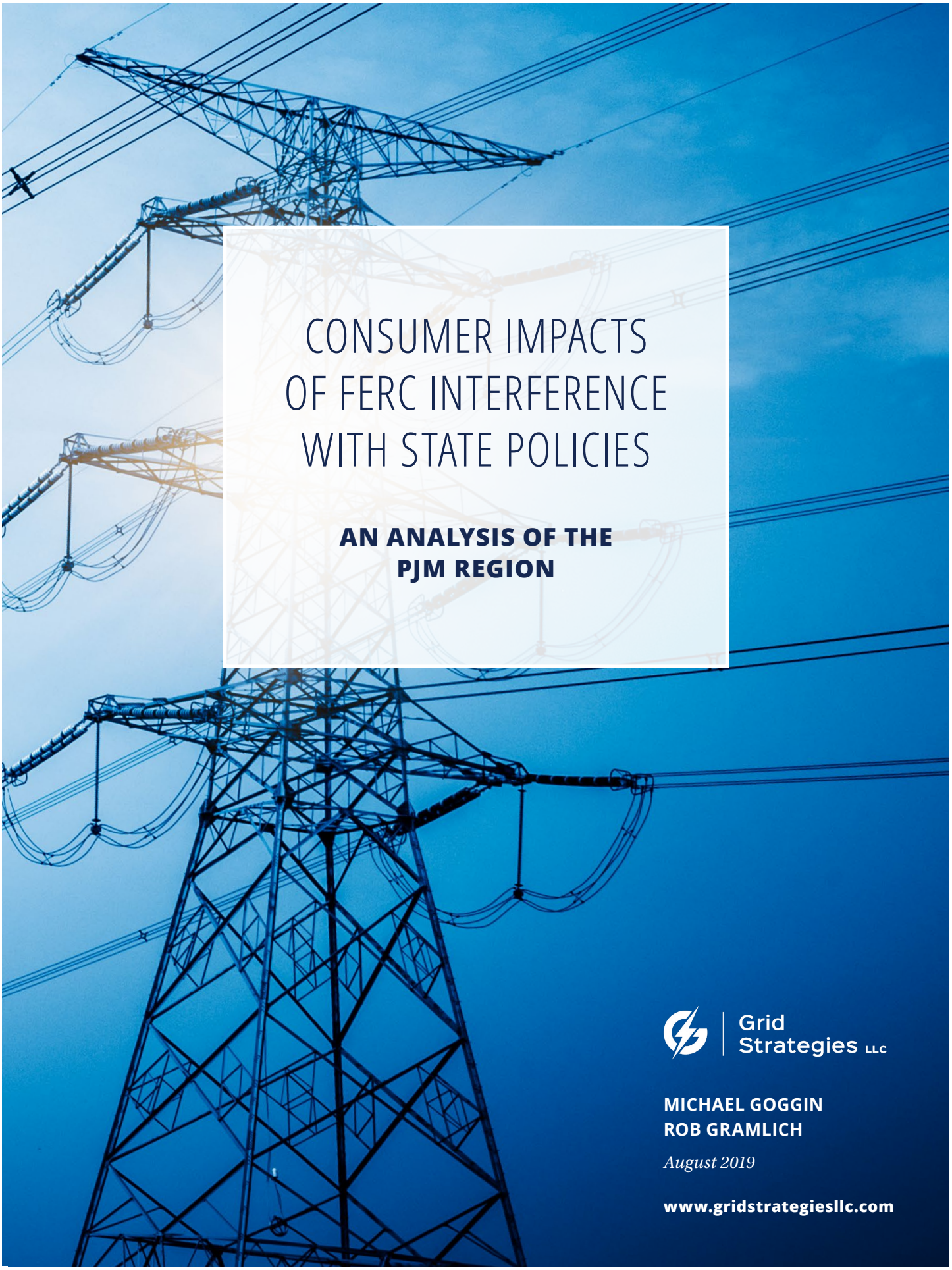

CONSUMER IMPACTS OF FERC INTERFERENCE WITH STATE POLICIES

AN ANALYSIS OF THE PJM REGION

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I. EXECUTIVE SUMMARY

The U.S. Federal Energy Regulatory Commission (FERC) has begun a major policy shift that it says is necessary to protect wholesale electricity markets from the impacts of state policies. More states are enacting policies with increasingly ambitious targets for carbon-free resources, in part due to the lack of federal action on greenhouse gas emissions. The new FERC policy, a broad application of the Minimum Offer Price Rule (MOPR), would raise the electricity capacity bids of resources that are deemed to benefit from state policies, increasing costs for consumers and hindering states from achieving their energy policy objectives. A major decision is before the FERC, and more will be coming in the months and years ahead if FERC continues down this road.

Using the methodology outlined at the end of this paper, we assessed the potential cost of imposing a broad MOPR policy to the 65 million homes and businesses across 13 states and the District of Columbia served by PJM Interconnection, LLC (PJM), the nation's largest grid operator. We estimate the total cost of the MOPR to PJM consumers could reach $5.7 billion per year, a 60% increase in cost compared to the current capacity market. The average residential customer in PJM could see their electric bill increase by over $6 per month. The MOPR would impose significantly higher costs on electricity users in all PJM states, not just states with large amounts of generating capacity subject to the MOPR. States with pro-clean energy policies would face additional costs beyond those accounted for here, as the price of credits to comply with those policies would also increase as resources benefiting from those policies lose their capacity market revenues. We estimate that over 14 GW of renewable energy resources will be excluded from PJM's auction.

TABLE 1 | *Total annual cost by state of PJM MOPR*

STATE *	TOTAL ANNUAL COST ($ MILLIONS)	$ PER AVERAGE MONTHLY RESIDENTIAL BILL
Ohio	$1,100	$6.01
Pennsylvania	$956	$5.75
Virginia	$927	$7.71
Illinois	$864	$4.95
New Jersey	$711	$4.68
Maryland	$499	$6.72
West Virginia	$167	$7.34
Kentucky	$121	$7.52
Indiana	$91	$6.64
Delaware	$85	$6.52
DC	$70	$5.34
North Carolina	$41	$7.45
Michigan	$25	$4.52
TOTAL/AVERAGE	**$5,658**	**$6.06**

** Note: PJM serves only a portion of the consumers in some of these states, explaining the lower cost impacts in Michigan, North Carolina, Indiana and Kentucky, in particular.*

II. HOW CAN FERC INTERFERE WITH STATE POLICY?

Background

Electric utilities in the United States have always been subject to economic regulation by both state and federal entities. Traditionally, state public utilities commissions regulated all aspects of the generation, transmission, and distribution systems owned by vertically integrated investor-owned utilities, while the U.S. Federal Energy Regulatory Commission (FERC) played a more limited role, only regulating the rates, terms, and conditions of transmission service for third parties and wholesale sales of energy to entities other than the utilities' "native load." With the electric industry restructuring that took place in parts of the U.S., FERC assumed more jurisdiction over transmission and power sales because all load was served by wholesale transactions rather than state-regulated retail sales to native load. States have retained the power to direct generation choices over the years and have done so in many ways with resource targets, tax policy, and other policies.

Regional Transmission Organizations and Independent System Operators[1] [RTOs/ISOs] were created in order to serve as the "air traffic controllers" of the bulk electric power delivery system to ensure fair transmission service and generation competition could take place. FERC's two major restructuring-related orders, Order No. 888 in 1996[2] and Order No. 2000 in 1999[3] provided "ISO Principles" and "RTO Characteristics and Functions."[4] There was no discussion in the record or in the Commission actions at that time related to the impacts of state policies on generation, or an RTO's role in addressing it. Power markets were facilitated by RTO transmission service administration, allowing market participants to trade under voluntary contractual terms, supplemented by the option of transacting through a central "spot" market administered by the RTO.

Genesis of RTO mitigation of state policy

RTO "mitigation" of state policy began a decade into wholesale electricity competition with the efforts of New Jersey and Maryland to build generation at a cost deemed more favorable for their consumers than they would pay in the RTO-administered market. Some of these state actions required utilities to procure certain resources and required the resources to act in certain ways. Concerns were raised that these actions constituted an exercise of "buyer-side market power." Buyer-side market power, or "monopsony power" as it is known in economics, would arise when a large buyer or buyers in a market withholds purchasing, or supports entry into the market, in order to suppress prices below competitive levels (in practice, this has been extremely rare). FERC found, and the courts agreed, that certain state policies were attempting to do that, and action was required to prevent wholesale market impacts. [5]

To address buyer-side market power, RTOs and FERC employed a tool called a Minimum Offer Price Rule (MOPR). MOPR replaces the bids of the generating unit tied to the state policy with a minimum bid level that is deemed by FERC to be competitive (an estimate of what the unsubsidized level would have been). This is how MOPR came into the RTO toolkit.

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1 RTOs and ISOs are essentially the same thing.

2 See FERC (1996), *Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities,* Federal Register, Vol. 61, No. 92, Friday, May 10, 1996, (https://www.govinfo.gov/content/pkg/FR-1996-05-10/pdf/96-10694.pdf).

3 FERC (1999), *Regional Transmission Organizations*, 89 FERC ¶ 61,285, Docket No. RM99-2-000; Order No. 2000, December 20, 1999, (https://www.ferc.gov/legal/maj-ord-reg/land-docs/RM99-2A.pdf).

4 Order No. 2000 characteristics included independence, scope and regional configuration, operational authority, and short-term reliability; the functions included tariff administration, congestion management, parallel path flow, ancillary services, transfer capacity determination, market monitoring, planning and expansion, and inter-regional coordination.

5 Hughes v. Talen Energy Marketing LLC (2016), 136 S. Ct. 1288, April 19, 2016, (https://www.leagle.com/decision/insco20160419f18).

MOPR is applied in RTO "capacity markets." Capacity is a product defined in certain RTO tariffs, separate from energy and ancillary services, to ensure sufficient generation availability at all times including during peak load. Generators rely on this market to cover their capital costs that may not be sufficiently recovered through energy and ancillary services market revenues. Certain RTOs hold auctions for capacity, typically for year-long periods, up to three years ahead of time. Capacity markets began as voluntary "residual" markets, but over time have become mandatory for all load in the U.S. Northeast in regions operated by the 13-state PJM Interconnection, New York ISO, and ISO New England. Capacity markets are a large and growing part of consumer payments.[6]

Recent Policy Shift

A major policy shift underway at FERC expanded MOPR from a surgical fix for specific potential exercises of market power, towards a role in which the MOPR applies across the entire market to any state policy that incentivizes generation from resources that could have an impact on the market. In a 2018 order on ISO-New England, FERC endorsed broad application of MOPR: "Absent a showing that a different method would appropriately address particular state policies, we intend to use the MOPR to address the impacts of state policies on the wholesale capacity markets."[7] The FERC majority subscribed to the theory that the state support distorts the wholesale market, making rates unjust and unreasonably low when state-supported resources enter and do not need to recover all of their costs in the electricity markets. FERC Commissioner Glick dissented from this view, saying "Broad application of the MOPR usurps the authority over generation resource decisions that Congress left to the states when it enacted the Federal Power Act (FPA). The better course of action would be for the Commission and the RTOs/ISOs to stop using the MOPR to interfere with state public policies and, instead, apply the MOPR in only the limited circumstance for which it was originally intended: to prevent the exercise of buyer-side market power."[8]

Renewable energy resources incentivized by state policies had been exempt from MOPR until this recent change in FERC policy. FERC typically found that state renewable energy policies were not plausible means of exercising buyer market power, because support of renewable energy resources would be an ineffective means for states to lower capacity prices, given their relatively small capacity value.[9] However,

6 The annual value of capacity markets for the year 2017 was $2.2 billion in New England and $8.55 billion in PJM, see ISO-NE IMM (2018), 2017 Annual Markets Report, (May 17, 2018), p. 4, (https://www.iso-ne.com/static-assets/documents/2018/05/2017-annual-markets-report.pdf) and Monitoring Analytics (2019), State of the Market Report for PJM 2018, (March 14, 2019), p. 16, (https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2018/2018-som-pjm-volume2.pdf). A GAO study noted that four US regions charged consumers a total of $51 billion from 2013 through 2016 so the cost has been consistently above $10 billion per year across the regions that have them, see GAO (2017), *Four Regions Use Capacity Markets to Help Ensure Adequate Resources, but FERC Has Not Fully Assessed Their Performance*, (December 2017), p. 29, (https://www.gao.gov/assets/690/688811.pdf). Capacity market revenues are growing relative to revenue from energy and ancillary services markets. Capacity payments as a portion of total payments in PJM have risen from under 5 percent to over 25 percent in 2017, see PJM (2017), *Proposed Enhancements to Energy Price Formation*, (November 15, 2017), p. 7, (https://www.pjm.com/-/media/library/reports-notices/special-reports/20171115-proposed-enhancements-to-energy-price-formation.ashx).

7 FERC (2018), *Order on Tariff Filing*, March 9, 2018, 162 FERC ¶ 61,205, Docket No. ER18-619, (https://www.ferc.gov/CalendarFiles/20180309230225-ER18-619-000.pdf), Par. 22.

8 FERC (2018), Glick dissent, p. 1.

9 "We find that the Complainants have demonstrated that NYISO's Services Tariff is unjust, unreasonable, or unduly discriminatory or preferential, pursuant to section 206 of the FPA, because it applies buyer-side market power mitigation to certain renewable and self-supply resources that have limited or no incentive and ability to artificially suppress ICAP market prices. This finding is consistent with the Commission's generally-applied minimum offer price rule policy; specifically, that buyer-side market power mitigation rules are intended to address market power exhibited by certain entities seeking to lower capacity market prices." See FERC (2015), *Order on Complaint and Directing Compliance Filing*, 153 FERC ¶ 61,022, Docket No. EL15-64-000, October 9, 2015, Par. 10, (https://www.ferc.gov/CalendarFiles/20151009155503-EL15-64-000.pdf), citing ConEd Complaint Order, 150 FERC ¶ 61,139 at p. 2: "we find that intermittent renewable resources with low capacity factors and high development costs, including many wind and solar resources, narrowly defined, provide their developer with limited or no incentive and ability to exercise buyer-side market power to artificially suppress ICAP market prices." (Par. 47)

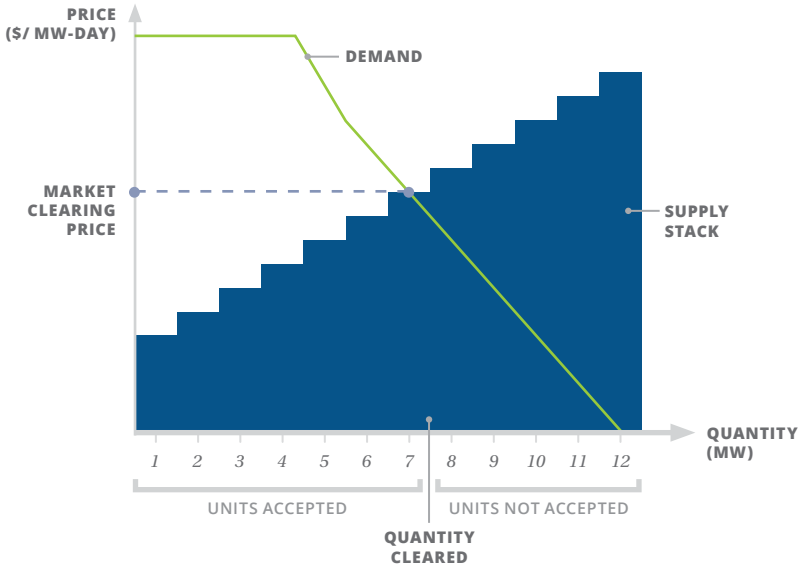
FERC recently eliminated such exemptions in ISO New England and PJM.[10] NYISO has proposed to broadly apply the MOPR to storage resources supported by state policy, prompting formal complaints by two New York state agencies seeking to preserve the benefits of those policies.[11]

Impacts of State Policy Mitigation

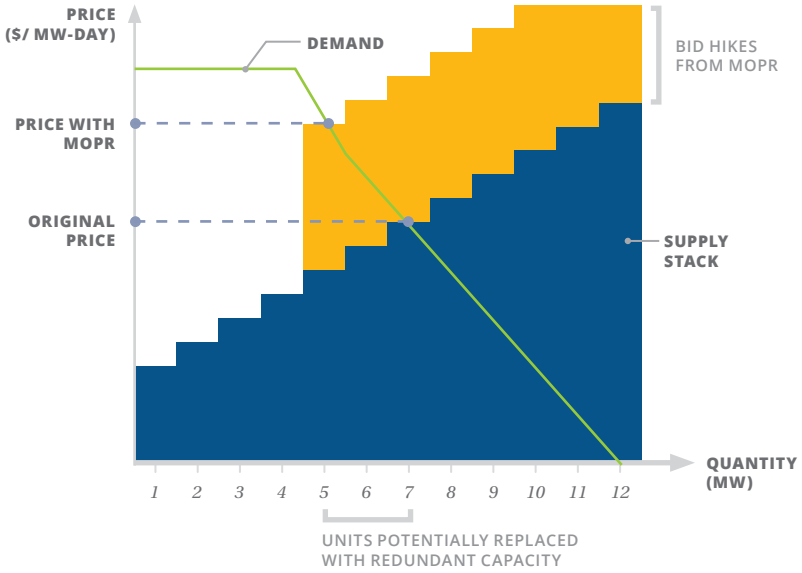
The effect of broad MOPR application to state-supported resources is to essentially preclude their participation in the capacity market and raise capacity prices. By artificially raising suppliers' bids, MOPR tends to raise market-clearing prices and causes consumers to pay for redundant capacity—customers first pay for the construction of resources through state policy, but when those resources are unable to clear the capacity market due to the MOPR, customers are forced to buy an equivalent amount of capacity that does clear in the capacity market. FERC itself has acknowledged this harm, but has downplayed its significance in recent decisions.[12] This extra capacity is unnecessary because the state-supported resources continue to provide physical capacity, despite being subject to the MOPR. As the market monitor for New York and New England has stated, "[t]he MOPR in this case is likely to significantly increase costs for New England's consumers. It can also cause conventional new resources to clear the [Forward Capacity Auction] inefficiently by preventing higher-cost renewables from clearing (even though they are committed to entering)."[13] The illustrations below show the higher prices that result from inflated bids, and the amount of state-supported capacity that is at risk of being replaced with

FIGURE 1

Capacity Market Without MOPR



Market Price Increase Due to MOPR



10 FERC Order on PJM Capacity market: "We find it unjust and unreasonable, and unduly discriminatory or preferential, for a resource receiving out-of-market payments to benefit from its participation in the PJM capacity market, by not competing on a comparable basis with competitive resources." *Order Rejecting Proposed Tariff Revisions, Granting in Part and Denying in Part Complaint, and Instituting Proceeding Under Section 206 of the Federal Power Act*, (June 29, 2018), 163 FERC ¶ 61,236, Docket Nos. EL16-49-000, et al., Par 66. (https://www.ferc.gov/CalendarFiles/20180629212349-EL16-49-000.pdf). FERC Order on ISO-NE: Order on Tariff Filing, March 9, 2018, 162 FERC ¶ 61,205, Docket No. ER18-619, (https://www.ferc.gov/CalendarFiles/20180309230225-ER18-619-000.pdf),

11 See FERC Docket No. EL19-86.

12 PJM MOPR order at P. 159.

13 *Comments of David B. Patton, Ph.D, Regarding State Policies Affecting Eastern RTOs*, Docket No. AD17-11, p. 4, (https://www.ferc.gov/CalendarFiles/20170426150115-Patton,%20Potomac%20Economics.pdf).

redundant capacity, resulting in a loss of needed revenue for the state-supported resources and the need for consumers to pay for extra capacity they do not need.

The New MOPR Policy is Unbounded in Scope, Potentially Applying to All Products in All Regions

State and local public policies affect generation resources in many ways. Many renewable portfolio standards (RPS) were passed in the same state legislation as their electric system restructuring policies. In other words, state regulation of generation and related financial incentives have long co-existed with centralized wholesale markets for generation. Former FERC Chairman Norman Bay noted, "The premise of the MOPR appears to be based on an idealized vision of markets free from the influence of public policies. But such a world does not exist, and it is impossible to mitigate our way to its creation."[14] Public policies vary in many dimensions: state vs federal, capital cost vs operating cost support, forms of insurance vs direct cost support, environmental vs economic development vs other social objectives, forms of zoning and resource access vs economic factors, and more. Sometimes impacts are direct and sometimes they flow indirectly from upstream sectors. Some policies are technology specific while others, such as Renewable Portfolio Standards, allow competition between technologies. It is not clear which will be caught in the MOPR net, or whether the MOPR tool will be able to mitigate the particular impact of each policy.

Broad MOPR application to state policies does not recognize that many state policies are themselves designed to correct market failures. A state may consider environmental impacts to be a cost to society that should be internalized, consistent with standard economic theory. In this case, policies compensating resources for clean attributes *enhance* rather than detract from market efficiency, as explained by scholars at the Institute for Policy Integrity.[15]

Certainly not all state policies are efficient or objectively beneficial. Each observer likely has different opinions of which of those policies are ill-advised and which are "legitimate." RTOs and FERC can and do provide their input into state legislative processes. For better or worse, Congress has reserved to states the authority to regulate generation, so long as those regulations are not inappropriately tethered to or aiming at matters within FERC's jurisdiction. If states continue to enact policies influencing the generation resource mix, as they have shown increasing interest in doing, and federally regulated RTOs impose cost increases each time, costs to consumers will rise.

FERC has not yet explained how a broad MOPR is consistent with decades of regulatory policy regarding what is a "just and reasonable" rate in a market. FERC policy has been clear that a just and reasonable rate in a market is the price where demand and supply intersect, as long as market power is absent or mitigated. This has been the general framework established by FERC and the courts since electricity competition began in the early 1990s.[16,17,18] This standard calls for careful identification of market power, and tailored mitigation to address it.

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14 FERC (2017), *Order Granting Complaint in Part and Denying in Part*, 158 FERC ¶ 61,137, Docket No. EL16-92-000, February 3, 2017, Bay concurrence, p. 2, (https://elibrary.ferc.gov/IDMWS/common/opennat.asp?fileID=14483864).

15 Bialek and Unel (2018), *Capacity Markets and Externalities: Avoiding Unnecessary and Problematic Reforms*, April 2018. (https://policyintegrity.org/files/publications/Capacity_Markets_and_Externalities_Report.pdf).

16 Elizabeth Gas Co. v. F.E.R.C., 10 F. 3d. at 870 (DC Cir. 1993), (https://www.leagle.com/decision/199387610f3d8661752).

17 "[I]n a competitive market, where neither buyer nor seller has significant market power, it is rational to assume that the terms of their voluntary exchange are reasonable, and specifically to infer that the price is close to marginal cost, such that the seller makes only a normal return on its investment." See Tejas Power Corp. v. FERC, 908 F.2d 998, 1004 (D.C. Cir. 1990), (https://casetext.com/case/tejas-power-corp-v-ferc).

18 Gramlich (2006), "The Role of Energy Regulation in Addressing Generation Market Power," March 31, 2006, (https://gridprogress.files.wordpress.com/2019/07/the-role-of-energy-regulation-in-addressing-generation-market-power.pdf).

FERC mitigation of state policy may also violate its obligation to avoid over-mitigation.[19] The courts have reined in the Commission when it fails to carefully identify market power and tailor mitigation to it. Market power analysis requires a demonstration of an incentive and ability to exercise market power. Such demonstrations of market power are not present in the recent FERC proceedings where broad MOPR has been applied. While it is true that RTOs are involved in mitigating generation (seller) market power, these programs are based on well-defined structural market failures such as pivotal supplier situations. Correctly or incorrectly, extensive market power analysis and regulatory proceedings were undertaken to balance over- and under-mitigation. No such effort has been made for broadly applying mitigation to buyer-side market power.

Applying MOPR broadly could expand beyond PJM's capacity market and apply to other products and other regions. FERC has approved, either in preliminary or final form, application of a broad MOPR in New England and PJM, and will soon consider it for the New York ISO. It could apply to other regions that do not have mandatory capacity markets. The same unbounded principle where any policy that impacts markets should be subject to mitigation could be used for market participant bids for other products in addition to capacity, such as energy and ancillary services.

III. CURRENT STATUS OF MOPR POLICY IN PJM

A major decision regarding the PJM region's capacity market is before the Commission at the time of this writing.[20] PJM Interconnection is not only the nation's largest grid operator, but the PJM capacity market is the largest single auction of electric power in the country, if not the world, with over $10 billion in value determined in a single auction.

The proposal before FERC was submitted by PJM, with significant influence from recent FERC decisions in PJM and other regions noted above outlining the Commission's new policy supporting broad MOPR. In June 2018, FERC declared the entire PJM capacity market unjust and unreasonable, relying on the theory that state policies were suppressing prices in PJM's market.[21] There was no demonstration, finding, or even analysis of buyer-side market power—FERC's traditional basis for applying the MOPR to a capacity resource. To mitigate the market distortion it found resulted from state policies, FERC directed broad application of MOPR to all resources that receive material out-of-market revenues pursuant to state law. However, FERC also proposed a potential workaround to the adverse impacts of a broad MOPR, in the form of a carve-out for state-supported resources called a "Fixed Resource Requirement-Resource-Specific" (FRR-RS). In the FRR-RS, a load-serving entity could undertake direct bilateral purchases of capacity from state-supported resources subject to MOPR, and correspondingly reduce the amount of capacity it needs to buy through PJM's centralized market. The FRR-RS builds upon an existing mechanism, the FRR, whereby utilities can avoid purchases from PJM's centralized capacity market by showing they have covered their capacity needs outside that market.

Since the June 2018 FERC order, PJM developed its specific proposal through its stakeholder process. While numerous parties filed proposals for a FRR-RS that would facilitate state policies and protect

19 Edison Mission Energy v. FERC, 394 F.3d 964 (D.C. Cir. 2005), (https://caselaw.findlaw.com/us-dc-circuit/1050761.html): "[Mitigation] may well do some good by protecting consumers and utilities against… the exercise of market power. But the Commission gave no reason to suppose that it does not also wreak substantial harm."

20 The FERC Docket is ER18-1314.

21 FERC Order on PJM Capacity market "We find it unjust and unreasonable, and unduly discriminatory or preferential, for a resource receiving out-of-market payments to benefit from its participation in the PJM capacity market, by not competing on a comparable basis with competitive resources." Par 66. FERC (2018), *Order Rejecting Proposed Tariff Revisions, Granting in Part and Denying in Part Complaint, and Instituting Proceeding Under Section 206 of the Federal Power Act*, (June 29, 2018), 163 FERC ¶ 61,236, Docket Nos. EL16-49-000, et al., (https://www.ferc.gov/CalendarFiles/20180629212349-EL16-49-000.pdf).

consumers, PJM chose instead to file a proposal that it called the "extended resource carve-out" or "extended RCO." Under this policy, the bilateral purchases would be allowed, but the prices in the central market would still be raised to reflect what the prices would be if the resources were excluded. The proposal is a complicated two-step auction in which the first run determines which resources are accepted and the second run sets the new (higher) price. That price is paid to all resources that clear in the first run. There is also a payment to resources that did not clear due to the presence of the state-supported resources. These resources are held harmless, and consumers pay for them, though they are not obligated to provide capacity or energy services.

The PJM proposal not only mitigates resources subject to state policy, but also renewable resources purchased voluntarily by consumers, such as the large and growing corporate energy user sector. Such transactions are not influenced by state policy, yet PJM still imposes MOPR bid restrictions on them. Thus, PJM's proposal is not only a broad mitigation of all state policy, but also a mitigation of voluntary transactions.

FERC can approve, reject, or modify the PJM proposal. As the matter is being considered under Section 206 of the Federal Power Act, FERC has more leeway to fashion a policy than it would in response to a Section 205 filing, where FERC is mostly constrained to a role of accepting or rejecting an RTO's proposal. However, the PJM proposal is among the most fully developed of the proposals submitted in response to the June 2018 order, with tariff provisions ready to be implemented, and thus provides an administratively easier path to implementation for FERC.

IV. THE COST OF MOPR IN PJM

As mentioned in the executive summary, the total cost of the MOPR to PJM consumers could reach $5.7 billion per year, a 60% increase in cost compared to the current capacity market. The MOPR would impose significantly higher costs on electricity users in all PJM states, and the average residential customer in PJM could see their electric bill increase by over $6 per month.

Methodology

The analysis began with a calculation of the amount of generating capacity that could be subject to the MOPR if it is implemented in a way that prevents resources that receive state incentives from participating in the capacity market.[22] The following table identifies the nameplate capacity of these resources, as well as the capacity credit PJM gives to those resources in its capacity market. Only renewable resources procured after 2018 to meet state RPS targets were counted. Existing renewables are less likely to be affected by the new MOPR policy because PJM has proposed that existing renewables' offer price floor would be near zero, as they have little to no avoidable cost.

TABLE 2 | *Total annual cost by state of PJM MOPR*

STATE *	TOTAL ANNUAL COST ($ MILLIONS)	$ PER AVERAGE MONTHLY RESIDENTIAL BILL
Ohio	$1,100	$6.01
Pennsylvania	$956	$5.75
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TOTAL/AVERAGE	**$5,658**	**$6.06**

** Note: PJM serves only a portion of the consumers in some of these states, explaining the lower cost impacts in Michigan, North Carolina, Indiana and Kentucky, in particular.*

The first four rows in the table show over 9,600 MW (accredited capacity[23]) of existing fossil and nuclear resources that receive significant state incentives, while over 14,300 MW (accredited capacity) of future renewable resources needed to meet state RPS targets could also be subject to the MOPR. Many of those state RPS policies reach their final targets in the year 2030, but much of that renewable deployment is likely to be front-loaded to take advantage of federal tax credits that are available through the year 2023. Combined with the existing subsidized fossil and nuclear capacity, this indicates around 24,000 MW of accredited capacity could be subject to the MOPR in the next capacity auction. The actual amount of accredited capacity removed by the MOPR could be lower if some of these resources were unable to clear the capacity market even without the MOPR in place, if resources are able to use exemptions to the MOPR, or if renewable deployment to meet state RPS policies occurs more gradually over the next decade.

This 24,000 MW of accredited capacity is remarkably close to the 23,741 MW that the PJM Independent Market Monitor (IMM) studied in an estimate of the impact on capacity prices from removing resources from the capacity market, albeit due to a different policy.[24] The IMM assessed the impact on capacity market prices from removing 23,471 MW of capacity under the resource-specific FRR option described above with the auction cleared under PJM's proposed repricing method, which calculates what prices

22 For the purposes of this analysis, we have modeled PJM's MOPR proposal to implement an Extended Resource Carve Out, which removes subsidized resources that cannot clear the capacity market when calculating capacity market prices.

23 "Accredited capacity" is based on PJM rules intended to estimate the likelihood a resource is available to serve peak load. It is called "unforced capacity," meaning it is reduced from nameplate capacity by forced outage rates for the unit in question.

24 See PJM Independent Market Monitor, "MOPR/FRR Sensitivity Analyses of the 2021/2022 RPM Base Residual Auction," September 2018, pages 15-17, available at https://www.monitoringanalytics.com/reports/Reports/2018/IMM_MOPR_FRR_Sensitivity_Analyses_Report_20180926.pdf

would have been without that capacity. The impact on PJM capacity market prices under the MOPR is likely to be comparable to the IMM's estimate, as both policies have the effect of increasing prices by removing supply from the capacity market. Because the IMM has access to confidential information about the shape of the capacity supply curve and which resources have cleared the capacity market, the IMM's estimate of the relationship between supply and price is likely to be more accurate than any estimate from an outside party. As a result, the IMM's estimate of an RTO-wide $94.67/MW-day price increase is a reasonable proxy for the impact the MOPR could have in the next PJM capacity auction.

TABLE 3 | *PJM generating capacity potentially subject to the MOPR*

RESOURCE	MW NAMEPLATE	CAPACITY VALUE	ACCREDITED CAPACITY MW
OVEC coal units	2300	91.1%	2,096
OH nuclear units	2150	98.4%	2,116
NJ nuclear units	3631	98.4%	3,573
IL PJM nuclear units	1880	98.4%	1,850
MD 2019 ORECs	70	27%	19
NJ generic RPS, wind	2440	13%	317
NJ generic RPS, solar	1545	60%	927
NJ solar carveout	2598	60%	1,559
NJ offshore wind	3500	27%	945
Incremental Illinois RPS demand 2019-2030, wind	911	13%	118
Incremental Illinois RPS demand 2019-2030, solar	2015	60%	1,209
Other post-2018 state RPS demand, wind	3730	13%	485
Other post-2018 state RPS demand, solar	9134	60%	5,480
MD RPS expansion, wind	2082	13%	271
MD RPS expansion, solar	4675	60%	2,805
MD offshore RPS expansion	762	27%	206
ACCREDITED CAPACITY SUM			**23,975 MW**

The $94.67/MW-day price increase was multiplied by the 163,627 MW of capacity procured in the last PJM capacity auction to arrive at the total PJM cost increase of $5.658 billion per year. To estimate the impact on different states, we allocated the total PJM cost of $5.658 billion across the PJM states using the capacity requirement for each PJM zone.[25] The cost to the average PJM residential customer for each state was calculated using EIA residential electricity consumption data.[26]

These results likely underestimate the price increase in PJM states and zones that are likely to have a large amount of capacity subject to the MOPR. For example, capacity market prices in much of New Jersey and parts of neighboring states have historically been higher than in other PJM zones, and MOPR would likely exacerbate that because the state has a large amount of existing nuclear capacity and future renewable capacity that benefits from state incentives. This would result in even higher costs to customers in those states.

It should be noted that this method is intended to estimate the cost of imposing the MOPR in the near-term, when capacity supply is inelastic (unable to increase in response to higher prices) so the primary impact of reducing capacity supply is to increase capacity market prices. This tends to impose a large cost on consumers, as the higher price applies to all MW of capacity procured in the capacity market. Over the longer-term (after market participants have had time to build new generating capacity, which typically requires at least several years for most large-scale resources), supply will increase in response to the

25 PJM, "Summary of 2021/2022 Base Residual Auction Results," May 2018, available at http://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2021-2022/2021-2022-base-residual-auction-results.ashx; the cost for multi-state PJM zones were allocated based on the number of customers in each state

26 Energy Information Administration, "2017 Average Monthly Bill- Residential," available at https://www.eia.gov/electricity/sales_revenue_price/xls/table5_a.xlsx

higher prices and prices will return to their equilibrium level. However, consumers will still bear the cost of buying capacity from the market that is redundant with the capacity provided by incentivized resources, but which the MOPR policy prevents from clearing the market. We have previously estimated the long-run cost to consumers under a MOPR in PJM to be up to $2.5 billion per year.[27]

27 "Affidavit of Michael Goggin," May 2018, available at https://gridprogress.files.wordpress.com/2019/08/affidavit-of-michael-goggin-grid-strategies-llc.pdf

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