) ignores market power and the option of generation resources to choose not to sign a potentially five year contract at a lower price than received by other FRR generation, and ignores the well known dynamics of pay as bid auctions.

Part of the reason that the FRR options result in higher charges for capacity, even when the FRR price is the same as the BRA clearing price, is that FRR entities are not eligible to receive CTRs. An FRR entity could achieve the equivalent of CTRs, but only if it is assumed that the FRR entity could and would import the same level of resources and pay imported resources the price defined by the competitive PJM Capacity Market.

The assumption that a state could price discriminate by paying prices for imports that are defined by a competitive PJM market is incorrect. FRR entities cannot purchase capacity directly in PJM capacity market auctions. The price for imports would have to be negotiated in advance and without knowledge of the clearing prices.

¹ This could also include the owners of capacity that could be imported, limited by the CETL.

The assumption that the clearing prices in the 2021/2022 BRA, in which market power increased prices, or any prior BRA, is the correct benchmark for future auctions is also unsupported. To the extent that the clearing prices of future BRAs are lower, the 2021/2022 BRA benchmark will understate the cost of FRR plans. The lower the future auction prices, the larger will be the required FRR premium. The only relevant benchmark is the actual capacity market clearing price that applies for the year(s) in which the FRR is in place.

FRR entities have a lower capacity obligation than the corresponding LDAs have in the PJM market. Regardless of the reason for this design element, it is an example of an RTO design element that could easily be changed if other market participants believed that it unfairly assigns a disproportionately small share of the overall responsibility for PJM capacity obligations to the FRR entity or entities.

Generators in FRR entities would have weaker performance obligations and incentives than generators in the corresponding LDAs in the PJM market. Regardless of the reason for this rule, it is also an example of an RTO rule that could easily be changed if other market participants believed that it unfairly assigns a disproportionately small share of the overall responsibility for PJM capacity resources to perform during high demand hours to the FRR entity or entities.

Introduction

In this report, the IMM analyzes the rules governing the FRR alternative to direct participation in the PJM Capacity Market and a range of potential impacts of creating an Ohio FRR service area both on payments by customers in Ohio and by customers in the balance of the RTO, based on explicitly stated assumptions.² The IMM previously published reports on the impacts of a ComEd FRR, a set of Maryland FRRs and a set of New Jersey FRRs, but the public discussion of potential FRRs in other LDAs has not been supported by analysis to date.^{3 4 5} The IMM will provide analyses of the outcomes under different assumptions and of other potential FRRs, upon request. The IMM

² See Reliability Assurance Agreement Among Load Serving Entities in the PJM Region (“RAA”), Article 1 and Schedule 8.1.

³ “Potential Impacts of the Creation of a ComEd FRR,” Monitoring Analytics, LLC, <<http://www.monitoringanalytics.com/reports/Reports/2019.shtml>> (December 18, 2019).

⁴ “Potential Impacts of the Creation of Maryland FRRs,” Monitoring Analytics, LLC, <http://www.monitoringanalytics.com/reports/Reports/2020/IMM_Potential_Impacts_of_the_Creation_of_Maryland_FRRs_20200416.pdf> (April 16, 2020).

⁵ “Potential Impacts of the Creation of New Jersey FRRs,” Monitoring Analytics, LLC, <http://www.monitoringanalytics.com/reports/Reports/2020/IMM_Potential_Impacts_of_the_Creation_of_New_Jersey_FRRs_20200513.pdf> (May 13, 2020).

previously provided comparable analysis of FERC’s resource specific FRR approach and of PJM’s extended resource carve out proposal or repricing approach.⁶ The IMM also provided an analysis of the impact of the MOPR order on prices in the upcoming BRA.⁷

The American Electric Power Company, Inc. (AEP) created the first FRR service area based on the original RPM tariff rules implemented in 2007.⁸ AEP was a vertically integrated utility (transmission, generation and distribution assets) which participated in all the other PJM markets, but which, rather than participating in the PJM Capacity Market, received payment for generation capacity well in excess of capacity market prices, based on a cost of service model, under a regulatory arrangement with Ohio.

In order to create a new FRR service area, a utility (investor owned, electric cooperative or public power entity) must elect the FRR option consistent with the PJM Market Rules. The utility can make a voluntary FRR election or be required to make the FRR election by the state in which the FRR exists.

There are four transmission zones in Ohio: American Electric Company (AEP), American Transmission Systems (ATSI), Dayton Power and Light Company (DAY), and Duke Energy Ohio/Kentucky (DEOK). Ohio could require that all LSEs located in the state elect FRR status or that all LSEs in specific zones elect FRR status.⁹ Regardless of the existence of retail choice, the FRR entity must include all load in the FRR service area and must provide adequate capacity to meet that load. In the AEP case, AEP owned enough generation assets to meet its PJM defined UCAP obligation. In Ohio, there are not enough capacity resources to meet the PJM defined FRR UCAP obligation. In order to create a viable Ohio FRR, LSEs in Ohio would need to contract with other capacity resource owners in Ohio, and capacity resource owners external to Ohio, limited by Capacity Emergency Transfer Limit (CETL) and minimum internal resource

⁶ See Monitoring Analytics, LLC “MOPR/FRR Sensitivity Analyses of the 2021/2022 RPM Base Residual Auction,” <http://www.monitoringanalytics.com/reports/Reports/2018/IMM_MOPR_FRR_Sensitivity_Analyses_Report_20180926.pdf> (September 26, 2018).

⁷ See Monitoring Analytics, LLC “Potential Impacts of the MOPR Order,” <http://www.monitoringanalytics.com/reports/Reports/2020/IMM_Potential_Impacts_of_the_MOPR_Order_20200320.pdf> (March 20, 2020).

⁸ See RAA Schedule 8.1; 117 FERC ¶ 61,331 (2006) at PP 36, 113.

⁹ An FRR entity is required to meet the capacity obligations of all alternative retail LSEs in the FRR service area. The alternative retail LSEs are required to compensate the FRR entity based on a state mandated compensation mechanism or based on the Rest of RTO capacity price, in the absence of a state compensation mechanism. For any delivery year subsequent to those addressed in the FRR entity’s current FRR capacity plan, the alternative retail LSE may satisfy the load payment to the FRR entity with capacity resources.

requirement, to meet the FRR UCAP obligation for the load in Ohio.¹⁰ There are shortfalls in internal capacity for an Ohio FRR and an ATSI/Ohio FRR.

The analysis in this report is based on the actual auction inputs and results for the PJM Reliability Pricing Model (RPM) BRA (BRA) for the 2021/2022 Delivery Year, the last BRA run.¹¹

The IMM evaluated the results of creating an Ohio FRR service area for load in Ohio, and for the rest of the capacity market, under six scenarios:

- Scenario 1: An FRR is established that includes all of Ohio and the FRR procures the entire Ohio capacity obligation at a rate equal to the weighted average of the 2021/2022 net CONE times B offer caps applicable to the LDAs in Ohio (\$230.14 per MW-day).
- Scenario 2: An FRR is established that includes all of Ohio and the FRR procures the entire Ohio capacity obligation at a rate equal to the weighted average clearing prices in the 2021/2022 RPM BRA applicable to LDAs in Ohio (\$152.94 per MW-day).
- Scenario 3: An FRR is established for the AEP/Ohio LDA and the FRR procures the entire AEP/Ohio capacity obligation at a rate equal to the 2021/2022 net CONE times B offer cap for AEP (\$233.91 per MW-day).
- Scenario 4: An FRR is established for the AEP/Ohio LDA and the FRR procures the entire AEP/Ohio capacity obligation at a rate equal to the AEP clearing price in the 2021/2022 RPM BRA (\$140.00 per MW-day).
- Scenario 5: An FRR is established for the ATSI/Ohio Zone and the FRR procures the entire ATSI/Ohio capacity obligation at a rate equal to the 2021/2022 net CONE times B offer cap for ATSI (\$226.70 per MW-day).
- Scenario 6: An FRR is established for the ATSI/Ohio Zone and the FRR procures the entire ATSI/Ohio capacity obligation at a rate equal to the clearing price applicable to the ATSI/Ohio Zone in the 2021/2022 RPM BRA (\$171.33 per MW-day).

¹⁰ The minimum internal resource requirement is the minimum percentage of capacity resources that must be located within an LDA to satisfy an FRR plan. It is calculated as the LDA reliability requirement minus CETL, divided by the zonal peak load forecast times the forecast pool wide requirement for the delivery year. In the 2021/2022 RPM BRA, ATSI, ATSI Cleveland and DAY LDAs did not have defined minimum internal resource requirements. AEP/Ohio is included in the Rest of RTO LDA, unconstrained area of the RTO, and therefore also did not have a defined minimum internal resources requirement.

¹¹ Participant behavior and market performance were evaluated as not competitive in the 2021/2022 RPM Base Residual Auction. See Monitoring Analytics, LLC, "Analysis of the 2021/2022 RPM Base Residual Auction - Revised," <http://www.monitoringanalytics.com/reports/Reports/2018/IMM_Analysis_of_the_20212022_RPM_BRA_Revised_20180824.pdf> (August 24, 2018).

Assumptions

1. In Scenarios 1 and 2, the PJM Capacity Market would not include Ohio. In Scenarios 3 and 4, the PJM Capacity Market would not include the Ohio portion of the AEP Zone (AEP/Ohio). In Scenarios 5 and 6, the PJM Capacity Market would not include the Ohio portion of the ATSI LDA (ATSI/Ohio).
2. In Scenarios 1 and 2, the FRR service area would include all of Ohio. In Scenarios 3 and 4, the FRR service area would include AEP/Ohio. In Scenarios 5 and 6, the FRR service area would include the ATSI/Ohio.
3. There would be capacity imports into Ohio FRRs only from capacity resources needed to cover any shortfall in meeting the FRR obligation. The price of imports to Ohio from capacity resources outside Ohio is assumed to be the same as the price paid to the capacity resources in Ohio meeting the FRR obligation.
4. All capacity resources would be eligible to meet FRR reliability requirements. This includes matched seasonal resources with an annual equivalent offer price less than or equal to the rate paid to all annual capacity resources in the FRR service area.
5. Unmatched seasonal resources would offer their capacity in the PJM Capacity Market. These resources would be mapped to the relevant parent LDA. In the 2021/2022 BRA, less than 100 annual equivalent ICAP MW, or less than 0.4 percent of the Ohio FRR obligation, were offered as seasonal capacity.
6. All resources that do not enter a contract with an Ohio FRR would offer their capacity resources in the PJM Capacity Market.
7. The MW capacity of energy efficiency resources that are part of the FRR plan would be added back to the FRR obligation.¹²

Market Structure

Table 2 shows the Ohio generation capacity resources in terms of installed capacity (ICAP).

¹² The FRR obligation is based on the PJM peak load forecast for the delivery year. The PJM peak load forecast accounts for the contribution of energy efficiency resources to reducing demand. To avoid double counting, the amount of energy efficiency capacity included in the FRR plan is added back to the FRR obligation.

Table 2 Generation capacity resources by transmission zone in Ohio¹³

Zone	ICAP (MW)	Percent
AEP	11,038.1	45.1%
ATSI	8,280.4	33.8%
DAY	1,411.5	5.8%
DEOK	3,114.2	12.7%
External	627.6	2.6%
Total	24,471.8	100.0%

Table 3 shows the installed capacity by fuel source for the capacity resources located in Ohio.¹⁴

Table 3 Installed capacity by fuel source¹⁵

Modeled LDA	Zone	Coal	Gas	Nuclear	Oil	Solar	Solid Waste	Hydroelectric	Wind	DR	EE	PRD	Total
Rest of RTO	AEP	6,114.0	4,812.5	0.0	0.0	0.0	0.0	0.0	111.6	1,336.5	144.6	0.0	12,519.1
ATSI	ATSI	2,117.1	3,808.2	2,134.0	221.1	0.0	0.0	0.0	0.0	1,043.6	128.4	0.0	9,452.4
Rest of ATSI	ATSI	1,490.0	3,421.8	894.0	75.0	0.0	0.0	0.0	0.0	798.1	95.3	0.0	6,774.2
	ATSI Cleveland	627.1	386.4	1,240.0	146.1	0.0	0.0	0.0	0.0	245.4	33.1	0.0	2,678.2
DAY	DAY	0.0	1,352.5	0.0	59.0	0.0	0.0	0.0	0.0	215.9	55.3	0.0	1,682.7
DEOK	DEOK	2,367.0	583.2	0.0	52.0	0.0	0.0	112.0	0.0	196.6	82.2	0.0	3,393.0
Rest of RTO	External	627.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	627.6
Total Ohio		11,225.7	10,556.4	2,134.0	332.1	0.0	0.0	112.0	111.6	2,792.5	410.5	0.0	27,674.8

Ohio’s renewable portfolio standard (RPS) has a target of 8.5 percent renewable energy by 2026.¹⁶ The Ohio RPS included a solar carve out provision prior to 2020.¹⁷ The RPS for

¹³ The capacity resources in the External Zone are owned by Ohio Valley Electric Corporation. A portion of OVEC resources are located in Ohio. OVEC was integrated into PJM on December 9, 2018, after the completion of 2021/2022 BRA.

¹⁴ The ICAP MW values reflect administrative reductions applied by PJM to the capabilities of wind generators to 14.7 percent for wind farms in mountainous terrain and 17.6 percent for wind farms in open terrain, and solar generators to 42.0 percent for ground mounted fixed panel, 60.0 percent for ground mounted tracking panel, and 38.0 percent for other than ground mounted solar arrays, of nameplate capacity when determining the installed capacity.

¹⁵ ICAP values, rather than UCAP, are used for confidentiality reasons and the ICAP values represent resources that were offered into the 2021/2022 RPM Base Residual Auction. Resources that were not offered into 2021/2022 RPM Base Residual Auction are not included in this table. Seasonal resources that were offered into the 2021/2022 RPM Base Residual Auction but were not matched and included as FRR capacity for this study are not included in this table.

¹⁶ Ohio’s RPS definition is not zero carbon. Ohio’s RPS definition of eligible resources includes wind, solar, wood, wood waste, black liquor, landfill gas and other biomass gas technologies. Waste to energy, black liquor, landfill gas and other biomass gas energy production result in carbon emissions.

2020 requires that 5.5 percent of retail load be met from renewable or alternative energy resources. The Ohio FRR capacity includes 275.7 MW renewable resources (1.0 percent), of which 223.2 MW are zero carbon (0.8 percent).¹⁸ The Ohio RPS ends in 2026.¹⁹

The most recent data from Ohio shows that renewable energy production from Ohio resources was 3,164.8 GWh in 2019, or 2.5 percent of Ohio energy production in 2019. In 2018, renewable energy production from Ohio resources was 2,716.5 GWh, or 2.0 percent of Ohio energy production. Ohio also imports significant levels of renewable energy in order to meet RPS targets. In 2019, Ohio imported 78.0 percent of the total RECs that met non solar RPS standards and imported 56.4 percent of the total SRECs; 67.9 percent of the imported non solar RECs were from carbon free resources.²⁰ SRECs retired in 2019 totaled 283,238.²¹

Market share is calculated by dividing the output of a supplier by total supply in a market. Concentration ratios are a summary measure of market share. The Herfindahl-Hirschman Index (HHI) concentration ratio is calculated by summing the squares of the market shares of all firms in a market.

FERC's Merger Policy Statement states that a market can be broadly characterized as: unconcentrated if the market HHI is below 1000, equivalent to 10 firms with equal market shares; moderately concentrated if the market HHI is between 1000 and 1800; and highly concentrated if the market HHI is greater than 1800, equivalent to between five and six firms with equal market shares.²²

Table 4 shows the HHI results for the FRRs analyzed. The HHI results show that the AEP and ATSI FRRs are highly concentrated and that the Ohio FRR is moderately concentrated.

¹⁷ Legislation that became effective October 22, 2019, lowered the 2026 RPS target from 12.5 percent to 8.5 percent and removed the solar carve out provision. See Ohio Legislature House, 133rd G.A., H.B. No. 6, "Ohio Clean Air Program," effective Date October 22, 2019, <<https://www.legislature.ohio.gov/legislation/legislation-summary?id=GA133-HB-6>>.

¹⁸ The renewable total includes 52.5 MW of landfill gas capacity in addition to the wind and hydroelectric generation.

¹⁹ See Ohio Legislature House, 133rd G.A., H.B. No. 6, "Ohio Clean Air Program," effective Date October 22, 2019, <<https://www.legislature.ohio.gov/legislation/legislation-summary?id=GA133-HB-6>>

²⁰ PJM EIS GATS.

²¹ PJM EIS GATS.

²² See *Inquiry Concerning the Commission's Merger Policy under the Federal Power Act: Policy Statement*, 77 FERC ¶ 61,263 mimeo at 80 (1996).

Table 4 HHI results

Market	HHI
AEP	2041
ATSI	2789
Ohio	1209

The HHI is not a definitive measure of structural market power. The number of pivotal suppliers in the capacity market is a more precise measure of structural market power than the HHI. It is possible to have pivotal suppliers in a market even when the HHI level is not in the highly concentrated range. 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 ownership structure of supply available to meet it.

A generation owner or owners are pivotal if the capacity of the owners' generation facilities is needed to meet the demand for capacity. The results of the pivotal supplier test are measured by the residual supply index (RSI_x). The RSI_x is a general measure that can be used with any number of pivotal suppliers. The subscript denotes the number of pivotal suppliers included in the test. If the RSI_x is less than or equal to 1.0, the supply owned by the specific generation owner, or owners, is needed to meet market demand and the generation owners are pivotal suppliers with a significant ability to influence market prices.

Table 5 shows the results of the pivotal supplier test for the FRRs analyzed. All participants in the Ohio and ATSI FRRs fail the one and three pivotal supplier test (RSI is less than 1.0), and all participants in the AEP FRR fail the three pivotal supplier test.²³

Table 5 Pivotal supplier results

Market	RSI _{1, 1.05}	RSI ₃	Total Participants	Failed RSI ₃ Participants
AEP	0.74	0.34	10	10
ATSI	0.52	0.31	7	7
Ohio	0.79	0.46	22	22

²³ The one pivotal supplier test and the three pivotal supplier test here include all market supply and all market demand for each FRR.

AEP and DEOK have previously created FRR service areas. The unforced capacity obligation of the FRR service areas is based on the peak load forecast for the delivery year. AEP’s entire existing FRR service area is located outside Ohio. DEOK’s entire existing FRR service area is located outside Ohio.

Figure 1 shows the peak load forecast for the AEP Zone, the portion of the AEP Zone that is in the PJM Capacity Market and the portion of the AEP Zone that is in Ohio. The peak load forecast for the 2021/2022 BRA for the AEP Zone was 22,124.0 MW. The peak load forecast for the portion of the AEP Zone in the PJM Capacity Market was 10,914.7 MW or 49.3 percent of the AEP Zone’s peak load forecast. The peak load forecast of the portion of the AEP Zone in Ohio, all of which is in the PJM Capacity Market, was 8,742.0 MW or 39.5 percent of the AEP Zone’s peak load forecast, or 80.1 percent of the portion of the AEP Zone’s peak load forecast located in in the PJM Capacity Market.

Figure 1 Distribution of peak load forecast for the AEP Zone for the 2021/2022 BRA

AEP Zone 22,124.0 (100.0%)	
PJM Capacity Market 10,914.7 MW (49.3%)	FRR 11,209.3 MW (50.7%)
AEP (Ohio) 8,742.0 MW (39.5%)	AEP (Outside Ohio) 13,381.9 MW (60.5%)

PJM Capacity Market 10,914.7 MW (100.0%)	
AEP (Ohio) 8,742.0 MW (80.1%)	

Figure 2 shows the peak load forecast for the DEOK Zone, the portion of the DEOK Zone in the PJM Capacity Market and the portion of the DEOK Zone in Ohio. The peak load forecast for the 2021/2022 BRA for the DEOK Zone was 5,336.0 MW. The peak load forecast for the portion of the DEOK Zone in the PJM Capacity Market was 4,457.5 MW or 83.5 percent of the DEOK Zone’s peak load forecast. The peak load forecast of the portion of the DEOK Zone in Ohio, which is entirely located in the PJM Capacity Market, was 4,457.5 MW or 83.5 percent of the DEOK Zone’s peak load forecast or 100 percent of the portion of the DEOK Zone’s peak load forecast located in the PJM capacity market.

Figure 2 Distribution of peak load forecast for the DEOK Zone for the 2021/2022 BRA

DEOK Zone 5,336.0 MW (100.0 %)	
PJM Capacity Market 4,457.5 MW (83.5 %)	FRR 878.5 MW (16.5 %)
DE (Ohio) 4,457.5 (83.5 %)	DE (KY) 878.5 MW (16.5 %)

PJM Capacity Market 4,457.5 MW (100.0 %)
DE (Ohio) 4,457.5 MW (100.0 %)

Table 6 shows the zonal UCAP obligation for each zone in Ohio. Of the four zones in Ohio (AEP, ATSI, DAY and DEOK), only DAY is entirely located in Ohio. This is the capacity obligation assigned to Ohio and each Ohio zone in the PJM Capacity Market. For example, the zonal UCAP obligation for the entire AEP Zone is 12,707.7 MW. The share of peak load of the Ohio portion of the AEP Zone is 80.1 percent. Ohio’s share of the AEP Zone zonal UCAP obligation is 10,178.1 MW. The ATSI Zone includes ATSI Cleveland LDA and Rest of ATSI LDA. The zonal UCAP obligation for the entire ATSI LDA is 14,464.9 MW, of which the share of ATSI Cleveland is 4,890.6 MW. The share of the Ohio portion of the Rest of ATSI LDA Ohio is 13,470.1 MW. The total Ohio zonal UCAP obligation for 2021/2022 Delivery Year is 32,624.3 MW.²⁴

²⁴ The reliability requirement for an LDA is the projected internal capacity in the LDA plus the capacity emergency transfer objective (CETO) for the delivery year. The CETO is calculated to meet 1 day in 25 year loss of load expectation for an LDA. See “PJM Manual 18: PJM Capacity Market,” § 2.4.2 Reliability Requirement in Locational Deliverability Areas, Rev. 45 (May 28, 2020). The FPR is calculated to meet 1 day in 10 year loss of load expectation for an LDA. See “PJM Manual 20: PJM Capacity Market,” § 1.7 Compliance with ReliabilityFirst (RF), Rev. 10 (March 21, 2019).

Table 6 Ohio share of the zonal UCAP obligation by transmission zone²⁵

Zone	Share of the Peak Load (Percent)	Zonal UCAP Obligation (MW)	Ohio Share of Zonal UCAP Obligation (MW)
AEP	80.1%	12,707.7	10,178.1
ATSI	93.1%	14,464.9	13,470.1
Rest of ATSI	89.6%	9,574.3	8,577.6
ATSI Cleveand	100.0%	4,890.6	4,890.6
DAY	100.0%	3,786.2	3,786.2
DEOK	100.0%	5,189.8	5,189.8
Ohio		36,148.6	32,624.3

Table 7 shows the potential FRR UCAP MW obligation for each zone in Ohio. Among the four zones in Ohio (AEP, ATSI, DAY and DEOK), only DAY Zone is entirely located in Ohio. This is the capacity obligation that would be assigned to Ohio and each Ohio zone if each were an FRR. The FRR obligation includes the EE add back. The FRR obligation is based on the PJM peak load forecast for the delivery year. The PJM peak load forecast is assumed to account for the contribution of energy efficiency resources because load is assumed to be reduced by the energy efficiency resources.²⁶ Consistent with the approach PJM uses in the capacity auctions, the amount of energy efficiency capacity included in the FRR plan is added back to the FRR obligation to avoid the double counting that would result from including EE as a supply side resource and as a reduction to the peak load forecast. For example, the FRR UCAP obligation for the Ohio portion of the AEP Zone (AEP/Ohio) is defined as the AEP/Ohio zonal forecast peak load (8,742.1 MW) times the forecast pool requirement (1.0898), or 9,527.1 MW plus the EE add back (157.6 MW) or 9,684.7 MW. The Ohio portion of the ATSI Zone (ATSI/Ohio) includes ATSI Cleveland and Rest of ATSI LDAs. The FRR obligation for the entire ATSI/Ohio Zone is 12,746.7 MW, of which the share of ATSI Cleveland is 4,614.0 MW. The total Ohio FRR obligation including the EE add back for the 2021/2022 Delivery Year would be 30,982.7 MW.

²⁵ The portion of the load that is not included in the existing FRR is used for calculating the Ohio's share of the peak load. The column totals exclude the zonal UCAP obligations for sub zones: Rest of ATSI and ATSI Cleveland, to avoid double counting.

²⁶ There are significant issues with the measurement and verification of EE. See the *2019 State of the Market Report for PJM*, Volume 2, Section 6: Demand Response pg. 314.

Table 7 Ohio share of the peak load, peak load forecast and FRR obligation by transmission zone^{27 28}

Zone	Share of the Peak Load (Percent)	Zonal Peak Load Forecast (MW)	FRR UCAP Obligation (MW) plus EE add back
AEP	80.1%	8,742.1	9,684.7
ATSI	93.1%	11,567.9	12,746.7
Rest of ATSI	89.6%	7,367.3	8,132.7
ATSI Cleveand	100.0%	4,200.6	4,614.0
DAY	100.0%	3,252.0	3,603.9
DEOK	100.0%	4,457.5	4,947.3
Ohio		28,019.5	30,982.7

Comparing Table 6 with Table 7 shows the zonal FRR UCAP obligations are lower than the UCAP obligations in the capacity market. The reduced obligations are a result of the fact that the RPM auction clearing uses sloped demand curves (Variable Resource Requirement or VRR curves) while the FRR Entities use vertical demand curves based on a fixed MW requirement.

Table 8 shows that the total capacity in Ohio offered in the 2021/2022 RPM BRA is not enough to meet the Ohio FRR obligation. LSEs in Ohio would need to secure capacity both from resource owners in Ohio and capacity resources outside Ohio to meet the FRR UCAP obligation for the Ohio FRR service area.

Table 8 shows unforced capacity offered, FRR UCAP obligation plus the EE add back and shortfall in each Ohio LDA. For example, in the 2021/2022 BRA, 1,645.1 MW UCAP were offered in the DAY LDA. The DAY FRR obligation for the 2021/2022 Delivery Year is 3,603.9 MW. The DAY LDA needs to import 1,958.8 MW UCAP or 54.4 percent of the FRR UCAP obligation from capacity resources located outside the DAY LDA.

²⁷ The contribution percentages are the five year historical average of the Ohio portion of each zone’s load during the yearly maximum load hour.

²⁸ The column totals exclude the FRR UCAP obligations for subzones: Rest of ATSI and ATSI Cleveland, to avoid double counting.

Table 8 Capacity, FRR obligation and shortfall for Ohio by LDA^{29 30}

Modeled LDA	Zone	Capacity (UCAP MW)	FRR Obligation (UCAP MW) plus EE add back	Excess/Shortfall (UCAP MW)	Shortfall (Percent)
Rest of RTO	AEP	12,061.4	9,684.7	2,376.7	24.5%
ATSI	ATSI	8,975.7	12,746.7	(3,771.0)	(29.6%)
Rest of ATSI	ATSI	6,508.5	8,132.7	(1,624.3)	(20.0%)
ATSI Cleveland	ATSI	2,467.2	4,614.0	(2,146.8)	(46.5%)
DAY	DAY	1,645.1	3,603.9	(1,958.8)	(54.4%)
DEOK	DEOK	3,391.9	4,947.3	(1,555.5)	(31.4%)
Rest of RTO	External	562.6	NA	NA	NA
Seasonal Matching		11.1	NA	NA	NA
Total Ohio		26,647.7	30,982.7	(4,335.0)	(14.0%)

Table 9 shows the LDA, modeled LDA and parent LDA for each zone in Ohio. All transmission zones are LDAs, but there are also additional LDAs, including parts of zones in some cases and multiple zones in other cases. Not all LDAs are modeled separately in the PJM capacity market auctions. Of the four LDAs in Ohio, DAY is entirely within Ohio. The ATSI Zone in Ohio includes the ATSI LDA, which includes the entire ATSI Cleveland LDA, both of which are part of the RTO parent LDA. The Ohio Valley Electric Corporation (OVEC) was not part of the PJM Capacity Market in the 2021/2022 BRA. The OVEC generation resources were offered in the 2021/2022 BRA as external resources through pseudo ties. All pseudo tied resources offered in the PJM Capacity Market are included in the Rest of RTO LDA.

Table 9 LDA and parent LDA of zones located in Ohio

Zone	LDA	Modeled LDAs	Parent LDA
AEP	AEP	Rest of RTO	RTO
ATSI	ATSI	ATSI, ATSI Cleveland	RTO
DAY	DAY	DAY	RTO
DEOK	DEOK	DEOK	RTO
OVEC (External)		Rest of RTO	RTO

Table 10 shows the weighted average net CONE times B offer caps applicable to LDAs in Ohio and the weighted average clearing prices in the 2021/2022 BRA.^{31 32}

²⁹ The capacity includes the annual equivalent of matched seasonal resources. Since the 2020/2021 Delivery Year, RPM rules allow seasonal resources to offer in the capacity market. Complementary seasonal capacity resources are matched within the auction clearing process.

³⁰ The column totals exclude the FRR Obligation and shortfall for subzones to avoid double counting.

Table 10 Net CONE times B offer cap for each zone in Ohio and weighted average clearing price for Ohio

Zone	FRR UCAP Obligation (MW) plus EE add back	Offer Cap (\$ per MW-day)	Ohio Share of Zonal UCAP Obligation (MW)	2021/2022 BRA Clearing Price (\$ per MW-day)
AEP	9,684.7	\$233.91	10,178.1	\$140.00
ATSI	12,746.7	\$226.70	13,470.1	\$171.33
Rest of ATSI	8,132.7	\$226.70	8,577.6	\$171.33
ATSI Cleveand	4,614.0	\$226.70	4,890.6	\$171.33
DAY	3,603.9	\$230.91	3,786.2	\$140.00
DEOK	4,947.3	\$231.09	5,189.8	\$140.00
Ohio	30,982.7	\$230.14	32,624.3	\$152.94

Figure 3 is a map of the zones and modeled LDAs in Ohio.

Figure 4 is a map of AEP Zone. The AEP service area in PJM is spread over seven states: Michigan, Indiana, Ohio, West Virginia, Virginia, Kentucky and Tennessee.

³¹ Weights for offer caps are the zonal FRR UCAP obligations. Weights for clearing prices are the zonal UCAP obligations. These weights are used throughout the report when weighted average offer caps and weighted average clearing prices are calculated.

³² The net CONE times B offer caps are calculated by zone. The gross CONE values are very close across zones but net revenues vary. See Table 5 in “Analysis of the 2021/2022 RPM Base Residual Auction - Revised,” <http://www.monitoringanalytics.com/reports/Reports/2018/IMM_Analysis_of_the_20212022_RPM_BRA_Revised_20180824.pdf> (August 24, 2018).

Figure 3 Ohio zones and modeled locational deliverability areas

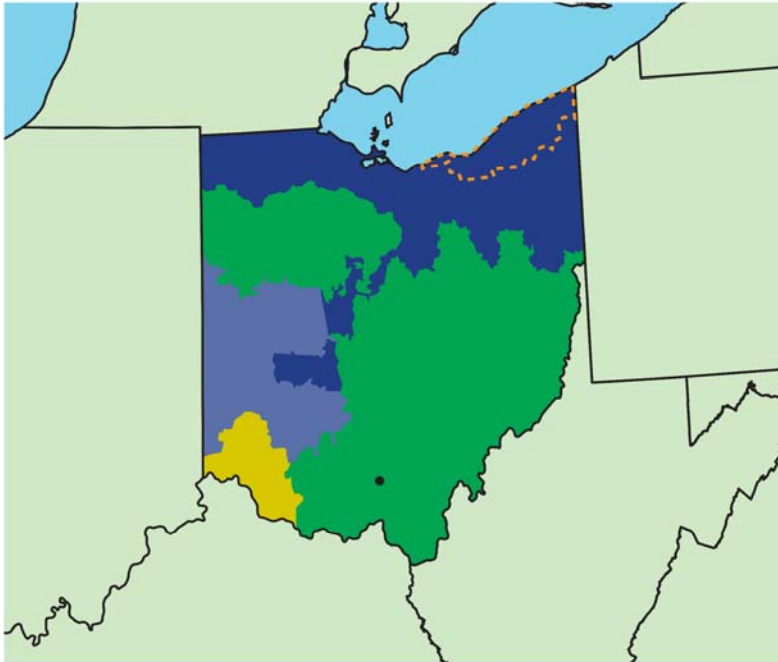
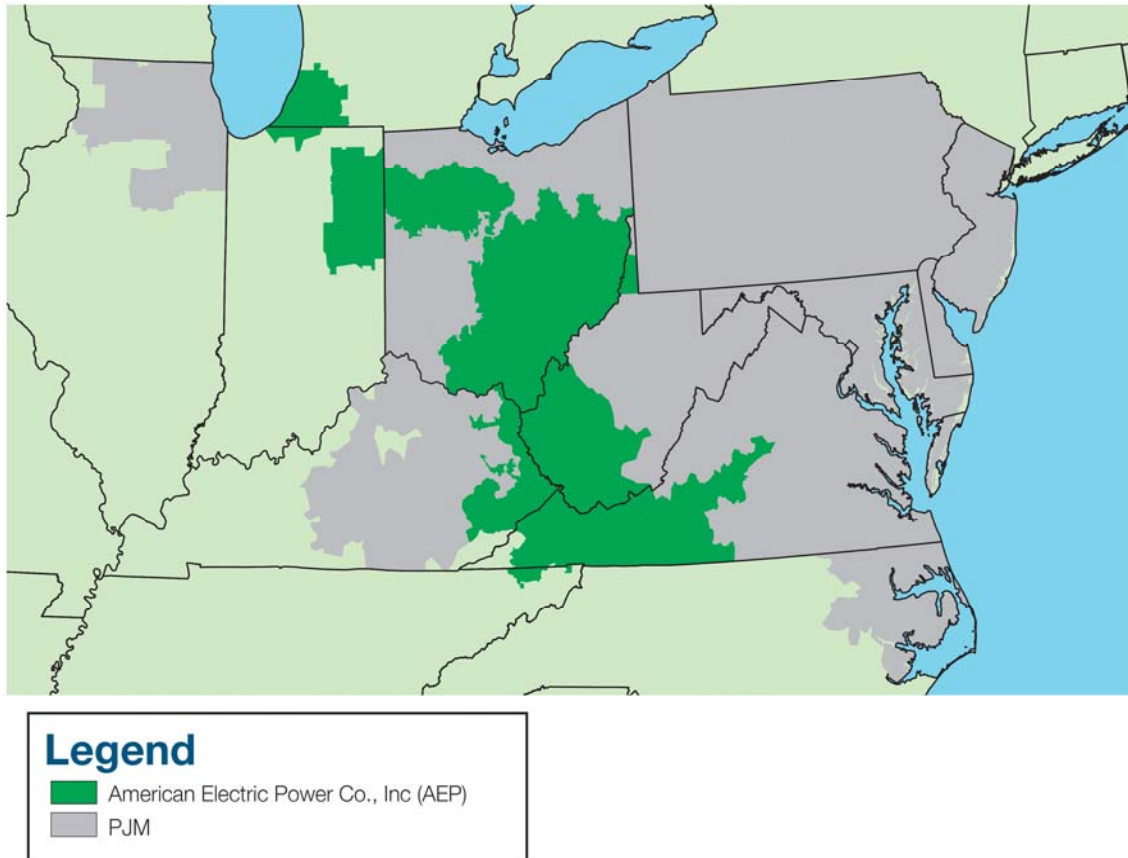


Figure 4 AEP Zone in PJM



Existing FRR Design

The existing FRR approach remains an option for utilities with or without retail choice, including both investor owned and publicly owned utilities.^{33 34} Such utilities have had and continue to have the ability to opt out of the capacity market and provide their own capacity. There is no reason for any special exemptions for such utilities. Such utilities have the option to use the existing FRR option if they plan to continue to be cost of service based or wish to become cost of service based.

The RAA provides that states may require LSEs to become FRR entities.³⁵

³³ See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.

³⁴ The current FRR rules address areas with retail choice. See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.D.8.

³⁵ See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.I.

The Reliability Assurance Agreement (RAA) defines the purpose of the FRR alternative.³⁶

The Fixed Resource Requirement (“FRR”) Alternative provides an alternative means, under the terms and conditions of this Schedule, for an eligible Load-Serving Entity to satisfy its obligation hereunder to commit Unforced Capacity to ensure reliable service to loads in the PJM Region.

The Reliability Assurance Agreement also defines the eligibility criteria for the FRR election.³⁷

A Party is eligible to select the FRR Alternative if it (a) is an IOU, Electric Cooperative, or Public Power Entity; and (b) demonstrates the capability to satisfy the Unforced Capacity obligation for all load in an FRR Service Area, including all expected load growth in such area, for the term of such Party’s participation in the FRR Alternative.

A Party eligible under B.1 above may select the FRR Alternative only as to all of its load in the PJM Region; provided however, that a Party may select the FRR Alternative for only part of its load in the PJM Region if (a) the Party elects the FRR Alternative for all load (including all expected load growth) in one or more FRR Service Areas; (b) the Party complies with the rules and procedures of the Office of the Interconnection and all relevant Electric Distributors related to the metering and reporting of load data and settlement of accounts for separate FRR Service Areas; and (c) the Party separately allocates its Capacity Resources to and among FRR Service Areas in accordance with rules specified in the PJM Manuals.

An IOU is defined in the PJM RAA as “an investor-owned utility with substantial business interest in owning and/or operating electric facilities in any two or more of the following three asset categories: generation, transmission, distribution.”

³⁶ See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.A.

³⁷ See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.B.

An entity must request to elect the existing FRR option no later than four months prior to the BRA for the first delivery year of the election. An entity must under the existing FRR option submit its FRR capacity plan no later than one month prior to the BRA for the effective delivery year. The minimum term for election of the existing FRR option is five consecutive delivery years. Under the existing FRR option, an entity may terminate its FRR election following the minimum term by providing written notice to PJM no later than two months prior to the BRA for the effective delivery year. In the event of a State Regulatory Structural Change, an entity may elect or terminate its FRR election by providing written notice to PJM no later than two months prior to the BRA for the effective delivery year.³⁸

Public power entities and electric cooperatives could use the existing FRR option if they plan to continue to be cost of service based. To request the existing FRR option, public power entities or electric cooperatives need to demonstrate that the identified service area meets the definition of an FRR Service Area as defined in the RAA. The definition of FRR Service Area provides that “In the event that the service obligations of an Electric Cooperative or Public Power Entity are not defined by geographic boundaries but by physical connections to a defined set of customers, the FRR Service Area in such circumstances shall be defined as all customers physically connected to transmission or distribution facilities of such Electric Cooperative or Public Power Entity within an area bounded by appropriate wholesale aggregate metering as described above.”

Under the current rules, an FRR entity can sell excess capacity in RPM auctions for a delivery year subject to a cap equal to the lesser of 25 percent of the unforced capacity equivalent of the installed reserve margin for such delivery year multiplied by the preliminary forecast peak load for which such FRR entity is responsible under its FRR capacity plan(s) for such delivery year, or 1,300 MW.³⁹ For Ohio, AEP, and ATSI, this cap

³⁸ State Regulatory Structural Change is defined as “to any Party, as a state law, rule, or order that, after September 30, 2006, initiates a program that allows retail electric consumers served by such Party to choose from among alternative suppliers on a competitive basis, terminates such a program, expands such a program to include classes of customers or localities served by such Party that were not previously permitted to participate in such a program, or that modifies retail electric market structure or market design rules in a manner that materially increases the likelihood that a substantial proportion of the customers of such Party that are eligible for retail choice under such a program (a) that have not exercised such choice will exercise such choice; or (b) that have exercised such choice will no longer exercise such choice, including for example, without limitation, mandating divestiture of utility-owned generation or structural changes to such Party’s default service rules that materially affect whether retail choice is economically viable.” See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Article 1.

³⁹ See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.E.2.

would equal 1,300.0 MW. In order to sell excess capacity in RPM auctions for a delivery year, an FRR entity must commit additional capacity resources above its defined FRR UCAP obligation in an amount equal to the lesser of three percent of the FRR UCAP obligation or 450 MW.⁴⁰ For Ohio, this additional threshold quantity would equal 445.0 MW. For AEP/Ohio, this additional threshold quantity would equal 285.8 MW. For ATSI, this additional threshold quantity would equal 378.2 MW.

Results

Scenario 1

In Scenario 1, an FRR is established that includes all of Ohio, and the FRR procures the entire Ohio FRR UCAP obligation of 30,982.7 MW at a rate equal to the weighted average of the 2021/2022 net CONE times B offer caps applicable to the LDAs in Ohio (\$230.14 per MW-day).⁴¹ Ohio has 4,335.0 MW UCAP or 14.0 percent fewer MW than needed to meet its FRR obligation. The Ohio FRR would need to contract with capacity resources outside Ohio to cover the deficit. If an Ohio FRR service area were created, the load in the service area would be required to procure 30,982.7 MW UCAP, 1,641.6 MW (5.0 percent) less than if Ohio remained in the PJM Capacity Market. In Scenario 1, summer capacity resources in Ohio are matched with winter capacity resources in Ohio such that the total annual equivalent price is less than or equal to the weighted average of the 2021/2022 net CONE times B offer caps applicable to the LDAs in Ohio (\$230.14 per MW-day). The unmatched seasonal resources are mapped to the rest of RTO LDA.

This is a sensitivity analysis based on the assumption that the owners of capacity resources in the Ohio FRR would request payment at the existing offer cap and that all capacity resources would be paid the same price. It is expected that the actual price for capacity in the Ohio FRR would be the result of a negotiation between the owners of the required capacity, and the State of Ohio.⁴² The price for capacity resources could

⁴⁰ See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Article 1 and Schedule 8.1.E.

⁴¹ The FRR UCAP obligation is defined as the [(obligation peak load * final zonal FRR scaling factor) – nominal PRD value committed by the FRR entity] * [forecast pool requirement + EE add back]. The final zonal FRR scaling factor equals the final zonal peak load forecast for the delivery year / zonal weather normalized peak load for the summer concluding prior to the start of the delivery year. See “Reliability Assurance Agreement Among Load Serving Entities in the PJM Region,” Schedule 8.1.F. The EE add back MW are determined by PJM in the BRA. See “PJM Manual 18B: Energy Efficiency Measurement & Verification,” Rev. 04 (Aug. 22, 2019).

⁴² This could also include the owners of capacity that could be imported, limited by the CETL.

substantially exceed the capacity market clearing price and the capacity market offer cap.

Table 11 compares the clearing prices for the rest of the PJM Capacity Market by LDA for the 2021/2022 RPM BRA and for Scenario 1. All binding constraints would have remained binding except the ATSI LDA constraint would not be binding and the MAAC constraint would be binding. The Rest of RTO LDA clearing price would decrease by \$77.01 per MW-day from \$140.00 per MW-day to \$62.99 per MW-day, or 55.0 percent, from the Rest of the RTO clearing price in the 2021/2022 RPM BRA. The clearing price of MAAC LDA would decrease by \$70.02 per MW-day from \$140.00 per MW-day to \$69.98 per MW-day, or 50.0 percent, from the MAAC clearing price in the 2021/2022 RPM BRA. The clearing price of the portion of the ATSI LDA remaining in the PJM Capacity Market would decrease by \$108.34 per MW-day from \$171.33 per MW-day to \$62.99 per MW-day, or 63.2 percent, from the ATSI clearing price in the 2021/2022 RPM BRA. The clearing prices of all other constrained LDAs would remain the same.

Table 12 shows the gross and net load charges to Ohio for the 2021/2022 BRA and for Scenario 1. The net load charges when Ohio is included in the PJM Capacity Market are net of Capacity Transfer Rights (CTRs) payments to load.⁴³ CTRs are analogous to FTRs in the energy market and return capacity market congestion revenues to load. Capacity market congestion revenues are the difference between the total dollars paid by load for capacity and the total dollars received by capacity market sellers. The difference exists because load pays for all capacity at the single LDA clearing price despite the fact that the capacity imported into the LDA receives a lower price based on its location. Credits for CTRs do not exist with an FRR because the CTR credits are based on the operation of the integrated PJM Capacity Market with locational pricing. The FRR entity would no longer be in the PJM Capacity Market and the rules governing price formation in the capacity market would no longer apply.⁴⁴

Table 12 shows that, based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, gross load charges for the 2021/2022 RPM BRA

⁴³ The MW of CTRs available for allocation to LSEs in an LDA is equal to the unforced capacity imported into the LDA determined based on the results of the Base Residual Auction and Incremental Auctions, less any MW of CETL paid for directly by market participants which include Qualifying Transmission Upgrades (QTUs) cleared in an RPM Auction and Incremental Capacity Transfer Rights (ICTRs). The price of the CTR credits is the locational adder for the LDA.

⁴⁴ If an FRR entity could pay imported capacity a lower price than it pays internal capacity, the difference would be analogous to a CTR credit. But increased reliance on internal resources in an FRR reduces the quantity of imports and the potential size of any such credit. In addition, the prices in the rest of the RTO are a function of the level of imports by the FRR entity, so if more imports are assumed, the price in the rest of RTO would also be higher.

for Ohio were \$1,827,482,123. In the 2021/2022 RPM BRA, only 8,007.3 MW UCAP of ATSI Zone capacity resources cleared. The ATSI LDA needed an additional 6,402.8 MW UCAP to meet the ATSI zonal UCAP obligation. The CTR credits received by the ATSI LDA are based on the UCAP MW needed to meet the ATSI UCAP obligation. The ATSI LDA imported 8,439.0 MW of capacity from the rest of the RTO LDA. The clearing price for the ATSI LDA was \$31.33 per MW-day higher than the clearing price for the rest of the RTO LDA. The load in the ATSI Zone received CTR credits of \$73,219,252. The share of CTR credits received by the load in the Ohio portion of the ATSI Zone was \$68,183,652. The load in the other zones in Ohio did not receive any CTR credits. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for Ohio were \$1,759,298,471.

If an Ohio FRR were created and the capacity price for Ohio were equal to the weighted average net CONE times B offer caps applicable to the LDAs in Ohio (\$230.14 per MW-day), the load charges for Ohio would have been \$2,602,627,417, an increase of \$843,328,946, or 47.9 percent higher than in the 2021/2022 BRA. (Table 12)

The higher load charges in Scenario 1 compared to the results of the 2021/2022 BRA are the result of higher prices and the elimination of CTRs, which more than offset the lower FRR UCAP obligation for the load in Ohio.

Table 13 shows the net load charges for the RTO excluding the load in the Ohio FRR for Scenario 1. Based on actual auction clearing prices and quantities, make whole MW and the RPM zonal UCAP obligation, the gross load charges for the 2021/2022 RPM BRA, for the RTO excluding the Ohio FRR, were \$7,887,489,049. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for the RTO excluding Ohio were \$7,627,546,204.

Under Scenario 1, the gross load charges for the 2021/2022 RPM BRA for the RTO excluding Ohio would have been \$6,230,561,900. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA, for the RTO excluding Ohio, would have been \$5,647,105,032, a reduction of \$1,980,441,172 or 26.0 percent.

If Ohio were to subsidize any generating units, the subsidy costs would be in addition to the direct FRR costs. In 2019, the State of Ohio passed the Ohio Clear Air Program to fund new subsidies for nuclear generation in the State of Ohio and to extend the subsidies for coal power plants.⁴⁵ The legislation requires Ohio customers to pay \$150 million per year, from 2021 through 2027, to subsidize the Davis Besse and Perry nuclear plants in Ohio. Ohio customers are also required to pay \$50 million per year to subsidize coal power plants owned by OVEC through 2030.

⁴⁵ See Ohio Clear Air Program, H.B. No. 6, 133rd G.A. (October 22, 2019). <
<https://www.legislature.ohio.gov/legislation/legislation-documents?id=GA133-HB-6>>

Table 11 Clearing prices in Scenario 1 and Scenario 2 compared to the actual BRA results

LDA	Scenario 1 and		Change	Percent
	2021/2022 BRA	Scenario 2		
Rest of RTO	\$140.00	\$62.99	(\$77.01)	(55.0%)
Rest of MAAC	\$140.00	\$69.98	(\$70.02)	(50.0%)
Rest of EMAAC	\$165.73	\$165.73	\$0.00	0.0%
Rest of SWMAAC	\$140.00	\$69.98	(\$70.02)	(50.0%)
Rest of PSEG	\$204.29	\$204.29	\$0.00	0.0%
PSEG North	\$204.29	\$204.29	\$0.00	0.0%
DPL South	\$165.73	\$165.73	\$0.00	0.0%
Pepco	\$140.00	\$69.98	(\$70.02)	(50.0%)
Rest of ATSI	\$171.33	\$62.99	(\$108.34)	(63.2%)
ATSI Cleveland	\$171.33	NA	NA	NA
ComEd	\$195.55	\$195.55	\$0.00	0.0%
BGE	\$200.30	\$200.30	\$0.00	0.0%
PPL	\$140.00	\$69.98	(\$70.02)	(50.0%)
DAY	\$140.00	NA	NA	NA
DEOK	\$140.00	NA	NA	NA

Table 12 Net load charges for Ohio (Scenario 1)⁴⁶

Ohio FRR	BRA	Scenario 1	Change	Percent
Zonal UCAP Obligation (MW UCAP)	32,624.3	30,982.7	(1,641.6)	(5.0%)
Zonal Capacity Price (\$/MW-day)	\$153.47	\$230.14	\$76.68	50.0%
Gross Load Charges	\$1,827,482,123	\$2,602,627,417	\$775,145,294	42.4%
Value of CTRs	\$68,183,652	\$0	(\$68,183,652)	(100.0%)
Net Load Charges	\$1,759,298,471	\$2,602,627,417	\$843,328,946	47.9%

Table 13 Net load charges for RTO excluding Ohio (Scenario 1)

RTO (Excluding Ohio)	Scenario 1 and		Change	Percent
	BRA	Scenario 2		
Zonal UCAP Obligation	131,003.0	133,018.6	2,015.5	1.5%
Gross Load Charges	\$7,887,489,049	\$6,230,561,900	(\$1,656,927,149)	(21.0%)
Value of CTRs	\$259,942,845	\$583,456,867	\$323,514,023	124.5%
Net Load Charges	\$7,627,546,204	\$5,647,105,032	(\$1,980,441,172)	(26.0%)

⁴⁶ The net load charges for the BRA include make whole payments. The gross load charges for the delivery year are calculated using the unrounded zonal capacity price.

Scenario 2

In Scenario 2, an FRR is established that includes all of Ohio and the FRR procures the entire Ohio FRR UCAP obligation of 30,982.7 MW at a rate equal to the weighted average clearing prices in the 2021/2022 RPM BRA applicable to the LDAs in Ohio (\$152.94 per MW-day). Ohio has 4,335.0 MW UCAP or 14.0 percent fewer MW than needed to meet its FRR obligation. The Ohio FRR would need to contract with capacity resources outside Ohio to cover the deficit. If an Ohio FRR service area were created, the load in the service area would be required to procure 30,982.7 MW UCAP, 1,641.6 MW (5.0 percent) less than if Ohio remained in the PJM Capacity Market. In Scenario 2, summer capacity resources in Ohio are matched with winter capacity resources in Ohio such that the total annual equivalent price is less than or equal to the weighted average clearing prices in the 2021/2022 RPM BRA applicable to the LDAs in Ohio (\$152.94 per MW-day). The unmatched seasonal resources are mapped to the rest of RTO LDA.

Table 11 compares the clearing prices for the rest of the PJM Capacity Market by LDA for the 2021/2022 RPM BRA and for Scenario 2. All binding constraints would have remained binding except for the ATSI LDA constraint which would not be binding and, in addition, the MAAC constraint would be binding. The Rest of RTO LDA clearing price would decrease by \$77.01 per MW-day from \$140.00 per MW-day to \$62.99 per MW-day, or 55.0 percent, from the Rest of the RTO clearing price in the 2021/2022 RPM BRA. The clearing price of MAAC LDA would decrease by \$70.02 per MW-day from \$140.00 per MW-day to \$69.98 per MW-day, or 50.0 percent, from the MAAC clearing price in the 2021/2022 RPM BRA. The clearing price of the portion of the ATSI LDA remaining in the PJM Capacity Market would decrease by \$108.34 per MW-day from \$171.33 per MW-day to \$62.99 per MW-day, or 63.2 percent, from the ATSI LDA clearing price in the 2021/2022 RPM BRA.

Table 14 shows the gross and net load charges to Ohio for the 2021/2022 BRA and for Scenario 2. The net load charges when Ohio is included in the PJM Capacity Market are net of CTRs.

Table 14 shows that, based on actual auction clearing prices and quantities, make whole MW and the RPM zonal UCAP obligation, gross load charges for the 2021/2022 RPM BRA for Ohio were \$1,827,482,123. In the 2021/2022 RPM BRA, only 8,007.3 MW UCAP of ATSI Zone capacity resources cleared. The ATSI LDA needed an additional 6,402.8 MW UCAP to meet the ATSI zonal UCAP obligation. The CTR credits received by the ATSI LDA are based on the UCAP MW needed to meet the ATSI UCAP obligation. The ATSI LDA imported 8,439.0 MW of capacity from the rest of the RTO LDA, consistent with the CETL value for ATSI LDA. The clearing price for the ATSI LDA was \$31.33 per MW-day higher than the clearing price of the Rest of the RTO LDA. The load in the ATSI Zone received CTR credits of \$73,219,252. The share of CTR credits received by the load in Ohio portion of the ATSI Zone was \$68,183,652. The load in the others zones in Ohio did not receive any CTR credits. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for Ohio were \$1,759,298,471.

If an Ohio FRR were created and the capacity price for Ohio were equal to the weighted average of the Ohio LDAs' clearing prices in the BRA (\$152.94 per MW-day), the load charges for Ohio would have been \$ \$1,729,499,574, a decrease of \$29,798,897, or 1.7 percent lower than in the 2021/2022 BRA.⁴⁷

The lower load charges in Scenario 2 compared to the results of the 2021/2022 BRA are the result of the same clearing prices and the lower FRR UCAP obligation for the load in Ohio, partially offset by the elimination of CTRs.

Table 15 shows the net load charges for the RTO excluding the load in Ohio for Scenario 2. The net load charges for the RTO excluding Ohio are the same as Scenario 1.

If Ohio were to subsidize any generating units, the subsidy costs would be in addition to the direct FRR costs.

Table 14 Net load charges for Ohio (Scenario 2)

Ohio FRR	BRA	Scenario 2	Change	Percent
Zonal UCAP Obligation	32,624.3	30,982.7	(1,641.6)	(5.0%)
Zonal Capacity Price (\$/MW-day)	\$153.47	\$152.94	(\$0.53)	(0.3%)
Gross Load Charges	\$1,827,482,123	\$1,729,499,574	(\$97,982,549)	(5.4%)
Value of CTRs	\$68,183,652	\$0	(\$68,183,652)	(100.0%)
Net Load Charges	\$1,759,298,471	\$1,729,499,574	(\$29,798,897)	(1.7%)

Table 15 Net load charges for RTO excluding Ohio (Scenario 2)

RTO (Excluding Ohio)	Scenario 1 and		Change	Percent
	BRA	Scenario 2		
Zonal UCAP Obligation	131,003.0	133,018.6	2,015.5	1.5%
Gross Load Charges	\$7,887,489,049	\$6,230,561,900	(\$1,656,927,149)	(21.0%)
Value of CTRs	\$259,942,845	\$583,456,867	\$323,514,023	124.5%
Net Load Charges	\$7,627,546,204	\$5,647,105,032	(\$1,980,441,172)	(26.0%)

Scenario 3

In Scenario 3, an FRR is established for the Ohio portion of the AEP Zone (AEP/Ohio FRR) and the FRR procures the entire AEP/Ohio capacity obligation at a rate equal to the 2021/2022 net CONE times B offer cap for AEP (\$233.91 per MW-day). The AEP/Ohio FRR has 2,376.7 MW UCAP or 24.5 percent more MW than needed to meet its FRR obligation. If an AEP FRR service area were created, the AEP/Ohio FRR would be

⁴⁷ The \$153.47 per MW-day is the Zonal UCAP Obligation weighted average net load price for Ohio, the capacity price charged to the load in the Zones within Ohio. In the 2021/2022 BRA, the FRR Obligation adjusted for EE add back, weighted resource clearing price for Ohio was \$152.94 per MW-day. The difference of \$0.53 per MW-day was due to Ohio's portion of funding for cleared Price Responsive Demand (PRD) credits and make whole payments to the seasonal resources.

required to procure 9,684.7 MW UCAP, 493.4 MW (4.8 percent) less than if the Ohio portion of the AEP Zone remained in the PJM Capacity Market. All the remaining annual resources not owned by the AEP in the AEP/Ohio Zone would be assigned to the Rest of the RTO LDA, which would remain in the PJM Capacity Market. In Scenario 3, summer capacity resources in the AEP/Ohio Zone are matched with winter capacity resources in the AEP/Ohio Zone such that the total annual equivalent price is less than or equal to the 2021/2022 net CONE times B offer cap for AEP/Ohio (\$233.91 per MW-day). The unmatched seasonal resources are mapped to the Rest of RTO LDA.

This is a sensitivity analysis based on the assumption that the owners of capacity resources needed to meet the reliability requirements in the AEP/Ohio FRR would request payment at the existing offer cap and that all capacity resources would be paid the same price. It is assumed that the actual price for capacity in the AEP/Ohio FRR would be the result of a negotiation between the owners of the required capacity, and the State of Ohio. The price for capacity resources could substantially exceed the capacity market clearing price and the capacity market offer cap.

Table 16 compares the clearing prices for the rest of the PJM Capacity Market by LDA for the 2021/2022 RPM BRA and for Scenario 3. All binding constraints would have remained binding and, in addition, the DEOK LDA constraint would be binding. The Rest of RTO LDA clearing price would decrease by \$32.94 per MW-day from \$140.00 per MW-day to \$107.06 per MW-day, or 23.5 percent, from the rest of the RTO LDA clearing price in the 2021/2022 RPM BRA. The DEOK LDA clearing price would decrease by \$11.53 per MW-day from \$140.00 per MW-day to \$128.47 per MW-day, or 8.2 percent, from the DEOK LDA clearing price in the 2021/2022 RPM BRA. The ATSI clearing price would remain the same.

Table 17 shows the gross and net load charges to the AEP/Ohio FRR for the 2021/2022 BRA and for Scenario 3. AEP/Ohio is included in the Rest of RTO LDA, the unconstrained area of the RTO. The load in the Rest of RTO LDA is not charged the locational adder and therefore did not receive CTR payments.

Table 17 shows that, based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, load charges for the 2021/2022 RPM BRA for AEP/Ohio were \$522,082,080. The load in the Ohio portion of the AEP Zone did not receive CTR credits.

If an AEP/Ohio FRR were created and the capacity price for the AEP/Ohio FRR were the net CONE times B offer cap (\$233.91 per MW-day), the load charges for the AEP/Ohio FRR would have been \$826,854,247, an increase of \$304,772,167, or 58.4 percent higher than in the 2021/2022 BRA.

The higher load charges in Scenario 3 compared to the results of the 2021/2022 BRA are the result of higher prices, which more than offset the lower FRR UCAP obligation for the load in AEP/Ohio.

Table 18 shows the net load charges for the RTO excluding the load in the AEP/Ohio FRR for Scenario 3. Based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, the gross load charges for the 2021/2022 RPM BRA, for the RTO excluding the AEP/Ohio FRR were \$9,192,889,092. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for the RTO excluding the AEP/Ohio FRR were \$8,864,762,595.

Under Scenario 3, the gross load charges for the 2021/2022 RPM BRA, for the RTO excluding the AEP/Ohio FRR would have been \$8,419,753,812. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA, for the RTO excluding the AEP/Ohio FRR would be \$7,848,869,895, a reduction of \$1,015,892,699 or 11.5 percent.

Table 19 shows the net load charges for Ohio excluding the load in the AEP/Ohio FRR for Scenario 3. Based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, the gross load charges for the 2021/2022 RPM BRA, for Ohio excluding the AEP/Ohio FRR were \$1,305,400,043. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for Ohio excluding the AEP/Ohio FRR were \$1,237,216,391.

Under Scenario 3, the gross load charges for the 2021/2022 RPM BRA, for Ohio excluding the AEP/Ohio FRR would have been \$1,245,572,716. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA, for Ohio excluding the AEP/Ohio FRR would be \$1,084,713,374, a reduction of \$152,503,017 or 12.3 percent.

Table 20 shows the change in the net load charges for AEP/Ohio, the rest of Ohio and Ohio. Under Scenario 3, the net load charges for AEP/Ohio would increase by 58.4 percent. The net load charges for Ohio excluding the AEP/Ohio FRR would decrease by 12.3 percent. The net load charges for Ohio would increase by 8.7 percent. The reduction in load charges for the rest of Ohio due to the decrease in clearing prices in DEOK and DAY Zones partially offsets the increase in the net load charges for the AEP/Ohio Zone.

If Ohio were to subsidize any generating units, the subsidy costs would be in addition to the direct FRR costs.

Table 16 Clearing prices in Scenario 3 and Scenario 4 compared to the actual BRA results

LDA	2021/2022 BRA	Scenario 3 and		
		Scenario 4	Change	Percent
Rest of RTO	\$140.00	\$107.06	(\$32.94)	(23.5%)
Rest of MAAC	\$140.00	\$107.06	(\$32.94)	(23.5%)
Rest of EMAAC	\$165.73	\$165.73	\$0.00	0.0%
Rest of SWMAAC	\$140.00	\$107.06	(\$32.94)	(23.5%)
Rest of PSEG	\$204.29	\$204.29	\$0.00	0.0%
PSEG North	\$204.29	\$204.29	\$0.00	0.0%
DPL South	\$165.73	\$165.73	\$0.00	0.0%
Pepco	\$140.00	\$107.06	(\$32.94)	(23.5%)
Rest of ATSI	\$171.33	\$171.33	\$0.00	0.0%
ATSI Cleveland	\$171.33	\$171.33	\$0.00	0.0%
ComEd	\$195.55	\$195.55	\$0.00	0.0%
BGE	\$200.30	\$200.30	\$0.00	0.0%
PPL	\$140.00	\$107.06	(\$32.94)	(23.5%)
DAY	\$140.00	\$107.06	(\$32.94)	(23.5%)
DEOK	\$140.00	\$128.47	(\$11.53)	(8.2%)

Table 17 Net load charges for AEP/Ohio (Scenario 3)

AEP/Ohio FRR	2021/2022 BRA	Scenario 3	Change	Percent
Zonal UCAP Obligation (MW UCAP)	10,178.1	9,684.7	(493.4)	(4.8%)
Zonal Capacity Price (\$/MW-day)	\$140.53	\$233.91	\$93.38	66.4%
Gross Load Charges	\$522,082,080	\$826,854,247	\$304,772,167	58.4%
Value of CTRs	\$0	\$0	\$0	0.0%
Net Load Charges	\$522,082,080	\$826,854,247	\$304,772,167	58.4%

Table 18 Net load charges for RTO excluding AEP/Ohio (Scenario 3)

RTO (Excluding AEP/Ohio)	2021/2022 BRA	Scenario 3 and		
		Scenario 4	Change	Percent
Zonal UCAP Obligation (MW UCAP)	153,449.2	154,415.2	966.0	0.6%
Gross Load Charges	\$9,192,889,092	\$8,419,753,812	(\$773,135,280)	(8.4%)
Value of CTRs	\$328,126,497	\$570,883,916	\$242,757,419	74.0%
Net Load Charges	\$8,864,762,595	\$7,848,869,895	(\$1,015,892,699)	(11.5%)

Table 19 Net load charges for the Rest of Ohio excluding AEP/Ohio (Scenario 3)

Ohio (Excluding AEP/Ohio)	2021/2022 BRA	Scenario 3 and		
		Scenario 4	Change	Percent
Zonal UCAP Obligation (MW UCAP)	22,446.1	22,587.5	141.3	0.6%
Gross Load Charges	\$1,305,400,043	\$1,245,572,716	(\$59,827,327)	(4.6%)
Value of CTRs	\$68,183,652	\$160,859,342	\$92,675,690	135.9%
Net Load Charges	\$1,237,216,391	\$1,084,713,374	(\$152,503,017)	(12.3%)

Table 20 Change in load charges for AEP/Ohio, Rest of Ohio and Ohio (Scenario 3)

	AEP/Ohio		Rest of Ohio		Ohio	
	Change	Percent	Change	Percent	Change	Percent
Zonal UCAP Obligation (MW UCAP)	(493.4)	(4.8%)	141.3	0.6%	(352.1)	(1.1%)
Gross Load Charges	\$304,772,167	58.4%	(\$59,827,327)	(4.6%)	\$244,944,840	13.4%
Value of CTRs	\$0	0.0%	\$92,675,690	135.9%	\$92,675,690	135.9%
Net Load Charges	\$304,772,167	58.4%	(\$152,503,017)	(12.3%)	\$152,269,150	8.7%

Scenario 4

In Scenario 4, an FRR is established for the AEP/Ohio Zone and the FRR procures the entire AEP/Ohio capacity obligation at a rate equal to the clearing price in the 2021/2022 RPM BRA (\$140 per MW-day). AEP/Ohio has 2,376.7 MW UCAP or 24.5 percent more MW than needed to meet its FRR obligation. In the 2021/2022 RPM BRA, the load in the AEP/Ohio Zone was charged for 10,178.1 MW UCAP, AEP/Ohio's share of the zonal unforced capacity obligation. If an AEP/Ohio FRR service area were created, the load in the service area would be required to procure 9,684.7 MW UCAP, 493.4 MW (4.8 percent) less than if the AEP/Ohio Zone remained in the PJM Capacity Market. All the remaining annual resources not owned by the AEP in the AEP/Ohio Zone would be assigned to the Rest of the RTO LDA, which would remain in the PJM Capacity Market. In Scenario 4, summer capacity resources in the AEP/Ohio Zone are matched with winter capacity resources in the AEP/Ohio Zone such that the total annual equivalent price is less than or equal to the clearing price in the 2021/2022 RPM BRA (\$140.00 per MW-day). The unmatched seasonal resources are mapped to the Rest of RTO LDA.

Table 16 compares the clearing prices for the rest of the PJM Capacity Market by LDA for the 2021/2022 RPM BRA and for Scenario 4. All binding constraints would have remained binding and, in addition, the DEOK LDA constraint would be binding. The Rest of RTO LDA clearing price would decrease by \$32.94 per MW-day from \$140.00 per MW-day to \$107.06 per MW-day, or 23.5 percent, from the rest of the RTO LDA clearing price in the 2021/2022 RPM BRA. The DEOK LDA clearing price would decrease by \$11.53 per MW-day from \$140.00 per MW-day to \$128.47 per MW-day, or 8.2 percent, from the DEOK LDA clearing price in the 2021/2022 RPM BRA.

The ATSI clearing price would remain the same.

Table 21 shows the gross and net load charges to the AEP/Ohio FRR for the 2021/2022 BRA and for Scenario 4. AEP/Ohio is included in the Rest of RTO LDA, the unconstrained area of the RTO. The load in the Rest of RTO LDA is not charged the locational adder and did not receive CTR payments.

Table 21 shows that, based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, gross load charges for the 2021/2022 RPM BRA for the AEP/Ohio were \$522,082,080. The load in the Ohio portion of the AEP Zone did not receive CTR credits.

If an AEP/Ohio FRR were created and the capacity price for the AEP/Ohio FRR were the clearing price in the BRA (\$140.00 per MW-day), the load charges for the AEP/Ohio FRR

would have been \$494,889,464, a decrease of \$27,192,616, or 5.2 percent lower than in the 2021/2022 BRA.⁴⁸

The lower load charges in Scenario 4 compared to the results of the 2021/2022 BRA are the result of the lower FRR UCAP obligation for the load in Ohio.

Table 22 shows the net load charges, for the RTO excluding the AEP/Ohio Zone, for Scenario 4. The net load charges for the RTO excluding the AEP/Ohio FRR are the same as Scenario 3.

Table 23 shows the net load charges, for Ohio excluding the AEP/Ohio Zone, for Scenario 4. The net load charges for Ohio excluding the AEP/Ohio FRR are the same as Scenario 3.

Table 24 shows the change in the net load charges for AEP/Ohio, the rest of Ohio and Ohio. Under Scenario 4, the net load charges for AEP/Ohio would decrease by 5.2 percent. The net load charges for Ohio excluding the AEP/Ohio FRR would decrease by 12.3 percent. The net load charges for all of Ohio would decrease by 10.2 percent. The reduction in load charges for the rest of Ohio due to the decrease in clearing prices in DEOK and DAY added to the decrease in the net load charges for the AEP/Ohio Zone.

If Ohio were to subsidize any generating units, the subsidy costs would be in addition to the direct FRR costs.

Table 21 Net load charges for AEP/Ohio LDA (Scenario 4)

AEP/Ohio FRR	2021/2022 BRA	Scenario 4	Change	Percent
Zonal UCAP Obligation (MW UCAP)	10,178.1	9,684.7	(493.4)	(4.8%)
Zonal Capacity Price (\$/MW-day)	\$140.53	\$140.00	(\$0.53)	(0.4%)
Gross Load Charges	\$522,082,080	\$494,889,464	(\$27,192,616)	(5.2%)
Value of CTRs	\$0	\$0	\$0	0.0%
Net Load Charges	\$522,082,080	\$494,889,464	(\$27,192,616)	(5.2%)

⁴⁸ The \$140.53 per MW-day is the zone net load price, the capacity price charged to the load in the AEP/Ohio Zone. In the 2021/2022 BRA, the resource clearing price for the AEP/Ohio Zone was \$140.00 per MW-day. The difference of \$0.53 per MW-day was due to AEP/Ohio's portion of funding for cleared Price Responsive Demand (PRD) credits and make whole payments to the seasonal resources.

Table 22 Net load charges for RTO excluding AEP/Ohio (Scenario 4)

RTO (Excluding AEP/Ohio)	Scenario 3 and		Change	Percent
	2021/2022 BRA	Scenario 4		
Zonal UCAP Obligation (MW UCAP)	153,449.2	154,415.2	966.0	0.6%
Gross Load Charges	\$9,192,889,092	\$8,419,753,812	(\$773,135,280)	(8.4%)
Value of CTRs	\$328,126,497	\$570,883,916	\$242,757,419	74.0%
Net Load Charges	\$8,864,762,595	\$7,848,869,895	(\$1,015,892,699)	(11.5%)

Table 23 Net load charges for the Rest of Ohio excluding AEP/Ohio (Scenario 4)

Ohio (Excluding AEP/Ohio)	Scenario 3 and		Change	Percent
	2021/2022 BRA	Scenario 4		
Zonal UCAP Obligation (MW UCAP)	22,446.1	22,587.5	141.3	0.6%
Gross Load Charges	\$1,305,400,043	\$1,245,572,716	(\$59,827,327)	(4.6%)
Value of CTRs	\$68,183,652	\$160,859,342	\$92,675,690	135.9%
Net Load Charges	\$1,237,216,391	\$1,084,713,374	(\$152,503,017)	(12.3%)

Table 24 Change in load charges for AEP/Ohio, Rest of Ohio and Ohio (Scenario 4)

	AEP/Ohio		Rest of Ohio		Ohio	
	Change	Percent	Change	Percent	Change	Percent
Zonal UCAP Obligation (MW UCAP)	(493.4)	(4.8%)	141.3	0.6%	(352.1)	(1.1%)
Gross Load Charges	(\$27,192,616)	(5.2%)	(\$59,827,327)	(4.6%)	(\$87,019,943)	(4.8%)
Value of CTRs	\$0	0.0%	\$92,675,690	135.9%	\$92,675,690	135.9%
Net Load Charges	(\$27,192,616)	(5.2%)	(\$152,503,017)	(12.3%)	(\$179,695,633)	(10.2%)

Scenario 5

In Scenario 5, an FRR is established for the Ohio portion of the ATSI Zone (ATSI/Ohio) and the FRR procures the entire ATSI/Ohio capacity obligation at a rate equal to the 2021/2022 net CONE times B offer cap (\$226.70 per MW-day). ATSI/Ohio has 3,771.0 MW UCAP or 29.6 percent fewer MW than needed to meet its FRR UCAP Obligation. The ATSI/Ohio FRR would need to contract with capacity resources outside the ATSI/Ohio FRR to cover the deficit. If an ATSI/Ohio FRR service area were created, the load in the service area would be required to procure 12,746.7 MW UCAP, 723.4 MW (5.4 percent) less than if the ATSI/Ohio LDA remained in the PJM Capacity Market. In Scenario 5, summer capacity resources in the ATSI/Ohio LDA are matched with winter capacity resources in the ATSI/Ohio LDA such that the total annual equivalent price is less than or equal to the 2021/2022 net CONE times B offer cap (\$226.70 per MW-day). The unmatched seasonal resources are mapped to the rest of RTO LDA.

This is a sensitivity analysis based on the assumption that the owners of capacity resources in the ATSI/Ohio FRR would request payment at the existing offer cap and that all capacity resources would be paid the same price. It is assumed that the actual price for capacity in the ATSI/Ohio FRR would be the result of a negotiation between the owners of the required capacity, and the State of Ohio. The price for capacity resources could substantially exceed the capacity market clearing price and the capacity market offer cap.

Table 25 compares the clearing prices for the rest of the PJM Capacity Market by LDA for the 2021/2022 RPM BRA and for Scenario 5. All binding constraints would have remained binding except for the ATSI LDA constraint which would not be binding and, in addition, the DEOK LDA constraint would be binding. The Rest of RTO LDA clearing price would decrease by \$45.28 per MW-day from \$140.00 per MW-day to \$94.72 per MW-day, or 32.3 percent, from the Rest of RTO LDA clearing price in the 2021/2022 RPM BRA. The clearing price of the portion of the ATSI LDA remaining in the PJM Capacity Market LDA would decrease by \$76.61 per MW-day from \$171.33 per MW-day to \$94.72 per MW-day, or 44.7 percent, from the ATSI LDA clearing price in the 2021/2022 RPM BRA. The DEOK LDA clearing price would decrease by \$11.53 per MW-day from \$140.00 per MW-day to \$128.47 per MW-day, or 8.2 percent, from the DEOK LDA clearing price in the 2021/2022 RPM BRA.

The clearing price of the AEP Zone included in the Rest of RTO LDA would decrease by \$45.28 per MW-day from \$140.00 per MW-day to \$94.72 per MW-day or 32.3 percent from the AEP Zone clearing price in the 2021/2022 RPM BRA. The DAY LDA clearing price would decrease by \$45.28 per MW-day from \$140.00 per MW-day to \$94.72 per MW-day, or 32.3 percent, from the DAY LDA clearing price in the 2021/2022 RPM BRA. Table 26 shows the gross and net load charges for the ATSI/Ohio FRR for the 2021/2022 BRA and for Scenario 5. The net load charges when the ATSI/Ohio FRR is included in the PJM Capacity Market are net of CTR payments to load.

Table 26 shows that, based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, gross load charges for the 2021/2022 RPM BRA for the ATSI/Ohio were \$844,979,678. In the 2021/2022 RPM BRA, only 8,007.3 MW UCAP of ATSI capacity resources cleared. The ATSI LDA needed an additional 6,402.8 to meet the ATSI zonal UCAP obligation. The CTR credits received by the ATSI LDA are based on the UCAP MW needed to meet the ATSI UCAP obligation. The ATSI LDA imported 8,439.0 MW of capacity from the rest of the RTO LDA. The clearing price for the ATSI LDA was \$31.33 per MW-day higher than the clearing price of the rest of the RTO LDA. The load in the ATSI Zone received CTR credits of \$73,219,252. The share of CTR credits received by the load in Ohio portion of the ATSI Zone was \$68,183,652. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for the ATSI/Ohio FRR were \$776,796,026.

If an ATSI/Ohio FRR were created and the capacity price for the ATSI/Ohio FRR were the net CONE times B offer cap (\$226.70 per MW-day), the load charges for the ATSI/Ohio FRR would have been \$1,054,729,291, an increase of \$277,933,265, or 35.8 percent higher than in the 2021/2022 BRA.

The higher load charges in Scenario 5 compared to the results of the 2021/2022 BRA are the result of higher prices and the elimination of CTRs, which more than offset the lower FRR UCAP obligation for the load in ATSI/Ohio.

Table 27 shows the net load charges for the RTO excluding the ATSI/Ohio FRR for Scenario 5. Based on actual auction clearing prices and quantities, make whole MW and

RPM zonal UCAP obligation, the gross load charges for the 2021/2022 RPM BRA, for the RTO excluding the ATSI/Ohio FRR, were \$8,869,991,494. After accounting for payments due to CTRs valued at \$259,942,845, the net load charges for the 2021/2022 RPM BRA for the RTO excluding the ATSI/Ohio FRR were \$8,610,048,649.

If an ATSI/Ohio FRR were created, the gross load charges for the 2021/2022 RPM BRA, for the RTO excluding the ATSI/Ohio FRR would have been \$7,619,372,234. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA, for the RTO excluding the ATSI/Ohio FRR would be \$7,130,885,746, a decrease of \$1,479,162,903 or 17.2 percent.

Table 28 shows the net load charges for Ohio excluding the load in the ATSI/Ohio FRR for Scenario 5. Based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, the gross load charges for the 2021/2022 RPM BRA, for Ohio excluding the ATSI/Ohio FRR were \$982,502,444. The net load charges for the 2021/2022 RPM BRA for Ohio excluding the ATSI/Ohio FRR were \$982,502,444.

Under Scenario 5, the gross load charges for the 2021/2022 RPM BRA, for Ohio excluding the ATSI/Ohio FRR would have been \$736,569,625. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA, for Ohio excluding the ATSI/Ohio FRR would be \$706,413,653, a decrease of \$276,088,792 or 28.1 percent.

Table 29 shows the change in the net load charges for ATSI/Ohio, the rest of Ohio and Ohio. Under Scenario 5, the net load charges for ATSI/Ohio would increase by 35.8 percent. The net load charges for Ohio excluding the ATSI/Ohio FRR would decrease by 28.1 percent. The net load charges for Ohio would increase by 0.1 percent. The reduction in load charges for the rest of Ohio due to the decrease in clearing prices in the AEP Zone, DEOK LDA and DAY LDA offsets the increase in the net load charges for the ATSI/Ohio Zone.

If Ohio were to subsidize any generating units, the subsidy costs would be in addition to the direct FRR costs.

Table 25 Clearing prices in Scenario 5 compared to the actual BRA results

LDA	Scenario 5 and			
	2021/2022 BRA	Scenario 6	Change	Percent
Rest of RTO	\$140.00	\$94.72	(\$45.28)	(32.3%)
Rest of MAAC	\$140.00	\$94.72	(\$45.28)	(32.3%)
Rest of EMAAC	\$165.73	\$165.73	\$0.00	0.0%
Rest of SWMAAC	\$140.00	\$94.72	(\$45.28)	(32.3%)
Rest of PSEG	\$204.29	\$204.29	\$0.00	0.0%
PSEG North	\$204.29	\$204.29	\$0.00	0.0%
DPL South	\$165.73	\$165.73	\$0.00	0.0%
Pepco	\$140.00	\$94.72	(\$45.28)	(32.3%)
Rest of ATSI	\$171.33	\$94.72	(\$76.61)	(44.7%)
ATSI Cleveland	\$171.33	NA	NA	NA
ComEd	\$195.55	\$195.55	\$0.00	0.0%
BGE	\$200.30	\$200.30	\$0.00	0.0%
PPL	\$140.00	\$94.72	(\$45.28)	(32.3%)
DAY	\$140.00	\$94.72	(\$45.28)	(32.3%)
DEOK	\$140.00	\$128.47	(\$11.53)	(8.2%)

Table 26 Net load charges for ATSI/Ohio LDA (Scenario 5)

ATSI/Ohio FRR	2021/2022 BRA	Scenario 5	Change	Percent
Zonal UCAP Obligation (MW UCAP)	13,470.1	12,746.7	(723.4)	(5.4%)
Zonal Capacity Price (\$/MW-day)	\$171.86	\$226.70	\$54.84	31.9%
Gross Load Charges	\$844,979,678	\$1,054,729,291	\$209,749,613	24.8%
Value of CTRs	\$68,183,652	\$0	(\$68,183,652)	(100.0%)
Net Load Charges	\$776,796,026	\$1,054,729,291	\$277,933,265	35.8%

Table 27 Net load charges for RTO excluding ATSI/Ohio LDA (Scenario 5)

RTO (Excluding ATSI/Ohio)	Scenario 5 and			
	2021/2022 BRA	Scenario 6	Change	Percent
Zonal UCAP Obligation (MW UCAP)	150,157.2	151,590.5	1,433.3	1.0%
Gross Load Charges	\$8,869,991,494	\$7,619,372,234	(\$1,250,619,260)	(14.1%)
Value of CTRs	\$259,942,845	\$488,486,488	\$228,543,643	87.9%
Net Load Charges	\$8,610,048,649	\$7,130,885,746	(\$1,479,162,903)	(17.2%)

Table 28 Net load charges for the Rest of Ohio (Scenario 5)

Ohio (Excluding ATSI/Ohio)	Scenario 5 and			
	2021/2022 BRA	Scenario 6	Change	Percent
Zonal UCAP Obligation (MW UCAP)	19,154.1	19,336.7	182.6	1.0%
Gross Load Charges	\$982,502,444	\$736,569,625	(\$245,932,819)	(25.0%)
Value of CTRs	\$0	\$30,155,972	\$30,155,972	NA
Net Load Charges	\$982,502,444	\$706,413,653	(\$276,088,792)	(28.1%)

Table 29 Change in load charges for ATSI/Ohio, Rest of Ohio and Ohio (Scenario 5)

	ATSI/Ohio		Rest of Ohio		Ohio	
	Change	Percent	Change	Percent	Change	Percent
Zonal UCAP Obligation (MW UCAP)	(723.4)	(5.4%)	182.6	1.0%	(540.9)	(1.7%)
Gross Load Charges	\$209,749,613	24.8%	(\$245,932,819)	(25.0%)	(\$36,183,207)	(2.0%)
Value of CTRs	(\$68,183,652)	(100.0%)	\$30,155,972	NA	(\$38,027,680)	(55.8%)
Net Load Charges	\$277,933,265	35.8%	(\$276,088,792)	(28.1%)	\$1,844,473	0.1%

Scenario 6

In Scenario 6, an FRR is established for the Ohio portion of the ATSI Zone (ATSI/Ohio) and the FRR procures the entire ATSI/Ohio capacity obligation at a rate equal to the clearing price in the 2021/2022 RPM BRA (\$171.33 per MW-day). ATSI/Ohio has 3,771.0 MW UCAP or 29.6 percent fewer MW than needed to meet its FRR UCAP Obligation. The ATSI/Ohio FRR would need to contract with capacity resources outside the ATSI/Ohio FRR to cover the deficit. If an ATSI/Ohio FRR service area were created, the load in the service area would be required to procure 12,746.7 MW UCAP, 723.4 MW (5.4 percent) less than if the ATSI/Ohio LDA remained in the PJM Capacity Market. In Scenario 6, summer capacity resources in the ATSI/Ohio LDA are matched with winter capacity resources in the ATSI/Ohio LDA such that the total annual equivalent price is less than or equal to the clearing price in the 2021/2022 RPM BRA (\$171.33 per MW-day). The unmatched seasonal resources are mapped to the rest of RTO LDA.

Table 25 compares the clearing prices for the rest of the PJM Capacity Market by LDA for the 2021/2022 RPM BRA and for Scenario 6. All binding constraints would have remained binding except the ATSI LDA constraint would not be binding and the DEOK LDA constraint would also be binding. The Rest of the RTO LDA clearing price would decrease by \$45.28 per MW-day from \$140.00 per MW-day to \$94.72 per MW-day, or 32.3 percent, from the rest of the RTO LDA clearing price in the 2021/2022 RPM BRA. The clearing price of the portion of the ATSI LDA remaining in the PJM Capacity Market would decrease by \$76.61 per MW-day from \$171.33 per MW-day to \$94.72 per MW-day, or 44.7 percent, from the ATSI LDA clearing price in the 2021/2022 RPM BRA. The DEOK LDA clearing price would decrease by \$11.53 per MW-day from \$140.00 per MW-day to \$128.47 per MW-day, or 8.2 percent, from the DEOK LDA clearing price in the 2021/2022 RPM BRA. The clearing price of the AEP Zone included in the Rest of RTO LDA would decrease by \$45.28 per MW-day from \$140.00 per MW-day to \$94.72 per MW-day or 32.3 percent from the AEP Zone clearing price in the 2021/2022 RPM BRA. The DAY Zone clearing price would decrease by \$45.28 per MW-day from \$140.00 per MW-day to \$94.72 per MW-day, or 32.3 percent, from the DAY Zone clearing price in the 2021/2022 RPM BRA.

Table 30 shows the gross and net load charges for the ATSI/Ohio FRR for the 2021/2022 BRA and Scenario 6. The net load charges when the ATSI/Ohio FRR is included in the PJM Capacity Market are net of CTRs.

Table 30 shows that, based on actual auction clearing prices and quantities, make whole MW and RPM zonal UCAP obligation, gross load charges for the 2021/2022 RPM BRA

for the ATSI/Ohio FRR were \$844,979,678. In the 2021/2022 RPM BRA, only 8007.3 MW UCAP of ATSI capacity resources cleared. The ATSI LDA needed an additional 6,402.8 to meet the ATSI zonal UCAP obligation. The CTR credits received by the ATSI LDA are based on the UCAP MW needed to meet the ATSI UCAP obligation. The ATSI LDA imported 8,439.0 MW of capacity from the rest of the RTO LDA. The clearing price for the ATSI LDA was \$31.33 per MW-day higher than the clearing price of the rest of the RTO LDA. The load in the ATSI Zone received CTR credits of \$73,219,252. The share of CTR credits received by the load in Ohio portion of the ATSI Zone was \$68,183,652. After accounting for CTRs, the net load charges for the 2021/2022 RPM BRA for the ATSI/Ohio FRR were \$776,796,026.

If an ATSI/Ohio FRR were created and the capacity price for ATSI/Ohio LDA were the clearing price in the BRA (\$171.33 per MW-day), the load charges for the ATSI/Ohio FRR would have been \$797,118,524, an increase of \$ 20,322,498 or 2.6 percent higher than in the 2021/2022 BRA.⁴⁹

The higher load charges in Scenario 6 compared to the results of the 2021/2022 BRA are the result of the same clearing prices and the lower FRR UCAP obligation for the load in the ATSI/Ohio FRR area and the elimination of CTR credits, which more than offsets the lower FRR UCAP obligation.

Table 31 shows the net load charges for the RTO excluding the ATSI/Ohio FRR for Scenario 6. The net load charges for the RTO excluding ATSI/Ohio FRR are the same as Scenario 5.

Table 32 shows the net load charges, for Ohio excluding the ATSI/Ohio FRR, for Scenario 6. The net load charges for Ohio excluding the ATSI/Ohio FRR are the same as Scenario 5.

Table 33 shows the change in the net load charges for the ATSI/Ohio FRR, the rest of Ohio and Ohio. Under Scenario 6, the net load charges for the ATSI/Ohio FRR would increase by 2.6 percent. The net load charges for Ohio excluding the ATSI/Ohio FRR would decrease by 28.1 percent. The net load charges for Ohio would decrease by 14.5 percent. The reduction in load charges for the rest of Ohio due to the decrease in clearing prices in the AEP Zone, DEOK LDA and DAY LDA more than offsets the increase in the net load charges for the ATSI/Ohio Zone.

⁴⁹ The \$171.86 per MW-day is the zone net load price, the capacity price charged to the load in the ATSI LDA. In the 2021/2022 BRA, the resource clearing price for the ATSI LDA was \$171.33 per MW-day. The difference of \$0.53 per MW-day was due to ATSI's portion of funding for cleared Price Responsive Demand (PRD) credits and make whole payments to the seasonal resources.

If Ohio were to subsidize any generating units, the subsidy costs would be in addition to the direct FRR costs.

Table 30 Net load charges for ATSI/Ohio (Scenario 6)

ATSI/Ohio FRR	2021/2022 BRA	Scenario 6	Change	Percent
Zonal UCAP Obligation (MW UCAP)	13,470.1	12,746.7	(723.4)	(5.4%)
Zonal Capacity Price (\$/MW-day)	\$171.86	\$171.33	(\$0.53)	(0.3%)
Gross Load Charges	\$844,979,678	\$797,118,524	(\$47,861,154)	(5.7%)
Value of CTRs	\$68,183,652	\$0	(\$68,183,652)	(100.0%)
Net Load Charges	\$776,796,026	\$797,118,524	\$20,322,498	2.6%

Table 31 Net load charges for RTO excluding ATSI/Ohio (Scenario 6)

RTO (Excluding ATSI/Ohio)	2021/2022 BRA	Scenario 5 and		Change	Percent
		2021/2022 BRA	Scenario 6		
Zonal UCAP Obligation (MW UCAP)	150,157.2	151,590.5	1,433.3	1,433.3	1.0%
Gross Load Charges	\$8,869,991,494	\$7,619,372,234	(\$1,250,619,260)	(\$1,250,619,260)	(14.1%)
Value of CTRs	\$259,942,845	\$488,486,488	\$228,543,643	\$228,543,643	87.9%
Net Load Charges	\$8,610,048,649	\$7,130,885,746	(\$1,479,162,903)	(\$1,479,162,903)	(17.2%)

Table 32 Net load charges for the Rest of Ohio (Scenario 6)

Ohio (Excluding ATSI/Ohio)	2021/2022 BRA	Scenario 5 and		Change	Percent
		2021/2022 BRA	Scenario 6		
Zonal UCAP Obligation (MW UCAP)	19,154.1	19,336.7	182.6	182.6	1.0%
Gross Load Charges	\$982,502,444	\$736,569,625	(\$245,932,819)	(\$245,932,819)	(25.0%)
Value of CTRs	\$0	\$30,155,972	\$30,155,972	\$30,155,972	NA
Net Load Charges	\$982,502,444	\$706,413,653	(\$276,088,792)	(\$276,088,792)	(28.1%)

Table 33 Change in load charges for ATSI/Ohio, Rest of Ohio and Ohio (Scenario 6)

	ATSI/Ohio		Rest of Ohio		Ohio	
	Change	Percent	Change	Percent	Change	Percent
Zonal UCAP Obligation (MW UCAP)	(723.4)	(5.4%)	182.6	1.0%	(540.9)	(1.7%)
Gross Load Charges	(\$47,861,154)	(5.7%)	(\$245,932,819)	(25.0%)	(\$293,793,974)	(16.1%)
Value of CTRs	(\$68,183,652)	(100.0%)	\$30,155,972	NA	(\$38,027,680)	(55.8%)
Net Load Charges	\$20,322,498	2.6%	(\$276,088,792)	(28.1%)	(\$255,766,294)	(14.5%)