UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Cricket Valley Energy Center LLC and Empire Generating Company, LLC,	)	
Complainants,	)	
v.	)	**Docket No. EL21-7-000**
New York Independent System Operator, Inc.,	)	
Respondent.	)	

PROTEST OF CLEAN ENERGY PARTIES

Pursuant to Rule 211 of the Federal Energy Regulatory Commission's ("FERC" or "Commission") Rules of Practice and Procedure,[1] the Sustainable FERC Project, Natural Resources Defense Council, Sierra Club, American Wind Energy Association, Alliance for Clean Energy New York, and Advanced Energy Economy (collectively, "Clean Energy Parties") respectfully submit this Protest in response to the Federal Power Act ("FPA" or "the Act") Section 206[2] complaint ("Complaint") filed on October 14, 2020, by Cricket Valley Energy Center LLC ("Cricket Valley") and Empire Generating Company, LLC ("Empire Generating") (collectively, "Complainants") against the New York Independent System Operator, Inc. ("NYISO") in the above-captioned docket.

Specifically, Complainants request fast-track processing and the issuance of an order on or before December 31, 2020, finding that the offer floor rules set forth in Attachment H to

[1] 18 C.F.R. §§ 385.211 and 214.
[2] 16 U.S.C. § 824e.

NYISO's Market Administration and Control Area Services Tariff (the "Services Tariff")[3] are unjust, unreasonable, and unduly discriminatory and establishing a replacement rate.

For the reasons set forth herein, the Clean Energy Parties protest the Complaint and urge the Commission to reject it because Complainants have failed to demonstrate that the existing rate is unjust and unreasonable and because the proposed expanded Minimum Offer Price Rule ("MOPR") is not just and reasonable. The Complainants have also failed to establish a need for fast track review. Clean Energy Parties also urge the Commission to provide an opportunity for stakeholders to work through its shared governance process and the New York Public Service Commission's ("NYPSC") resource adequacy proceeding to explore opportunities to durably integrate policy with NYISO's capacity market design.[4]

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[3] Capitalized terms used and not otherwise defined herein have the same meaning as that provided in the Services Tariff, or if not defined therein, in the NYISO's Open Access Transmission Tariff ("OATT"). The Offer Floor Rules are set forth in Section 23.4.5.7 of Attachment H to the Services Tariff. Although the rules are labelled therein as "Buyer-Side Market Power Mitigation Measures for Installed Capacity," Complainants refer to them as the "Offer Floor Rules."

[4] N.Y. State Pub. Serv. Comm'n, Case 19-E-0530, *Order Instituting Proceeding and Soliciting Comments* (Aug. 8, 2019), http://documents.dps.ny.gov/public/Common/ ViewDoc.aspx?DocRefId=%7b1D25F4BE-9A05-463F-A953-790D36E318BC%7d.

I. SUMMARY OF ARGUMENT

The complaint filed by Cricket Valley Energy Center, LLC and Empire Generating Company LLC is meritless and must be rejected by the Commission. These two uneconomic gas generators seek to transform NYISO's capacity market from a tool designed primarily to ensure cost-effective resource adequacy into a mechanism to prop up generation resources not needed for reliability. As explained in the written testimony of Dr. Kathleen Spees and Dr. Samuel A. Newell of The Brattle Group, *The Economic Impacts of Buyer-Side Mitigation in New York ISO Capacity Market*, the economic theory underlying this complaint is fundamentally flawed and would yield a "capacity market that excludes a large majority of the fleet, with market clearing outcomes having no relationship to underlying supply and demand fundamentals."

The Brattle Group's analysis shows that expanding NYISO's Buyer-Side Mitigation (BSM) rules as requested in the complaint would result in almost 3,900 UCAP MW of redundant gas- and oil-fired plants clearing the capacity market over the next decade that otherwise would have been replaced by state policy resources. This amount is supplemental to the over 3,000 UCAP MW of thermal plants that would be unnecessarily retained over the next decade by the BSM as it already applies in more limited areas of New York. Drs. Spees and Newell estimate the total cost to New York consumers of the MOPR expansion sought by this complaint at $1.3 billion annually by 2030. Rarely do consumers get so little for so much.

Complainants have failed to meet their burden under Section 206 to establish that the existing capacity market rules, including the offer floor rules, are unjust and unreasonable. *First*,

Complainants have not established that the allegedly low capacity prices caused by unmitigated participation of state policy resources imperils resource adequacy. NYISO is currently oversupplied with capacity and low capacity prices are indicative of a high level of resource adequacy in a capacity market with a downward sloping demand curve like NYISO's. *Second*, the complaint fails to establish that the state policies it targets reflect any exercise of buyer-side market power or attempt at market manipulation that would justify mitigation, nor would its proposal balance the risks of over- and under-mitigation, as part of the necessary standard for setting just and reasonable rates. Instead the Complaint proposes precisely the opposite – a sweeping change that would enrich existing generators at customer expense without corresponding benefit, that creates more harm than benefit, that is not tailored to the scope of any actual ability or incentive to suppress capacity prices, and fails to balance the interests of investors and consumers.

Third, while Complainants contend that NYISO's capacity market rates are unjust and unreasonable simply because those rates reflect costs and benefits created by state policy, this argument is unavailing. Complainants' contention that FERC should purify its markets of the impacts of public policy is both futile and likely to be implemented in a discriminatory manner, especially when considering the substantial historic and ongoing subsidies that have benefited fossil generation. More fundamentally, Complainants are incorrect that the influence of state policies on markets renders the prices unjust and unreasonable—such policies actually work to correct for well-established market failures (environmental externalities) and to rationalize supply and demand.

Fourth, Complainants have not shown that they have been deprived of their constitutional right to an opportunity to recover their costs as a result of the current NYISO capacity rates. The

record establishes that merchant gas generators in New York including one of the Complainants, attribute their financial headwinds to low energy prices and higher than expected costs, not lower-than-expected capacity costs. Moreover, any impacts of New York public policy on the revenues these facilities can earn should have been foreseen by investors, as New York has been pursuing increasingly ambitious decarbonization policies for nearly two decades.

Fifth, Complainants take a shortcut in their argument that the status quo is not just and reasonable in NYISO—urging a facile transposition of the broad MOPR the Commission recently imposed upon PJM to NYISO without considering factors unique to NYISO. Complainants fail to consider the differences in how NYISO's capacity market works with other facets of the ISO and state regulatory structure to ensure resource adequacy, and the unique circumstances arising in a single-state ISO.

Finally, while simultaneously failing to develop a thorough analysis, put forth the factual record necessary to support its sweeping request, or assemble a significant coalition, Complainants simultaneously seek to circumvent entirely the stakeholder process that would best assist in developing the necessary record.

While Complainants have failed to meet their burden to show that the existing rates are not just and reasonable, they have also failed to establish that the replacement rate they call for is just and reasonable. Complainants' proposal to expand BSM to state environmental policy resources in the entire NYISO market relies on a deeply flawed theory totally detached from fundamental economic principles – including those Complainants purport to hold sacrosanct – and fails to meet statutory requirements to ensure just and reasonable rates that are not unduly

discriminatory. As a result, Complainants fail to establish the record necessary for the Commission to justify application of the PJM MOPR to the NYISO capacity market.

As a threshold legal flaw, Complainants' legal theory fails to conduct statutorily required balancing of consumer costs against investor benefits and fails to protect consumers from excessive rates.

The basic premise of Complainants' proposed replacement rate is that NYISO should protect the competitiveness of its market by offsetting or otherwise nullifying the benefits certain suppliers receive as a result of state policies, so as to protect revenues and market share for resources that don't receive similar benefits. As explained by The Brattle Group, which routinely advises NYISO and the NYPSC on the economics of its markets, the Complainants' economic arguments are incomplete and flawed.

Those arguments first fail to acknowledge that the state policies at issue address well-understood market failures such as environmental externality costs, and are thus not subsidies distorting the market but instead policy-driven corrections that improve the efficiency of the market. Next, Complainants inaccurately characterize the low market prices of state policy resources as reflecting inappropriate "price suppression" that threatens the long-term capacity market supply, when in fact compensating non-emitting resources for their environmental value simply lowers their net cost of production and makes them correctly appear more competitive as capacity providers with high energy and ancillary services value. Brattle also explains why MOPR is unnecessary to preserve reliability in a market with a downward sloping demand curve, where low prices are an indicator of a high degree of resource adequacy, rather than a warning sign it may be under threat.

Contrary to Complainants' assertions that MOPR is needed to protect their investments from regulatory risk, a market where prices are artificially increased by a rule as contested and legally problematic as the MOPR does not lay a foundation for stable investment, and would in fact undermine the greater degree of investment certainty that Complainants purport to seek. The greater uncertainty and instability associated with MOPR not only arises from the fact that it may be overturned by a court or reversed by a future Commission, but also the increasing probability that states committed to achieving decarbonization goals will leave capacity markets or FERC-jurisdictional markets altogether. Expansion of MOPR will not yield just and reasonable rates in NYISO—instead FERC should return this tool to its narrow original purpose of mitigating the exercise of buyer-side market power.

Finally, expanded MOPR would not be just and reasonable because FERC lacks the authority to implement a wholesale market rule that so thoroughly and intentionally usurps the state's prerogative to regulate generation facilities and generally enact policies to address environmental and social impacts of these facilities. By defining the problem as the impact of legitimate state policies on markets and then tailoring the scope of the remedy to undo the effects of those policies, FERC infringes on an area of state authority. Additionally, the Commission should view Complainant's arguments with even greater skepticism because of unique aspects of the New York ICAP framework. The unique interplay of the ICAP market with state-jurisdictional reliability criteria, which Congress specifically allowed to exceed otherwise-applicable national reliability rules, should give the Commission pause before adopting the bull-in-a-china-shop approach that Complainants seek. The "Clean MOPR" would result in mitigation of lawful state aims, while upsetting a carefully designed reliability and capacity

procurement construct in which NYISO plays an essential role. The Commission should instead uphold New York's ability to pursue lawful goals untethered from affecting wholesale markets.

Clean Energy Parties therefore urge the Commission to promptly dismiss this complaint.

II. BACKGROUND

A. The purpose of capacity markets is to support reliability at minimal cost to consumers through price signals capable of guiding the orderly entry and exit of resources.

Electricity capacity markets are a means to an end, not an end in themselves.[5] Their purpose is to protect the public from any excessive costs for maintaining resource adequacy, which is the ability of the electric system to supply electrical demand and energy requirements at all times. In most of the United States, the electric system is considered "adequate" if the system has enough supply available to ensure that an involuntary loss of load (blackout) occurs no more than once every ten years.[6] Capacity markets, like competitive wholesale markets generally, are intended to provide reliable electric services at the least cost possible. Ensuring adequate resource capacity involves a complex combination of forecasting demand and providing sufficient incentives to ensure future supply will be on line to meet that demand; capacity markets are just one of several approaches to tackling this issue.

All competitive wholesale markets operated by regional transmission organizations or independent system operators ("RTO/ISOs") employ energy and ancillary service markets to provide electricity to customers on a short-term basis. These short-term markets reflect the

[5] *New York State Pub. Serv. Comm'n. and New York State Energy Research and Dev. Auth. v. New York Indep. Sys. Operator, Inc.*, 173 FERC ¶ 61,060, Glick Dissent at P 15 (Oct. 15, 2020).
[6] Johannes P. Pfeifenberger, Kathleen Spees, Kevin Carden, Nick Wintermantel, *Resource Adequacy Requirements: Reliability and Economic Implications*, at 5, The Brattle Group, (Sept. 2013), https://www.ferc.gov/sites/default/files/2020-05/02-07-14-consultant-report.pdf

marginal cost of system operations at granular locational levels and short time intervals.[7] They provide incentives for long-term resource investment (retirement or new entry) by providing a basis for forward price expectations. The revenues from marginal cost pricing, however, are not enough to cover the costs of resources at a level necessary to meet reliability standards.[8] RTO/ISOs therefore employ a variety of approaches (including contracting, scarcity pricing, and capacity markets) to supplement the signals provided by the energy and ancillary services markets to facilitate new investment, retirement decisions, and participation by demand response.

Capacity markets employ a market-based approach to address the "missing money" that resources need to remain viable but are unable to earn solely by providing energy and ancillary services. Specifically, they provide price signals through a competitive capacity auction design that sets prices at the intersection of sellers' capacity market supply offers and the administrative demand curve in each transmission-constrained location and system-wide. Under this framework, the market produces prices consistent with supply-demand conditions. The market produces low prices when there is more than enough supply to meet resource adequacy needs, and it produces high prices when capacity supply is scarce.[9] Capacity markets are thus a mechanism for attracting new investments and retaining supply, in which private parties may respond to competitive pricing signals to enter the market when supply is tight (and prices are high) or exit the market when supply is long (and prices are low).

Efficient outcomes in capacity markets rely upon resources competing with each other to require as little capacity market revenue as possible to cover their going forward costs. For the

[7] Devin Hartman, *Enhancing Market Signals For Electric Resource Adequacy*, at 5, R Street Policy Study No. 123, (Dec. 2017).
[8] *Id.*
[9] Brattle Testimony at 9.

market to be truly competitive, resources must have the flexibility to reflect and bear the risk of their own expertise, experience, technology, risk tolerance, and whatever else might provide them with a competitive advantage in the quest to provide capacity at the lowest possible cost.[10] Capacity sellers offer their resources into the market at the minimum price they are willing to accept to come online or stay in the market.[11] For any given resource, the minimum price they are willing to accept is driven by a number of factors including primarily: (a) costs associated with bringing new supply into the market or maintaining an existing facility that needs re-investment; and (b) minus any anticipated net revenues that could be earned from energy markets, ancillary service markets, or other revenue sources (such as sales of renewable energy credits (RECs), steam, or gypsum).[12] Many sellers also adjust their capacity offer price based on any bilateral sales agreements for capacity or any co-products they may produce; as well as based on their long-term view of future energy and capacity prices.[13] Sellers that are able to pre-sell most of their capacity or energy through bilateral contracts would typically have their going forward costs covered by their anticipated revenues and so, using the formula above, would offer into the capacity market at a zero price, as would most sellers that have already come online and have few going-forward capital investments.[14]

The "correct" capacity price in a competitive and efficient market is the one that accurately reflects underlying fundamentals of supply and demand, and can accurately price signal when and where capacity investments are needed (and when high-cost resources can retire).[15] When new resources are required to offer capacity at administratively-determined

[10] 173 FERC ¶ 61,060, Glick Dissent at P 5 (Oct. 15, 2020).
[11] Brattle Testimony at 9.
[12] *Id*.
[13] *Id*.
[14] *Id*.
[15] *Id.* at 12.

prices (i.e., price offer floors) that negate out-of-market revenues, it creates a systemic bias in favor of existing resources and curtails resources' incentive and ability to compete across all possible dimensions.[16] This bias has a chilling effect on the development of new technologies and resources needed to satisfy state or federal public policies and slows the transition to a cleaner, more advanced resource mix. Ignoring out-of-market revenues also undermines the integrity of the capacity market because the set of resources selected in market auctions do not reflect the lowest-cost or most efficient means of ensuring resource adequacy. The capacity market thus becomes a mechanism for propping up prices and protecting incumbent generators that tend to be old, inefficient, and highly polluting. Market rules that establish administratively-determined prices to negate out-of-market revenues are inefficient and anti-competitive.[17]

B. New York State has unique authority over resource adequacy and reliability.

Prior to the restructuring of the State's electric industry in the 1990s, the New York Public Service Commission ("NYPSC") ensured that vertically integrated investor-owned utilities ("IOUs") maintained adequate amounts of system resources to reliably serve customers. The IOUs were also members of the New York Power Pool ("NYPP"), which employed an Installed Reserve Margin ("IRM") that required the IOUs to maintain generation levels sufficiently above forecasted peak demand to meet the one loss-of-load day per ten years reliability standard.[18]

In accordance with electric industry restructuring initiatives, the NYPSC approved the transfer of operational control over certain transmission assets from the IOUs to the NYISO in

[16] *Id*.
[17] *Id.* at 13–16.
[18] *See generally* NYPSC, Case No. 29409, *Plans for Meeting Future Electricity Needs in New York State*.

1999.[19] As a condition of this transfer of control, the IOUs' responsibility for maintaining applicable levels of capacity was delegated to the NYISO to ensure that the competitive market would maintain the reserves needed to ensure reliability (i.e., to meet the IRM). Since the NYISO was established, resource adequacy in New York State has been maintained through a series of state-administered and NYISO tariff processes that build on the ICAP arrangements that were established by the NYPP, and are subject to review and approval by both the NYPSC and FERC.

Despite electric industry restructuring, New York State maintains significant authority for electric reliability. Under state law, NYPSC remains statutorily obligated to address resource adequacy matters that fall within its statutory authority under the Public Service Law, including its duty to ensure that electric service is provided in a manner that is "safe and adequate and in all respects just and reasonable."[20] And, it has further authority to "encourage [jurisdictional entities] to formulate and carry out long-range programs . . . for the performance of their public service responsibilities with economy, efficiency, and care for . . . preservation of environmental values and the conservation of natural resources."[21] To carry out its obligations, the NYPSC has "power to order such reasonable improvements as will best promote the public interest, preserve the public health and protect those using such . . . electricity."[22]

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[19] NYPSC, *Order approving transfer of operational control and of physical and deferred assets from the investor-owned utility Member Systems of the New York Power Pool to the New York Independent System Operator*, Case No. 99-E-0745, Joint Petition of Central Hudson Gas & Electric Corporation, et al. (Sep. 21, 1999).
[20] N.Y. Pub. Serv. Law § 65(1).
[21] N.Y. Pub. Serv. Law § 5(2). *See Consol. Edison Co. of N.Y. v Pub. Serv. Comm'n of State of N.Y.*, 47 N.Y.2d 94 (1979) *reversed on other grounds* (describing the broad delegation of authority to the Commission and the Legislature's unqualified recognition of the importance of environmental stewardship and resource conservation in amending the N.Y. Pub. Serv. Law to include § 5).
[22] N.Y. Pub. Serv. Law § 66(2) (The Commission also has authority under this section to "order reasonable improvements and extensions of the works, wires, poles, lines, conduits, ducts and other reasonable devices, apparatus and property of…electric corporations and municipalities.").

The FPA generally reserves resource adequacy matters to states by expressly reserving the right for states to exercise jurisdiction "over facilities used for the generation of electric energy or over facilities used in local distribution."[23] The FPA also reflects the nexus between resource adequacy and reliability matters by authorizing FERC to "develop and enforce compliance with reliability standards" covering the bulk power system. However, it explicitly prohibits FERC from "order[ing] the construction of additional generation or transmission capacity or to set and enforce compliance with standards for adequacy or safety of electric facilities or services."[24] Moreover, FERC's jurisdiction over reliability standards preserves the "authority of any State to take action to ensure the safety, adequacy, and reliability of electric service within that State, as long as such action is not inconsistent with any reliability standard, except that the State of New York may establish rules that result in greater reliability within that State, as long as such action does not result in lesser reliability outside the State than that provided by the reliability standards."[25] Thus, Congress conferred upon New York State the unique authority to impose stricter reliability rules than national and regional requirements set by FERC.

NYISO's operation of the New York State Bulk Power System is ultimately subject to three levels of review by reliability organizations. First, North American Electric Reliability Corporation ("NERC"), which is the Electric Reliability Organization for the United States under Section 215 of the FPA,[26] establishes mandatory electric standards for power system operations and planning. Second, the Northeast Power Coordinating Council ("NPCC"), which serves as the

[23] 16 U.S.C. §824(b)(1).
[24] 16 U.S.C. §824o(h)(i).
[25] *Id.*
[26] Energy Policy Act of 2005, P.L. 109-58 (Aug. 8, 2005).

regional entity for conducting compliance review and enforcement for NERC, establishes reliability criteria that are more specific and/or more stringent than the NERC standards for the northeastern United States and Canada.[27] Third, the New York State Reliability Council ("NYSRC") establishes New York State Reliability Rules that are more specific and/or more stringent than the NERC standards and NPCC criteria.[28] NYSRC has promulgated its own more specific resource adequacy rule.[29] The NYPSC has repeatedly adopted the NYSRC Reliability Rules as New York State regulations.[30] The NYISO is required to comply with the NYSRC Rules and NPCC Criteria.[31]

C. NYISO's capacity market is designed to send price signals that meet long-term resource adequacy objectives in the most cost-effective manner for consumers

[27] New York State Reliability Council, *Reliability Rules & Compliance Manual For Planning and Operating the New York State Power System*, Rule A.1 R.1, (May 11, 2018, Version 43) states:
R1. The NYSRC shall annually perform and document an analysis to calculate the NYCA Installed Reserve Margin (IRM) requirement for the following Capability Year. The IRM analysis shall:
R1.1 Probabilistically establish the IRM requirement for the NYCA such that the loss of load expectation (LOLE) of disconnecting firm load due to resource deficiencies shall be, on average, no more than 0.1 days per year. This evaluation shall make due allowances for demand uncertainty, scheduled outages and deratings, forced outages and deratings, assistance over interconnections with neighboring control areas, emergency NYS Transmission System transfer capability, and capacity and/or load relief from available operating procedures.
R1.2 Utilize the methodology and modeling parameters for establishing NYCA IRM requirements and a timeline for the study process, as described in NYSRC Policy 5 "Procedure for Establishing NYCA Installed Capacity Requirements."
R1.3 Prepare a technical report documenting the assumptions, models, methodology and results of the IRM Study.
[28] *See* NYSRC, *Reliability Rules & Compliance Manual: For Planning and Operating the New York State Power System*, (July 17, 2020, Version 45).
[29] *Id.*
[30] NYPSC, *Order Adopting New York State Reliability Rules*, Case No. 05-E-1180, In the Matter of the Reliability Rules of the New York State Reliability Council and the Criteria of the Northeast Power Coordinating Council (Feb. 9, 2006); *id.*, *Order Adopting Modifications to New York State Reliability Rules* (Dec. 21, 2006); *id.*, *Order Adopting Second Modifications to New York State Reliability Rules* (July 23, 2007); *id.*, *Order Adopting Third Modifications to New York State Reliability Rules* (Dec. 24, 2007); *id.*, *Order Adopting Modifications to New York State Reliability Rule*s (Feb. 9, 2015); *id.*, *Order Adopting Modifications to New York State Reliability Rule*s (Mar. 21, 2016); *id.*, *Order Adopting Modifications to New York State Reliability Rule*s (Dec. 21, 2016); *id.*, *Order Adopting Modifications to New York State Reliability Rule*s (Dec. 20, 2017); *id.*, *Order Adopting Modifications to New York State Reliability Rule*s (Feb. 13, 2019).
[31] Agreement between the New York Independent System Operator and the New York State Reliability Council, Article 3, http://www.nysrc.org/pdf/Agreements/1999%20NYSRC%20NYISO%20Agreement%20signed.PDF.

The NYISO's wholesale market framework was designed to provide reliable service at least cost through three complementary markets for energy, ancillary services, and capacity. Each market addresses distinct reliability needs. The energy and ancillary services markets provide least-cost dispatch and ensure short-term operational reliability. The capacity market supplements these markets to help meet long-term resource adequacy objectives in the most cost-effective manner. FERC has consistently held that suppliers in competitive markets must have an opportunity to recover their costs but are not guaranteed cost recovery.[32]

NYISO's capacity market framework, the ICAP market, is designed to maintain reliability of the bulk power system by procuring sufficient resource capability to meet system and locational resource adequacy needs.[33] Each year, the IRM is computed by the NYSRC, with technical assistance from the NYISO.[34] The quantity needed for the IRM is first established on an ICAP basis as a reserve margin above peak load, and translated into the amount of MWs of UCAP that must be secured from supply resources. [35] The NYISO oversees the qualification of supply resources that are eligible to meet system and local capacity needs, determining the UCAP of supply each resource is eligible to sell in the summer and winter seasons within each capacity market zone.

Pursuant to the NYISO's FERC-approved tariff, NYISO determines the amount of capacity that each load-serving entity ("LSE") must procure based on the aggregate consumption

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[32] *See, e.g., CXA La Paloma, LLC v. California Indep. Sys. Operator Corp.*, 165 FERC ¶ 61,148 (Nov. 19, 2018) (c*iting Bridgeport Energy, LLC*, 113 FERC ¶ 61,311 at P 29 (2005)), *reh'g denied*, 169 FERC ¶ 61,045 (Oct. 17, 2019).
[33] Brattle Testimony at 9.
[34] Kathleen Spees, et al., *Qualitative Analysis of Resource Adequacy Structures for New York*, at 7, The Brattle Group (May 19, 2020); *see* NYISO, *Manual 4: Installed Capacity Manual*, at 4 (June 5, 2020), https://www.nyiso.com/documents/20142/2923301/icap_mnl.pdf/234db95c-9a91-66fe-7306-2900ef905338.
[35] NYISO, *Manual 4: Installed Capacity Manual*, at 4 (June 5, 2020), https://www.nyiso.com/documents/20142/2923301/icap_mnl.pdf/234db95c-9a91-66fe-7306-2900ef905338.

of its end-use customers over the peak load hour. LSEs may meet their obligation to procure sufficient capacity by either self-supplying, entering into bilateral contracts with capacity suppliers, or through the NYISO-administered auctions. LSEs are required to purchase sufficient amounts of capacity or pay a deficiency charge.[36]

Each LSE has the flexibility to determine how it will meet the resource adequacy obligation through some combination of self-supply, forward bilateral contracting, voluntary participation in NYISO auctions, or reliance on the final mandatory spot auction.[37] However, BSM rules (discussed in Section II.F below) can prevent LSEs from using self-supply or bilaterally-contracted new resources by subjecting them to mitigation and imposing a prohibitive risk that these resources will not clear.[38]

To support and enforce LSEs' ability to fulfill the resource adequacy obligation, NYISO conducts a series of auctions for each delivery year including: (a) voluntary forward 6-month strip auctions for UCAP; (b) voluntary monthly forward auctions conducted 1 to 6 months ahead of time; and (c) mandatory non-forward monthly spot auctions that all LSEs and resources must participate in to resolve any remaining shortfalls relative to their capacity obligations and ensure that all supply is offered for sale.[39]

The mandatory final spot auction incorporates an administratively-constructed, downward-sloping demand curve and determines the final quantity of capacity procured with a bias toward over-procurement.[40] The NYISO establishes a sloped ICAP demand curve for Long

[36] *See* NYISO, Market Administration and Control Area Services Tariff, Sec. 5.14: Installed Capacity Spot Market Auction and Installed Capacity Supplier Deficiencies.
[37] Kathleen Spees, et al., *Qualitative Analysis of Resource Adequacy Structures for New York*, at 7, The Brattle Group (May 19, 2020); *see* NYISO, *Manual 4: Installed Capacity Manual*, at 4 (June 5, 2020), https://www.nyiso.com/documents/20142/2923301/icap_mnl.pdf/234db95c-9a91-66fe-7306-2900ef905338.
[38] *Id.* at 7 n.9.
[39] *Id.* at 7.
[40] *Id.*

Island, New York City, the G-J Locality and for the NYCA as a whole based on four factors: (1) the projected annual net energy and ancillary services revenues of a peaking plant; (2) the locational minimum installed capacity requirement for the locality, and NYCA minimum installed capacity requirement for NYCA-wide; (3) the point at which the value of additional surplus capacity above the applicable minimum requirement declines to $0 ("zero-crossing point"); and (4) the levelized embedded cost of a new peaking plant in each locality, as well as the rest of state capacity region.[41] These separate capacity market prices signal the need for investment in each locality to meet resource adequacy.

D. State policies invariably impact the costs and revenues of supply resources

The NYISO capacity market has never operated in a vacuum. New York State policies have real world impacts that have always shaped the investment environment. This has been true since NYISO's inception as demonstrated by NYISO's first Power Trends Report in 2001, which implored New York State to aggressively pursue policies that would facilitate resource development, conservation, improve fuel diversity, and issued warnings about the State's increased reliance on natural gas as the fuel of choice for electricity production.[42]

New York State has a long history of actively pursuing energy, environmental, and climate policies, including policies that address aspects of resource adequacy. As Brattle's

[41] *See New York Indep. Sys. Operator, Inc.*, 113 FERC ¶ 61,271, 62,066 (Dec. 15, 2005).
[42] *See* NYISO, *Power Alert: New York's Energy Crossroads* (Mar. 2001), https://www.nyiso.com/documents/20142/2223154/2001-Power-Trends.pdf/76414f57-e20d-b17c-142b-5f523fea4afd; *Id.* at 22 ("As part of its energy policy, the State must consider matters of fuel diversity in addition to the issues of economics and adequacy of energy supply. New York through the auspices of its Energy Planning Board needs to study the state's increased reliance on natural gas as the fuel of choice for electricity production.")

testimony notes, New York's steady long-term march toward aggressive climate and clean energy policies would not have escaped the prudent investor:[43]

- As early as 2002, the New York State government expressed concern in its State Energy Plan regarding the reliance of the state on gas-fired electricity and established a goal to increase renewable energy by 50% as a percentage of total load served by 2020, aiming to move from 10% of demand met by renewable energy to 15% by 2020.[44] In 2004, the NYPSC had adopted the more aggressive Renewable Portfolio Standard ("RPS") goal of 25% renewable energy by 2013.[45] Investment in Empire Energy was made against this backdrop, wherein New York had clearly displayed its commitment to promoting renewable energy.

- In 2010 the RPS goal was amended to achieve 30% renewable energy by 2015.[46]

- In December 2015, Through Reforming the Energy Vision ("REV"), New York State Government called for 80% GHG emissions reduction by 2050 and 50% of electricity demand to be met by renewables by 2030.[47]

- On January 25, 2016 the New York State Department of Public Service ("NYDPS") staff published a white paper regarding what was to become the Clean Energy Standard, which aimed to meet the goals set forth by Governor Cuomo 2015. In this white paper they discussed the plan to institute a zero-emissions energy credit ("ZEC") in order to support "a smooth emission-free transition from nuclear to non-nuclear resources in the event that energy prices are not able to support the continued financial viability of the plants during their license lives."[48] The ZEC program was established formally on August 1st, 2016, when the NYPSC adopted the Clean Energy Standard.[49] It was not until January 24, 2017, nearly one year after NYDPS staff published the white paper regarding the ZEC program, which Cricket Valley Energy Center ("CVEC") closed on financing for the Cricket Valley generating facility.[50]

- In July 2018, the NYPSC adopted a supplementary goal to contribute toward the overall objective of the Clean Energy Standard whereby LSEs were obligated to obtain, on behalf

[43] Brattle Testimony at 20–22.
[44] New York State, *2002 New York State Energy Plan*, at Section 1–3 (2002), https://energyplan.ny.gov/Plans/2002.aspx.
[45] NYPSC, *Order Regarding Retail Renewable Portfolio Standard*, Case No. 03-E-0188 (Sept. 24, 2004).
[46] *Id.*, *Order Establishing New RPS Goal and Resolving Main Tier Issue* (Jan. 8, 2010).
[47] New York State, *Reforming Energy Division - REV* (Nov. 13, 2020), https://www.ny.gov/sites/ny.gov/files/atoms/files/REV_WhatYouNeedToKnow2.pdf.
[48] NYPSC, *Staff White Paper on Clean Energy Standard*, at 30, Case No. 15-E-0302 (Jan. 25, 2016).
[49] *Id.*, *Order Adopting a Clean Energy Standard* (Aug. 1, 2016).
[50] *See* Business Wire, *Advanced Power AG Closes Financing of $1.584 Billion Energy Center in Dover, New York* (Jan. 24, 2017).

of their retail customers, the Offshore Wind Renewable Energy Credits ("ORECs") associated with the output of 2.4 GW of new offshore wind generation facilities.[51]

- In July 2019, New York State enacted the Climate Leadership and Community Protection Act ("CLCPA"), which mandates a transition to 70% renewable electricity by 2030, 100% clean electricity by 2040, an 85% reduction in economy-wide greenhouse gas emissions, and another 15% greenhouse gas reduction via offsets by 2050.[52] The CLCPA also expands on the CleES objectives requiring the establishment of programs for at least 9 GW of Offshore Wind by 2035, and requires the NYPSC to develop programs to procure 6 GW of photovoltaic solar generation by 2025, and to support 3 GW of energy storage capacity by 2030. The CLCPA also mandates a just and equitable energy transition by requiring that at least 35 percent of the benefits of the state's clean energy program accrue to historically marginalized communities disproportionately impacted by pollution and climate change.

Merchant generation investors operate in a market and regulatory context that has always included environmental regulations from which they should not be expected to be indemnified any more than they should be charged when regulations work in their favor.[53] But even if investors could not have fully anticipated the full extent or particulars of New York's climate and clean energy ambitions, these policies are within the state's mandate to protect public health and are part of the context in which investment choices are made. Investors choose to bear the risks and rewards associated with changing market conditions and regulations, and there is no reason to indemnify them for their choices.[54]

E. New York addresses environmental externalities through a range of public policies

New York is ideally situated, as a single-state ISO, to align wholesale electricity markets with states' policy goals, and offer market-based solutions that help to achieve these goals reliably at low cost.

[51] NYPSC, *Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement*, Case No. 18-E-0071 (July 12, 2018).
[52] S. 6599, 2019 Sess. Laws of N.Y., at § 2, https://legislation.nysenate.gov/pdf/bills/2019/s6599.
[53] Brattle Testimony at 19.
[54] *Id.* at 15.

New York addresses environmental externalities through a range of public policies and regulations that serve as both carrots and sticks.[55] With respect to greenhouse gas emissions, the most significant policy goal implemented by New York is the CLCPA, which, as discussed above, mandates a transition to 70% renewable electricity by 2030, 100% clean electricity by 2040, an 80% reduction in economy-wide greenhouse gas emissions, and another 15% greenhouse gas reduction via offsets by 2050.[56] It also sets a number of technology-specific goals with respect to offshore wind, storage and distributed solar.[57] As mentioned above, the state's ZEC program that was adopted as part of the state's Clean Energy Program in 2016 was done to ensure "a smooth emission-free transition from nuclear to non-nuclear resources in the event that energy prices are not able to support the continued financial viability of the plants during their license lives."[58]

New York has also implemented policies to address other air pollutants, such as rules promulgated by the New York State Department of Environmental Conservation's ("NYDEC") to impose more stringent NOx emissions limits to simple cycle and regenerative combustion turbines, also referred to as "peaking units," which typically run to meet electric load during peak demand period.[59] The primary purpose of these rules is to lower allowable NOx emissions from these units during high ozone days.[60]

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[55] A list of major policy drivers affecting the electricity sectors can be found in: NYISO, *Reliability and Market Considerations For A Grid In Transition*, at 8–9, Table 1: Potential NYISO Market Design Enhancements (May 2019), https://www.nyiso.com/documents/20142/6785167/Grid+in+Transition+DRAFT+FOR+POSTING.pdf/74eb0b20-6f4c-bdb2-1a23-7d939789ed8c?version=1.1&t=1558703451381&download=true.
[56] S. 6599, 2019 Sess. Laws of N.Y., https://legislation.nysenate.gov/pdf/bills/2019/s6599.
[57] *Id.*
[58] NYPSC, *Staff White Paper on Clean Energy Standard*, at 30, Case No. 15-E-0302 (Jan. 25, 2016).
[59] NYDEC, *Ozone Season Oxides of Nitrogen (NOx) Emission Limits for Simple Cycle and Regenerative Combustion Turbines, Subpart 227-3* (Oct. 7, 2019).
[60] *Id*.

These laws and regulations implemented by New York – along with several others directed toward the production of clean energy – are legitimate policies within its authority that are designed to address externalities and result in revenues as well as costs for various energy resources.

F. History of NYISO's Buyer Side Mitigation Rules

The original and proper economic purpose of BSM rules is to protect the market from the exercise of buyer market power; schemes where large net buyers or their representatives offer a small amount of uneconomic supply into the market below cost in order to suppress market clearing prices.[61] Without such a rule, a large net buyer could be in a position to game the capacity markets by bringing a small quantity of incremental capacity supply into the market, offering the supply at a zero price, and producing a low capacity price.[62] By taking a loss on that small position, a large net buyer could then benefit from a much larger lower capacity price in the market.[63]

To prevent this manipulative price suppression, the BSM rules seek to restate the offer price from zero to a higher level based on the MOPR.[64] The higher MOPR price prevents this scheme from producing price suppression and makes it less likely that the resource in question would clear the capacity market. When applied to large net buyers and their supported resources, the BSM rules privatize the cost of any potentially uneconomic investments, while holding other parties in the market harmless.[65] More importantly, the rules are intended to disincentivize the manipulative behavior and associated economic waste from taking place at all.

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[61] *NYISO*, 122 FERC ¶ 61,211 (Mar. 7, 2008).
[62] Brattle Testimony at 10.
[63] *Id*. at 10–11.
[64] *Id*. at 11.
[65] *Id*.

NYISO's BSM rules were first implemented in 2008.[66] FERC's order accepting that proposal explained, "[m]arkets require appropriate price signals to alert investors when increased entry is needed" and that uneconomic entry could result in "artificially depressed" capacity prices.[67] FERC emphasized that, "[u]nder the FPA, the Commission must ensure that rates are just and reasonable. The courts have long held that establishing just and reasonable rates involves a balancing of consumer and investor interests."[68]

Subsequent FERC orders have reiterated that NYISO must implement the BSM rules because "under-mitigation" of uneconomic entry can artificially suppress capacity prices, which ultimately harms long-term consumer interests.[69] "Under-mitigation" could create incentives that would undermine the market, result in an over-reliance on cost-based "Reliability Must Run" agreements or transmission expansion to maintain reliability. On the other hand, "over-mitigation" can unnecessarily discourage entry by new resources.[70] To help achieve this balance, the Commission has authorized multiple exemptions from the BSM rules for resources that are shown to have "limited or no incentive and ability to artificially suppress ICAP Market Prices."[71]

Over the last decade, the scope of the BSM rules has expanded. The rules initially applied only to "net buyers" that subsidized uneconomic entry, but this limitation was removed due in

[66] 122 FERC ¶ 61,211.
[67] *Id.* at PP 103, 110.
[68] *Id*. at P 103.
[69] *See*, *e.g.*, *NYPSC* v. *NYISO*, 154 FERC ¶ 61,088, at P 11, 31 (Feb. 5, 2016) (reiterating the importance of balancing "the need to mitigate the exercise of buyer-side market power to ensure just and reasonable ICAP market prices with the risk of over-mitigating new entrants"); *Consolidated Edison Co. of New York, Inc. v. NYISO*, 150 FERC ¶ 61,139, at P 4 (Feb. 26, 2015); *NYISO*, 143 FERC ¶ 61,217, at P 77 (June 6, 2013) (noting that buyer-side market power mitigation rules must "appropriately balance the need for mitigation of buyer-side market power against the risk of over-mitigation").
[70] *Id*.
[71] *See*, *e.g.*, *NYPSC v. NYISO*, 153 FERC ¶ 61,022, at P 10 (Oct. 9, 2015) ("October 15 Order"); 154 FERC ¶ 61,088, at P 31 ("We maintain that certain narrowly defined renewable and self-supply resources should not be subject to the buyer-side market power mitigation rules because they have limited or no incentive and ability to exercise buyer-side market power to artificially suppress ICAP market prices.").

large part to difficulty in establishing who constituted a "net buyer."[72] The BSM rules also originally only applied to New York City, but were later expanded to include the G-J locality ("mitigated capacity zones").[73] This limited application is associated with the original narrow purpose of the rules, which were to prevent manipulative price suppression. The mitigated capacity zones were the only locations within the New York Control Area ("NYCA") in which the market structure indicated that any large net buyer might have the incentive and ability to exercise market power. Certain parties have requested that BSM rules be expanded to the rest-of-state (i.e., the zones other than the mitigated capacity zones), but after evaluating the issue through its stakeholder process, NYISO determined that expanded BSM rules are not necessary, and FERC ultimately rejected arguments seeking to expand BSM to rest-of-state earlier this year.[74]

NYISO's BSM rules currently provide that, unless exempt from mitigation, each new capacity resource must enter the mitigated capacity zones[75] at a price that is at or above an applicable offer floor until its capacity clears 12 monthly auctions.[76] The offer floor price excludes certain out-of-market revenue that resources may receive (namely revenue from state

[72] *See NYISO*, 124 FERC ¶ 61,301 (Sept. 30, 2008) at P 29 ("Upon further review, for the reasons set forth in the requests for rehearing, the Commission will grant rehearing on this issue. NYISO will not be required to modify its proposed market power mitigation rules for uneconomic entry so that they only apply to net buyers. We find that all uneconomic entry has the effect of depressing prices below the competitive level and that this is the key element that mitigation of uneconomic entry should address. Parties requesting rehearing have convinced us that defining net buyers raises significant complications and provides undesirable incentives for parties to evade mitigation measures"), P 39 ("Nevertheless, the Commission recognizes that the NYPSC may conclude that the procurement of new capacity, even at times when the market-clearing price indicates entry of new capacity is not needed, will further specific legitimate policy goals, such as renewable portfolio standards. We agree that it may be appropriate to exempt such new resources from the price floor proposed by NYISO").
[73] *See* 143 FERC ¶ 61,217, 62,440.
[74] *Indep. Power Producers of New York, Inc. v. NYISO*, 170 FERC ¶ 61,118, at 61,783, P 24 (Feb. 20, 2020).
[75] NYISO's Services Tariff defines "Installed Capacity" as "External or Internal Capacity, in increments of 100 kW, that is made available pursuant to Tariff requirements and ISO Procedures." NYISO, Services Tariff § 2.9 MST Definitions (27.0.0). The G-J Locality (mitigated capacity zones) consists of Load Zones G, H, I, and J zones "within which a minimum level of Installed Capacity must be maintained." *Id.* § 2.12 MST Definitions (8.0.0) (defining "Locality").
[76] NYISO, Services Tariff § 23.4.5.7 MST Attach. H (3.0.0).

programs that support clean resources). NYISO's buyer-side market power mitigation rules do not apply to new resources entering in the broader NYCA footprint.[77]

NYISO will exempt a new entrant from the offer floor if it passes either one of two exemption tests under its buyer-side market power mitigation rules: the Part A test, which assesses market capacity conditions, or the Part B test, which evaluates unit-specific costs.[78] If a new resource passes either test, it is not required to offer above a floor price in the capacity market. Under the Part A test, NYISO will exempt a new entrant from the offer floor if the forecast of capacity prices in the first year of a new entrant's operation is higher than the default offer floor, which is 75% of the Net Cost of New Entry ("CONE") of the hypothetical unit modeled in the most recent ICAP demand curve reset. This test allows new resources to avoid an offer floor at times when the market is approaching the minimum required level of capacity needed in a given load zone, regardless of whether approaching the minimum required level of capacity is due to load growth or the exit of existing resources. Under the Part B test, NYISO will exempt a new entrant from the offer floor if the forecast of capacity prices in the first three years of a new entrant's operation (three-year mitigation study period), is higher than the Net CONE of the new entrant. A resource may also be exempt from buyer-side market power mitigation rules if it meets the requirements for a competitive entry exemption,[79] a renewable resources exemption,[80] or a self-supply exemption.[81]

[77] 173 FERC ¶ 61,060, at P 3.
[78] NYISO, Services Tariff § 23.4.5.7.2 MST Attach. H (2.0.0).
[79] *Id.* § 23.4.5.7.9.1 MST Attach. H Competitive Entry Exemption (2.0.0).
[80] *See Vineyard Wind LLC*, 173 FERC ¶ 61,058 (Oct. 16, 2020).
[81] *See* October 2015 Order at P 2 (requiring NYISO to revise the rules governing buyer-side market power mitigation in NYISO's Services Tariff to exempt a narrowly defined set of renewable and self-supply resources), *reh'g denied*, 154 FERC ¶ 61,088 (October 2015 Rehearing Order); *see also NYISO*, 170 FERC ¶ 61,121 (Feb. 20, 2020) (accepting in part, subject to condition, and rejecting in part NYISO's compliance filing to the October 2015 Order and directing NYISO to file a further compliance filing).

FERC has recently expanded the role of BSM in New York and in other regions to impose a MOPR more broadly to apply to resources that earn policy payments.[82] The large majority of these resources in New York and other regions are those awarded policy payments in recognition of their contribution toward achieving states' environmental policies.[83]

Importantly, beyond these significant and unnecessary consumer costs, the application of BSM to state resources will have a disproportionate impact on the health and economic well-being of individuals living in disadvantaged communities in New York. In particular, Status Quo BSM rules apply to resources developed in Zones G-J (the Lower Hudson Valley and New York City), a capacity-constrained area of the grid where the continued operation of heavily polluting peaker plants poses significant economic, public health, and environmental hazards to nearby disadvantaged communities.[84] These peaker plants are some of the most inefficient generating resources in the state, with significantly higher costs than the average cost of electricity in New York. These high costs disproportionately impact disadvantaged New Yorkers, many of whom pay over six percent of their annual household income in energy costs.[85] Brattle's analysis confirms that the inefficiencies of BSM rules will manifest through delayed retirement of uneconomic fossil plants in Zones G-J as noted above.

Several stakeholder processes are evaluating the needs for reforming NYISO's capacity market and, in particular, the BSM rules. NYISO has commenced a Comprehensive Mitigation Review through its shareholder process to undertake a holistic evaluation of its capacity market

[82] *See id.*; *see Calpine Corp. v. PJM Interconnection, LLC*, 163 FERC ¶ 61,236 (June 29, 2018).
[83] Brattle Testimony at 10; *see* 173 FERC ¶ 61,060, Glick dissenting.
[84] NYSPC, *Comments of the New York City Environmental Justice Alliance & Allies*, at 8, Case No. 19-E-0530 (Jan. 31, 2020); *see also* NYC Environmental Justice Alliance et al., *Dirty Energy, Big Money, Peak Coalition Report*, at 5 (May 2020), https://nylpi.org/wp-content/uploads/2020/05/PEAK-report-Dirty-Energy-Clean-Money-May-2020.pdf.
[85] *See id.*

rules to evaluate how to modify market structures to preserve competitive price signals and economic efficiency while maintaining system reliability and supporting the CLCPA requirements.[86] NYISO and its stakeholders are reviewing the mitigation rules for its capacity market to create a balanced framework that preserves competitive price signals and economically efficient market outcomes required to maintain system reliability, but also enables the CLCPA goals.[87] NYISO is evaluating the current framework of BSM rules in consideration of a future with significant penetration of weather-dependent intermittent resources, energy storage, and distributed energy resources that are expected to result from policy objectives such as those found in the CLCPA.[88] To date, Complainants have not directly engaged in this process.[89]

In addition, state policymakers in New York have initiated a proceeding on the future of resource adequacy in the state.[90] The proceeding intends to assess the policy position that the NYPSC should take with respect to resource adequacy; consider how public policies can best be aligned under existing market mechanisms such as the ICAP auctions or whether new alternative approaches should be pursued; and consider cost impacts and benefits to consumers under various resource adequacy mechanisms.[91] To date, Complainants have also not directly engaged in this proceeding.

G. Arguments Raised by Complainants

Complainants allege that NYISO's Offer Floor Rules are unjust, unreasonable and unduly discriminatory because they do not adequately address price suppression in NYISO's ICAP spot market auctions caused by state-supported resources that receive out-of-market payments. The

[86] NYISO, *Power Trends 2020*, at 31 (2020).
[87] *Id*. at 36.
[88] *Id*.
[89] *Mot. of NYISO for Extension of Time to Answer Compl.*, at 4, n.9, Docket No. ER21-7-000 (Oct. 16, 2020).
[90] *See* NYPSC, *Proceeding on Motion of the Commission to Consider Resource Adequacy Matters*, Case No. 19-E-0530.
[91] *See id*.

Complaint states that the Commission should direct NYISO to replace the Offer Floor Rules with a "clean" MOPR that covers out-of-market support to all new and existing resources, regardless of the resource type, with few or no exceptions and that this MOPR should apply throughout the NYCA.[92]

The Complaint alleges that the integrity and effectiveness of the capacity market has become threatened by these out-of-market payments, and that these payments prevent or delay the retirement of state-preferred resources, including nuclear generators, that Complainants allege cannot compete with fossil-fuel generation.[93] Complainants further allege that this issue is more acute than in PJM for several reasons, including the fact that the amount of MWs of nuclear generation in PJM represented only 3.2% of projected peak load while ZECs apply to 10.5% of peak load in NYISO and that state-supported offshore wind is projected to be 1,350 MW in several PJM states and 9,000 MW in NYISO.[94]

Complainants allege that the threat of price suppression from these state-supported resources is not addressed outside of the G-J Localities, and is inadequately addressed in these areas given that Offer Floor Rules only apply to new resources and have several exemptions. The Complaint posits that the Commission properly found similar deficiencies in PJM's MOPR and that the same reasoning should apply here.[95] Moreover, Complainants assert that there are no regional differences between NYISO and PJM that would make these rules less severe or otherwise lawful.[96]

[92] Complaint at 2.
[93] *Id*. at 15.
[94] *Id*. at 17.
[95] *Id*. at 18.
[96] *Id*. at 19–20.

The Complainants propose to further expand BSM in New York through several reforms: (1) to increase the applicable MOPR price to a technology-specific value in all cases (which will typically be much higher than the current default value); (2) to eliminate Part A and Part B exemptions that can allow certain resources to avoid BSM application in the delivery year; (3) to apply BSM broadly across all capacity zones in New York; and (4) to apply BSM to existing as well as new resources, with the greatest effect being the immediate application of BSM to approximately 3,100 UCAP MW of existing nuclear resources.[97] Overall these changes would substantially expand the scope of capacity resources affected by BSM.

III. Argument

A. Complainants have failed to demonstrate that the existing rate is unjust and unreasonable

As the complainants, CVEC and Empire Generating bear "the burden of proof to show that any rate, charge, classification, rule, regulation, practice, or contract is unjust, unreasonable, unduly discriminatory, or preferential shall be upon the Commission or the complainant."[98] Thus, to prevail in this Section 206 proceeding, CVEC and Empire Generating must first demonstrate that the existing capacity market prices and rules are unjust, unreasonable, or unduly

[97] *See* Brattle Testimony at 11, n.13.

[98] 16 U.S.C. § 824e(b). *See also Old Dominion Elec. Coop. v. PJM, Interconnection, LLC*, 164 FERC ¶ 61,116, at P 16, n.39 (Aug. 17, 2018) (citing Union Elec. Co. v. FERC, 668 F.2d 389, 393 (8th Cir. 1981)); *PJM Interconnection, LLC*, 156 FERC ¶ 61,180, at P 2 (Sept. 15, 2016) (explaining that PJM has a Section 206 burden to demonstrate existing market practices are unjust and unreasonable); *PJM Interconnection, LLC*, 149 FERC ¶ 61,091, at PP 1, 32 (Oct. 31, 2014) (explaining that PJM has the burden when it files a complaint pursuant to Section 206 of the FPA).

discriminatory or preferential.[99] They have not done so, and therefore the Complaint should be rejected.[100]

Just and reasonable rates are those that "involve[] a balancing of consumer and investor interests."[101] "It is long-established that the 'primary aim [of the Federal Power Act] is the protection of consumers from excessive rates and charges.'"[102] Ensuring a "competitive" marketplace is one means to this end, but not an end in itself.[103] Accordingly, the Commission and federal appellate courts have long held that ensuring just and reasonable rates entails balancing investor and customer interests, and that the Commission has a duty to engage in this balancing when setting rates.[104]

In the context of capacity markets, a just and reasonable rate is one that considers the impact of rate design choices on customers and the effect of price signals on entry and exit of capacity resources.[105] Rates must avoid establishing artificial price signals that discourage new entry or delay necessary exit from the market.[106] "[T]he Commission must strike a balance

[99] *See Joint Cal. Complainants v. Pacific Gas & Elec Co.*, 163 FERC ¶ 61,112, at P 7 (May 17, 2018); *La. Public Service Comm'n v. Entergy Corp.*, 139 FERC ¶ 61,107, at P 24 (May 7, 2012).
[100] *See Emera Maine v. FERC*, 854 F.3d 9, 25 (D.C. Cir. 2017).
[101] 122 FERC ¶ 61,211, at P 103.
[102] *Xcel Energy Servs. Inc. v. FERC*, 815 F.3d 947, 952–53 (D.C. Cir. 2016) (quoting *Mun. Light Bds. of Reading & Wakefield v. FPC*, 450 F.2d 1341, 1348 (D.C. Cir. 1971), cert. denied, 405 U.S. 989 (1972)); *FERC v. EPSA*, 136 S. Ct. 760, 781 (2016) (citing *Penn. Water & Power Co. v. FPC*, 343 U.S. 414, 418); *Atl. Ref. Co. v. NYPSC*, 360 U.S. 378, 388 (1959) (FPA charges Commission with providing consumers a "complete, permanent, and effective bond of protection from excessive rates and charges").
[103] *See Envtl. Action, Inc. v. FERC*, 939 F.2d 1057, 1061 (D.C. Cir. 1991) ("Competition is valued not for its own sake but because it is most likely to maximize the satisfaction of consumer wants.").
[104] *See e.g.*, *Wisconsin Pub. Power, Inc. v. FERC*, 493 F.3d 239, 262–63 (D.C. Cir. 2007) (per curiam) (quoting *FPC v. Hope Nat. Gas Co.*, 320 U.S. 591, 603 (1944)); *New England Power Generators Ass'n, Inc.*, 146 FERC ¶ 61,039, at P 52 (Jan. 24, 2014); 122 FERC ¶ 61,211, at P 103 ("The courts have long held that establishing just and reasonable rates involves a balancing of consumer and investor interests.").
[105] *See e.g.*, *NYISO*, 122 FERC ¶ 61,064, at P 54 (Jan. 29, 2008) (rejecting use of updated demand curve factors that "do not recognize the need to balance the impact on consumers with the need to provide correct price signals for new generation entry.").
[106] 143 FERC ¶ 61,217, at P 77 (mitigation rules must "appropriately balance the need for mitigation of buyer-side market power against the risk of over-mitigation"); 154 FERC ¶ 61,088, at P 31; 150 FERC ¶ 61,139, at P 5.

between, on one hand, setting a price that will retain enough existing resources to maintain reliability and, on the other hand, protecting consumers from overpaying for that capacity."[107]

Complainants' argument that current ICAP rates are unjust and unreasonable consists of little more than reciting the Commission's rationale in the 2018 CASPR Order and December 2019 order concerning PJM's capacity market and comparing the quantities of resources supported by various forms of state policy in New York to those quantities in the PJM region.[108] Complainants do not establish that the current ICAP rates improperly balance consumer and investor interests, nor that those rates fail to send appropriate price signals to guide entry and exit and ensure resource adequacy at least cost to consumers. Finally, Complainants have not met their burden of proof to establish that the current rates fail to "protect[] the statutory and constitutional rights of other generation suppliers," namely their "entitle[ment] to an '*opportunity* to recover [their] costs.'"[109]

1. Current capacity rates provide more than an adequate level of resource adequacy are therefore just and reasonable

Complainants have not produced any evidence that resource adequacy—the objective of the capacity market—is in any way threatened by the lower capacity prices that Complainants attribute to state policy resource participation in the market.[110] Nor could they, as the New York control area has a very comfortable reserve margin over the next decade: 28-30% versus the

[107] *See* 146 FERC ¶ 61,039, at P 52.
[108] *See e.g.*, Complaint at 19 ("If the Commission was 'compelled by the evidence' to find that subsidies in PJM had 'reached a level sufficient to significantly impact the capacity market clearing prices and the integrity of the resulting price signals,' it is likewise compelled to reach that conclusion here, where ZECs and other state subsidies are flowing to an even larger proportion of the generation resources in New York.").
[109] Complaint at 22–23 (internal citations omitted, emphasis in original). There is considerable overlap between Complainants' case for why the current ICAP rules are unjust and unreasonable, and why their vaguely described proposed replacement rate is just and reasonable. In responding to these arguments within the framework of the two-step Section 206 process, this protest likewise contains some repetition of evidence and economic concepts important to the Commission's consideration of each step.
[110] *See* Compl. at 15-18..

Installed Reserve Margin requirement of 18.9% for 2020-2021.[111] This forward trend is generally consistent with the historical data over ICAP over-procurement.[112]

More fundamentally, as explained in the Brattle Affidavit, low prices cannot pose any threat to resource adequacy in a capacity market with a downward sloping demand curve.[113] In such a market, like ICAP, low prices are actually indicative of a high level of resource adequacy because the market clears at a low price only if the supply curve intersects the demand curve well above the reserve margin target.[114] If prices decline as a result of a substantial quantity of low-cost policy resources entering the market, to the point that certain past fossil fuel investments are no longer viable on a going-forward basis and decide to exit the market, then prices will rise to the level needed to ensure that any needed new entry is incented.

The notion that relatively high prices are needed to ensure resource adequacy relates to the myth that only resources that rely solely upon capacity market price signals can provide resource adequacy. But ICAP market design can and does accurately account for the resource adequacy value of all resources regardless of whether they receive state policy support; there is no basis to assert that the contributions of state policy resources should be further devalued to make room for resources that do not receive such support.[115]

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[111] NYISO, *2020 Load and Capacity Data*, at 121, Table V-2a (Apr. 2020), https://www.nyiso.com/documents/20142/2226333/2020-Gold-Book-Final-Public.pdf/.
[112] Paul Hibbard et al., *NYISO Capacity Market Evaluation of Options*, at 27, Fig. 1, Analysis Group (May 2015), https://www.analysisgroup.com/uploadedfiles/content/insights/publishing/nyiso_capacity_market_evaluation_of_options.pdf.
[113] Brattle Testimony at 12–13.
[114] *Id.*
[115] *See id.* at 17 (noting importance of accurate resource accreditation to maintain reliability as part of decarbonization).

Low prices do not threaten to undermine resource adequacy, but instead are evidence of satisfactory (or even excess) resource adequacy conditions.[116] Low prices in these circumstances are sending an appropriate price signal regarding the lack of need for new merchant generation or investment in older plants to continue operation; those rates are therefore just and reasonable.[117]

2. The Complaint Fails to Demonstrate an Actual "Threat", Does Not Propose Just and Reasonable Changes to NYISO's Mitigation Measures, and Fails to Tailor its Relief to the Scope of Any Actual "Problem"

The Complaint claims that New York State subsidies, such as ZECs and renewable energy procurement goals, "represent a material and immediate threat" to the ICAP market.[118] However, the Complaint simply presumes that the State is exercising market power (with or without intent to do so) to "threaten" this market.[119] Here, the Complaint's allegation that current rates are unjust and unreasonable is built upon the profoundly illogical and unfounded concept that lawful state energy programs amount to an exercise of market power requiring mitigation, and requests overbroad relief that is inconsistent with Commission precedent on the appropriate scope and careful balancing required for mitigation measures.

As an initial threshold matter, the Supreme Court has held that the Commission must properly balance the interests of investors and consumers.[120] Thus, a just and reasonable rate or practice should not simply enrich one group at the expense of the other.

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[116] *See, e.g., Midcontinent Independent System Operator, Inc. v. FERC*, 170 FERC ¶ 61,215, at P 133 (Mar. 20, 2020) ("[L]ow Auction Clearing Prices may reflect supply and demand fundamentals such as lower Reserve Requirements and more capacity supply being offered in that Auction, and do not necessarily mean that the Auction has produced unjust, unreasonable, and unduly discriminatory rates.").

[117] *See e.g.*, 146 FERC ¶ 61,039, at P 52 (noting the Commission's setting a price that will retain enough existing resources to maintain reliability and, on the other hand, protecting consumers from overpaying for that capacity).

[118] Complaint at 15.

[119] *Id.* at 21.

[120] *See Morgan Stanley Capital Grp. v. Pub. Util. Dist. No. 1 of Snohomish Cnty., Wash.*, 554 U.S. 527, 532 (2008) ("FERC must choose a [ratemaking] method that entails an appropriate 'balancing of the investor and the consumer interests.'"), *quoting FPC v. Hope Nat. Gas Co.*, 320 U.S. 591, 603 (1944).

In the specific context of market power mitigation, the Commission's own precedent (as well as applicable judicial precedent) requires the Commission to carefully tailor any mitigation measures to the actual or likely exercise of market power, and to balance the risks of over- and under-mitigation. For example, in *Edison Mission Energy, Inc. v. Fed. Energy Regulatory Comm'n*, the Court of Appeals for the District of Columbia Circuit determined that a Commission order approving NYISO mitigation measures *without* considering the likely harms was arbitrary and capricious.[121] The D.C. Circuit also noted that "the Commission's contradiction of its prior rulings acknowledging the potential ill effects of forcing down prices absent structural market distortions is the epitome of agency capriciousness."[122] This line of decisions requiring careful balancing of benefits and consequences of mitigation, and tailoring mitigation to the scope of any actual or likely market power, is robust, and both pre- and post-dates *Edison Mission Energy*.[123] Commissioner Glick noted in a previous Buyer-Side Mitigation case that:

> To the extent that the Commission [historically] required buyer-side mitigation of capacity market offers, it limited the mitigation to only resources that could be used effectively for the purpose of depressing capacity market prices or to resources with both the incentive and ability to depress capacity market clearing prices. In short,

[121] 394 F.3d 964, 969 (D.C. Cir. 2005) ("[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 . . . .").

[122] *See id.*

[123] *See e.g.*, 150 FERC ¶ 61,139, at P 45 (finding NYISO's buyer-side mitigation rules "unjust and unreasonable because they are unnecessarily applied to unsubsidized, competitive entrants who have no incentive to inappropriately suppress capacity market prices"); *Cal. Indep. Sys. Operator Corp.*, 119 FERC ¶ 61,076, P 490 (2007) ("[I]t is the possession of market power (and, therefore, the potential to exercise it), not the actual exercise of market power, that triggers the need for mitigation . . . . Market power mitigation exists to guard against the potential exercise of market power, and is required whenever a market *participant is found to have* market power. Therefore, *once it is determined that an entity has market power*, adequate mitigation of the potential to exercise market power becomes essential." (emphasis added)); *Midwest Indep. Transmission Sys. Operator, Inc. Pub. Utils. with Grandfathered Agreements in the Midwest ISO Region*, 111 FERC ¶ 61,043, at P 78 (2005) ("We note . . . that the Court of Appeals has cited concerns with mitigation plans that mitigate workably competitive markets, suppress prices and deter market entry. And we recognize that the mitigation plan could result in potentially above-market costs for some customers for one day before the IMM institutes mitigation . . . . [W]e consider the potential harms of this one-day lag in mitigation to be lower, and the cost impact to be less, than the potential harm of footprint-wide mitigation for all days."); *Midwest Independent System Operator, Inc.*, 109 FERC ¶ 61,157, at P 238 (2004) (explaining that assuring just and reasonable rates requires the Commission to "balance under-mitigation and over-mitigation").

> buyer-side market power mitigation was all about and only about the exercise of buyer-side market power.[124]

The Clean Energy Parties support the application of this type of carefully balanced, narrowly tailored buyer-side mitigation, as made clear in the Brattle Report.[125] However, the Complaint represents precisely the opposite—a requested sweeping change that would enrich existing generators at customer expense, without corresponding benefit, that creates more harm than benefit, and that is not tailored to the scope of any actual ability or incentive to suppress capacity prices, and that the interests of investors and consumers are appropriately balanced.

To the extent Complainants identify a "threat" from NYISO's current mitigation measures, it is to revenues for existing fossil generators; to the extent they claim any likely "benefits" resulting from expanding BSM in New York, these putative benefits are almost exclusively increased capacity prices again inuring to existing fossil generators.[126] The premise that this rate increase would represent a "correct" outcome is fundamentally misguided, as the Brattle Testimony makes clear.[127] It is telling that the Complaint scarcely references *customers* at all (other than suggesting they should bear more risk than private capital)[128] nor does it indicate

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[124] *New York Indep. Sys. Operator, Inc.*, 172 FERC ¶ 61,058, Glick Dissent at P 32 (2020), *citing PJM Interconnection, L.L.C.*, 117 FERC ¶ 61,331, at PP 34, 103–104 (2006) (discussing the buyer-side market power mitigation provisions imposed as part of the settlement that created the Reliability Pricing Model) *and citing* 122 FERC ¶ 61,211, at P 106 (2008) (explaining that buyer-side market power "mitigation is aimed at preventing uneconomic entry by net buyers of capacity, the only market participants with an incentive to sell their capacity for less than its cost.").

[125] Brattle Testimony at 20 ("BSM is an appropriate mechanism for its original purpose of preventing manipulative price suppression. In that context BSM has a valid economic rationale: to prevent net-short entities and their representatives from sponsoring uneconomic investments to suppress prices to benefit themselves in the short-run while impose deadweight loss on society. BSM deters such behavior and protects markets from its effects. With this protection, it is difficult to imagine investors trusting the market enough to invest in it.").

[126] *See* Complaint, at Attach. A, Shanker Aff. at P 44 (claiming removing subsidized units would increase capacity prices by $44.27/kW-year).

[127] Brattle Testimony at 14 ("Applying MOPR to policy resources addresses the misguided question of how to 'correct' prices to a higher level that would prevail in the absence of state policies. Thus, MOPR creates a fundamental disconnect between market pricing outcomes that deviate from the underlying fundamentals of supply (including that associated with state policy resources) and demand (as expressed through resource adequacy requirements).").

[128] Complaint at 10.

how they might conceivably benefit from the desired relief. Clearly, Complainants' investors might benefit, but this does not comport with the core statutory framework.[129]

Finally, there is no plausible argument that diverse new and existing market participants subject to a diverse array of legitimate state requirements—such as nuclear generators receiving ZECs, offshore wind generators receiving Ocean Renewable Energy Coalition (ORECs), and energy storage resources developed pursuant to a procurement mandate—have an individual or collective incentive to manipulate capacity prices. [130] As discussed in further detail in Section III.B.3 below, Brattle's analysis makes clear that the relief sought is overbroad, and would impose statewide costs far in excess of benefits. Based upon extensive precedent that requires tailoring mitigation requirements and balancing the risks of over- and under-mitigation, the Commission must reject the Complaint. The ICAP for NY's non-mitigated zones *is* just and reasonable (i.e., competitive, efficient, and accurately signals entry/exit) because BSM is not applied to clean resources.

3. Capacity prices are not unjust and unreasonable simply because they reflect costs and benefits created by state policies

Complainants are incorrect to suggest that NYISO capacity market prices are unjust and unreasonable insofar as they are affected by state government policies. *See, e.g.*, Compl. at 18. First, Complainants offer no basis to differentiate between the state policies that they contend

[129] *See Morgan Stanley Capital Grp.*, 554 U.S. 527, 532 (2008) (" FERC must choose a [ratemaking] method that entails an appropriate "balancing of the investor and the consumer interests.""),

[130] *See NYPSC & NYSERDA v. NYISO*, 170 FERC ¶ 61,119 (2020), Glick Dissent at P 19, n.38 ("The Commission's suggestion that electric storage resources, collectively, might have market power is as absurd as expressing a concern that a particular natural gas resource may have market power because natural gas resources, viewed collectively, have market power.") (citing 170 FERC ¶ 61,119 at P 39); *see also New York State Pub. Serv. Comm'n v. New York Indep. Sys. Operator*, 158 FERC ¶ 61,137 (Bay, Chairman, concurring at 3) (2017) ("The MOPR is not applied to the state, which may not actually be a buyer and which is acting on behalf of its citizenry, but to the resource, which is offering to sell capacity to the market and which may be a commercial entity. The theory, in other words, assumes such a congruence of interests between the state and the resource that the resource is mitigated for the conduct of the state.").

unlawfully influence capacity market prices and the plethora of other federal, state, and local policies that have for decades influenced the costs of operating electric generating facilities. Second, Complainants' economic theory that capacity markets ought to be free from the influence of government policies reflects a misunderstanding of the role of those markets, would impose unnecessary costs on consumers, and cause economic waste.

Historical data demonstrates that government policies have provided substantial support targeted toward specific types of capacity resources, including large-scale ones that comprise a significant share of capacity in the New York market. There is no reason to believe that historic policy actions would have any less impact on market prices than Complainants contend they do today. In 1989 alone, for example, coal-fired generators benefited from nearly seven and a half billion dollars in federal government support, and natural gas fired generators a little less than one billion.[131] On average, federal subsidies to conventional generation[132] amounted to roughly eleven percent of the cost of electricity to an end-consumer.[133] It defies reason to suggest that support of this magnitude did not affect the composition of capacity resources, providing advantages to some resources and not others, and affecting wholesale prices.

As former Commission chairman Norman Bay observed, an "idealized vision of markets free from the influence of public policies . . . does not exist, and it is impossible to mitigate our way to its creation."[134] The effort to insulate markets from the influence of public policies is not only futile but also highly likely to be implemented in a discriminatory manner by mitigating the impact of certain types of state policies (e.g., ZEC payments) but not others (e.g., tax benefits for

[131] All values are in 1989 dollars. Douglas N. Koplow, *Federal Energy Subsidies: Energy, Environmental, and Fiscal Impacts*, at 20–21 (Table 10 and 11), Alliance to Save Energy (1993), https://perma.cc/8XHP-DGDK.
[132] Including nuclear, hydro, coal, gas, and oil.
[133] Douglas N. Koplow, *Federal Energy Subsidies: Energy, Environmental, and Fiscal Impacts*, at 20, Alliance to Save Energy (1993), https://perma.cc/8XHP-DGDK..
[134] 158 FERC ¶ 61,137 (Bay, Chairman, concurring at 2).

fossil fuel extraction). Moreover, the Complaint's suggestion that markets must be insulated from state policies in order to render just and reasonable rates is asymmetric—it focuses only on mitigating benefits conferred directly on supply resources via state policy rather than costs imposed on such resources or benefits conferred indirectly, such as state policy-driven retirement of specific facilities that inures to the benefit of competitors. Complainants' theory is therefore incomplete in a way that conveniently benefits Complainants' bottom line.

Even if the effort to mitigate the impacts of state policy on FERC's markets were neither futile nor unavoidably discriminatory, it would still be misguided. Rates for capacity are not unjust and unreasonable when they reflect the revenues that capacity resources can earn outside of FERC's markets; this is instead the hallmark of a capacity market that ensures resource adequacy at the least cost to consumers.[135] As described by Brattle:

> Forcing policy resource offers upward through BSM rules would generally prevent them from clearing. It would result in an artificially high capacity clearing price and induce inefficient behaviors and uneconomic incentives: it would retain costly existing supply that would otherwise retire, attract costly new supply that is not needed, and dis-incentivize customers from utilizing more electricity given inflated prices that signal a false scarcity of capacity supply. Thus, the application of BSM to policy resources causes the capacity market to depart from supply-demand fundamentals.[136]
>
> . . . .
>
> [T]he "correct" capacity price is the one that accurately reflects underlying fundamentals of supply and demand. This is the accurate price that should signal when and where capacity investments are needed (and when high-cost resources can retire). The logical conclusion under this corrected economic analysis is that

[135] *See* Commissioner Richard Glick Dissent, FERC Docket No. EL19-86-001 (Oct. 15, 2020) ("But a capacity market is a means to an end, not an end in itself. It is a construct that is supposed to minimize the amount of money that customers spend on capacity in order to meet a target reserve margin.[27] A capacity market that does not serve that purpose and is 'efficient' only if you disregard the fact that, in the real-world, it produces inefficient results is a 'market' that we ought to reject out-of-hand."), https://www.ferc.gov/news-events/news/item-e-25-commissioner-richard-glick-dissent-regarding-new-york-state-public#_ftnref24.

[136] Brattle Testimony at 16.

> BSM should be eliminated from application to policy resources so that capacity prices can be utilized to rationalize supply with demand."[137]

As the D.C. Circuit explained in upholding the Commission's authority to create capacity markets, the markets were designed to take state regulation of generation mix as an input. Rather than forcing a particular generation mix on states, capacity markets were designed merely to ensure a reserve margin is hit so as to reduce the likelihood of future blackouts.[138]

A final reason that capacity market rates are not unjust and unreasonable because they reflect state policies is that many of those policies function to address a well-known market failure—the environmental externalities associated with fossil generation. As explained in the Brattle Affidavit, state policies such as carbon pricing or clean energy attribute payments operate to correct for this market failure. Brattle Aff. at 10–11. In doing so, these policies actually yield capacity market prices that are more efficient. As economists at the Institute for Policy Integrity have explained:

> It is a misguided approach to treat externality payments like distortive, rent-seeking subsidies that simply provide financial aid to a group of producers without being directly tied to a quantifiable external benefit. This misunderstanding may stem from the tendency to focus only on private costs when defining what it means to be an "economic" resource. Generators that receive externality payments, and clear the market, are indeed economic when considered from the perspective of overall social welfare. [139]

Complainants have thus failed to established that ICAP rates are unjust and unreasonable due to the lack of mitigation of state policies. Capacity rates that reflect state policies lead to more

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[137] *Id.* at 12.

[138] *Conn. Dep't of Pub. Util. Control v. FERC*, 569 F.3d 477, 481 (D.C. Cir. 2009) ("The 'Installed Capacity Requirement' is misnamed because increasing it doesn't actually "require" anyone to "install" any new "capacity" at all. State and municipal authorities retain the right to forbid new entrants from providing new capacity, to require retirement of existing generators, to limit new construction to more expensive, environmentally friendly units, or to take any other action in their role as regulators of generation facilities without direct interference from the Commission. Of course, those choices affect the pool of bidders in the Forward Market, which in turn affects the market clearing price for capacity.").

[139] Sylwia Bialek & Burcin Unel, *Capacity Markets and Externalities: Avoiding Unnecessary and Problematic Reforms*, at 11, Institute for Policy Integrity (Apr. 2018), https://policyintegrity.org/files/publications/Capacity_Markets_and_Externalities_Report.pdf.

economically optimal outcomes rather than shifting revenues from consumers to suppliers in a wasteful manner.

4. Complainants have not been deprived of an opportunity to recover their costs

While Complainants generally contend that ICAP rates and unjust and unreasonable simply because they are affected by state policy, they also assert that they may be denied their constitutional right to an opportunity to recover their costs. Compl. at 18–19. Complainants paint a picture in which they would have such an opportunity but for the "lower than expected capacity prices caused by uneconomic retention of state subsidized generation facilities," Compl. at 33; however, this picture is contradicted by attestations in recent bankruptcy proceedings which attribute the financial woes of certain gas plants largely to energy price declines.

The affidavit of Garrick F. Venteicher filed in May 2019 in Empire Generating Company's Chapter 11 proceeding describes three main contributors to the debtor's condition: (1) "Energy prices in the New York wholesale market have not reached the levels anticipated by the Debtors over the past few quarters for a variety of reasons, (2) colder-than-usual winters that have increased gas supply costs relative to energy prices, and (3) limited gas supply due to delays in construction of new pipeline facilities."[140] The latter two problems were compounded by the plant's inability to operate based on fuel oil, despite such dual fuel capability being part of the plant's original design. *Id.* at n.5. The Complaint also refers to the financial impacts on other generators who did not join this Complaint, such as the New Athens Generating Company, LLC facility. Compl. at 33. However, the June 2020 Chapter 11 filings by New Athens similarly

[140] Declaration of Garrick F. Venteicher (I) in Support of Chapter 11 Petitions and First Day Motions and (II) Pursuant to Local Bankruptcy Rule 1007-2 at ¶¶ 29-30, Case No. 19-23007 (RDD) (Bankr. S.D. N.Y. filed May 19, 2019) ("Venteicher Declaration"), https://casedocs.omniagentsolutions.com/cmsvol2/pub_47271/737164_3.pdf.

conveys that the plant's financial distress is caused by "demand destruction" caused by one recent warmer winter, deployment of energy efficiency and demand response, and the economic downturn attributable to the ongoing pandemic.[141] New Athens' bankruptcy filing also notes that natural gas prices "have remained historically low" continuing downward pressure on energy prices. *Id.* From these filings, it is clear that the economic headwinds faced by these facilities are independent of capacity market prices, but instead reflect broader dynamics of supply and demand that are at the core of an investment risk decision.

Complainants' right to an opportunity to recover their costs does not absolve them of any risk that those costs might not be recovered.[142] Complainants had ample notice of regulatory uncertainty with respect to New York state's climate policies and accepted those risks when beginning operations in 2010 (Empire) and 2013. The Brattle affidavit sets out the "record of New York's steady long-term march" to today's policies, beginning as far back as 2002.[143] Brattle concludes that because "the state has long discussed its environmental priorities, particularly the need to address climate change[,] [i]nvestors in new power plants should have anticipated something like the CLCPA to effectuate a transition in the generation fleet." *Id.* at 14. Because any savvy investor would have been aware that the investment faced some risk of disadvantageous state policies, the Complainants should not be bailed out of a risk they knowingly took. Shielding investors from both the fundamental risk associated with wholesale market participation, as well as foreseeable policy risks, is antithetical to, and would undermine the benefits associated with, wholesale electric competition. As noted in the Brattle Affidavit,

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[141] Declaration of Dale E. Lebsack, Jr. in Support of Chapter 11 Petitions and First Day Pleadings, ¶ 24, Case No. 20-11597 (MFW) (Bankr. Del. filed June 18, 2020), https://cases.primeclerk.com/NEG/Home-DownloadPDF?id1=MTQ1ODczMw==&id2=0.

[142] *Hope*, 320 U.S. at 603 ("regulation does not [e]nsure that the business shall produce net revenues") (quoting *FPC v. Nat. Gas Pipeline Co.*, 315 U.S. 575, 590 (1942).

[143] Brattle Testimony at 14–15.

these two gas plants benefited in many ways from state policies, such as "the finalization of the state's arrangement with Entergy to shut down the Indian Point Energy Center, agreements to retire the state's remaining coal plants, rules to eliminate high-NO_X-emitting peaking plants from Downstate New York, and possible future expansion of electricity demand from policy-driven electrification of the heating and transportation sectors."[144] These upsides of state policy are part of the same investment picture as the downsides alleged by Complainants, and wholesale market rates are not unjust and unreasonable simply because they don't asymmetrically correct for only state policy's downward effects on rates. Rates that reflect both upward and downward pressure from state and federal policies do not deprive investors of an opportunity to recover their costs, but are instead part of the overall context in which investment decisions in competitive markets are rightly made.

5. Complainants Fail to Acknowledge Factors that Differentiate NYISO from Other Regions with Mandatory Capacity Markets

Complainants' core argument is that because FERC has applied a "clean MOPR" in PJM, and set out principles concerning application of the MOPR in ISO-NE, it is a foregone conclusion that the MOPR should be applied in NYISO as well. In practice, the Commission has taken significantly different approaches to application of nominally uniform market design principles where regional factors counseled a different outcome.[145] The undersigned organizations have consistently taken the position, across RTOs, that MOPR should not be applied to resources supported by state policy (absent evidence of actual buyer-side market power). Nevertheless, we also note that there are relevant regional differences that make a clean

[144] *Id.* at 14.
[145] *See, e.g.*, 170 FERC ¶ 61,215 at P 132.

MOPR even less appropriate in New York—differences that Complainants have failed to acknowledge or address.

For example, NYISO relies less on its capacity auction to ensure resource adequacy than do PJM and ISO-NE—its spot auction is supplemented by the Comprehensive System Planning Process.[146] As experts from the Analysis Group noted in a 2015 evaluation of whether NYISO should consider moving to a more forward capacity market design:

> The NYISO CSPP/resource adequacy construct differs from the planning processes in ISO-NE and PJM in many respects, and needs to be viewed as an integrated approach, when considering the potential benefits of moving to a different capacity market structure. In particular, ISO-NE and PJM place greater reliance on the capacity market for maintaining resource adequacy, in comparison to NYISO. While both regions include planning processes to identify reliability needs (similar to NYISO), non-market reliability solutions are limited to backstop transmission solutions from the planning perspective. This has meaningful implications for the role that the capacity market has in maintaining resource adequacy in each of these RTOs. While ISO-NE and PJM are both heavily dependent on the capacity market to maintain resource adequacy, NYISO can rely on other approaches if market-based solutions do not emerge, including solutions supported by the transmission operators such as the repowering of existing assets.[147]

Complainants acknowledge that NYISO's prompt spot auction is different from PJM's three-year forward auction, but draw the wrong conclusion from that difference. Complainants assert that that mitigation of state policy resources is even more necessary in New York because investors have less warning regarding the impact of state policy resources on prices than do

[146] Paul Hibbard et al., Analysis Group, *NYISO Capacity Market Evaluation of Options* 25 (May 2015), https://www.analysisgroup.com/uploadedfiles/content/insights/publishing/nyiso_capacity_market_evaluation_of_options.pdf ("The NYISO relies on its Comprehensive System Planning Process (CSPP) to maintain reliability, given the long lead time to developing generation and transmission infrastructure and the need for other processes to ensure that reliability objectives are met. The CSPP includes a Reliability Needs Assessment, which includes a 10-year forward-looking planning evaluation reflecting future loads, known generation and transmission resources, and system topology. The RNA identifies any unmet reliability needs over the 10-year horizon, solutions to the identified needs are solicited and evaluated by the NYISO, and the plans and schedules to be implemented to meet the defined reliability needs are established in the Comprehensive Reliability Plan (CRP)".) (footnote omitted).

[147] *Id.*

investors in PJM, which has a three-year forward auction.[148] However, responsible investors should and do take their warnings regarding the impact of state policies from paying attention to trends in federal and state government rulemaking and legislative processes, in order to get a longer-term view of changes on the horizon.[149] Prudent investors would not wait to see the actual impact on a spot market clearing price that is affected by many other short-term trends. As noted above, because of the spot market design of ICAP, investors make decisions based in part on longer-term trends in ICAP prices, rather than based on a single month's clearing price. Thus, the notion that investors in New York lack adequate warning of changes in ICAP prices and therefore are more in need of means to be protected from market forces, is baseless.

Complainants also fail to discuss that the fact that NYISO is a single-state RTO in which the state plays a more prominent role in resource adequacy means that the relevant market and regulatory considerations are fundamentally different from a state where (in FERC's flawed view), the state has given over more responsibility for determining what gets built to FERC's own market.[150] While the undersigned organizations strenuously dispute FERC's characterization of the appropriate role of capacity markets versus states in resource development decisions, the fact remains that this rationale applies with considerably less force in New York, and Complainants have failed to address it. Another implication of NYISO being a single-state RTO is that FERC cannot purport to have a responsibility to address cost shifting between states.[151] Complainants touch upon this point by arguing that mitigation is more necessary in

[148] Complaint at 20–21.
[149] *See* Brattle Testimony at 19–21.
[150] *See, e.g.*, PJM Dec. 2019 MOPR Order at P 17 ("This order addresses the growing impact of State-Subsidized Resources because those subsidies reject the premise of the capacity market and circumvent competitive outcomes.").
[151] *Calpine*, 163 FERC ¶ 61,236 (June 2018), at 162 ("the status quo requires consumers in some PJM states to subsidize the policy decisions of other PJM states.").

NYISO because in New York the benefits of state policies would not be dispersed across a region, but instead concentrated in New York.[152] This argument shamelessly urges FERC to use its authority over wholesale capacity rates to discourage states from adopting policies affecting the generation mix; any decision grounded in such a rationale would indisputably "aim at" a matter of state jurisdiction and thus be unlawful.[153]

In sum, Complainants have vastly oversimplified the complex question before the Commission by arguing that the Commission's determination that capacity rates in PJM were not just and reasonable can be extended to NYISO. By failing to acknowledge and address relevant regional differences in market design and regulatory structure, Complainants have failed to meet their burden of proof.

6. Complainants Provide No Indication They Have Sought to Use NYISO's Stakeholder or Tariff Processes

Complainants request sweeping relief before the Commission. However, it does not appear that Complainants have made any effort to use the NYISO stakeholder process, nor have they notified NYISO and its Market Monitoring Unit pursuant to NYISO's tariff. The Commission has historically urged market participants to utilize the stakeholder process before seeking to modify mitigation rules that "impact all market participants."[154] Complainants' failure to do so is especially problematic in light of their paper-thin reasoning, lack of meaningful analysis, and failure to develop any sort of factual record to support its massive, system-wide mitigation proposal.

[152] Complaint at 20–21.
[153] *See* December 2019 PJM MOPR Order (Glick dissent) at PP 9–10.

Throughout the types of ICAP market concerns at issue in the Complaint., the Commission placed significant weight on the central role of the stakeholder process. In *IPPNY I*, the Commission concurred with NYISO that "mitigation proposals must have the support of a fully developed factual record and a stakeholder process" and accordingly "direct[ed] NYISO to establish a stakeholder process to consider (1) whether there are circumstances that warrant the adoption of buyer-side mitigation rules in the rest-of-state; and (2) whether resources under repowering agreements similar to Dunkirk's have the characteristics of new rather than existing resources, triggering a buyer-side market power evaluation because of their potential to suppress prices in the capacity market and what mitigation measures need to be in place to address such concerns."[155]

NYISO conducted the required stakeholder process, and submitted an initial compliance filing to the Commission on June 16, 2015.[156] The NYISO Compliance Filing describes in detail the months of stakeholder meetings, including discussions of any potential need to extend BSM to the Rest of State, and assessed the likely market impacts if the state's two largest load-serving utilities were working in concert. NYISO concluded that the Commission need "not take any action regarding buyer-side market power mitigation rules for new entry in Rest of State," and that if such a need were identified NYISO "would propose mitigation measures at that time, as it is required to do under the Services Tariff."[157] At the request of Commission staff, NYISO then supplemented this filing on November 16, 2015, reaching the same conclusion.[158] Having received NYISO's analysis in June 2015, the Commission noted in *IPPNY II* only that NYISO

[155] *Indep. Power Producers of New York, Inc.*, 150 FERC ¶ 61,214 at P 71 (2015).
[156] Compliance Report Regarding Buyer-Side Mitigation Measures under EL13-62, Docket No. EL13-62 (Jun 17, 2015), https://elibrary.ferc.gov/eLibrary/filedownload?fileid=13907374 ("NYISO Compliance Filing").
[157] NYISO Compliance Filing at 5; at App'x I.
[158] Response of New York Independent System Operator, Inc. to November 16, 2015 Data Request under EL13-62, Docket No. EL13-62 (Dec. 16, 2015), https://elibrary.ferc.gov/eLibrary/filedownload?fileid=14074761

had complied with its directive on the stakeholder process, and rejected arguments seeking to expand BSM beyond the mitigated capacity zones to rest-of-state.

In addition to the stakeholder process, NYISO's Market Services Tariff allows any market participant – including Complainants – to bring to the attention of the ISO or its Market Monitoring Unit any potential abuses of market power that might require imposition of mitigation measures.[159] Indeed, if NYISO identifies "*or is made aware of*" any abuses of market power, the tariff states that it *shall* make a filing with FERC under Section 205 of the FPA, and must identify the particular conduct, tailor specific mitigation measures aimed at that conduct, consult with the MMU, and justify the mitigation measure.[160] Complainants do not appear to have used the tariff process of 23.1.2; they instead state that they "discussed the issues raised in this Complaint with NYISO, but NYISO has declined to propose revisions to the Services Tariff that would address Complainants' concerns."[161]

In fact, NYISO and its MMU have continued to diligently monitor NYISO-administered markets, and the most recent State of the Market Report does not identify any price suppression resulting from exercise of market power that would require extension of buyer-side mitigation measures to Rest-of-State. [162] The 2019 State of the Market report notes that the Rest of State

[159] See NYISO MST at 23.1.2 ("In addition, the ISO and its Market Monitoring Unit shall monitor the markets the ISO administers for conduct that the ISO or the Market Monitoring Unit determines constitutes an abuse of market power but that does not trigger the thresholds specified below for the imposition of mitigation measures by the ISO. If the ISO identifies or is made aware of any such conduct, and in particular conduct exceeding the thresholds for presumptive market effects specified in Section 23.3.2.3 below, it shall make a filing under Section 205 of the Federal Power Act, 16 U.S.C. § 824d (1999) ("§ 205") with the Commission requesting authorization to apply appropriate mitigation measures. Any such filing shall identify the particular conduct the ISO believes warrants mitigation, shall propose a specific mitigation measure for the conduct, shall incorporate or address the recommendation of its Market Monitoring Unit, and shall set forth the ISO's justification for imposing that mitigation measure . . . .").
[160] *Id.* (emphasis added).
[161] Complaint at 36.
[162] 2019 State Of Market (SOM) report, https://www.nyiso.com/documents/20142/2223763/NYISO-2019-SOM-Report-Full-Report-5-19-2020-final.pdf/bbe0a779-a2a8-4bf6-37bc-6a748b2d148e?t=1589915508638.

zones experienced a 47-52% capacity cost decrease.[163] This is comparable to the capacity cost reductions in the mitigated Lower Hudson Valley zones,[164] and was caused in large part by a reduction in the peak demand forecast and a reduction in the Installed Reserve Margin (that is, less capacity was needed to assure reliability).[165] The State of the Market Report also notes the need to harmonize state public policy goals with mitigation rules, whereas Complainants' desired relief would increase capacity prices while leading to unnecessary excess capacity.[166]

Importantly, as detailed below, several of these key factors are not within NYISO's control – notably the IRM and the Locational Capacity Requirements, which are set by the New York State Reliability Council.[167] Without engaging with other affected agencies and stakeholders, the Complainants now ask the Commission to dismantle and rebuild the intricate framework of capacity markets, installed and locational capacity requirements, and reliability rules that the NYISO, New York agencies, and the New York State Reliability Council have developed.

In short, Commission precedent strongly indicates that changes to mitigation measures "must have the support of a fully developed factual record and a stakeholder process," particularly where they would affect all market participants.[168] Complainants have ignored the actual conclusions of the NYISO and MMU regarding the reasons for capacity price changes in the unmitigated zones, and seek unwarranted changes to complex reliability and capacity rules affecting multiple agencies and market participants. The Commission should direct Complainants to utilize the NYISO stakeholder process or otherwise notify NYISO and its

[163] *Id.*
[164] *Id.* at A-8.
[165] *Id.* at A-191
[166] *Id.* at 21–22.
[167] http://www.nysrc.org/
[168] *IPPNY I* at P 71.

MMU of any alleged price suppression in the ICAP market, but it should not indulge the instant Complaint.

B. Complainants' Expanded BSM Proposal Is Not Just and Reasonable

Complainants urge the Commission to apply the highly contentious[169] Minimum Offer Price Rule it recently imposed in the PJM capacity market to the NYISO ICAP market.[170] While Complainants generally call for application of the same MOPR rules as established in the Commission's December 19, 2019, April 16, 2020, and October 15, 2020 Orders pertaining to the PJM Capacity Market (collectively, PJM MOPR Orders),[171] they do not delve into the complex detail thereof. Complainants focus their analysis almost exclusively on the perceived financial benefits of an Expanded BSM for merchant owners of fossil resources and ignore entirely all of the other underlying disputes regarding the application of the PJM MOPR Orders

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[169] To date there are at least 28 petitions seeking review of the Commission's PJM MOPR Orders currently before the 7th Circuit Court of Appeals. *See Ill. Commerce Comm. et al. v. FERC*, Case Nos 20-1645, 20-1759, 20-1760, 20-1761, 20-1762, 20-1819, 20-1849, 20-2010, 20-2016, 20-3027, 20-3028, 20-3029, 20-3030, 20-3031, 20-3032, 20-3033, 20-3034, 20-3035, 20-3036, 20-3037, 20-3038, 20-3039, 20-3040, 20-3041, 20-3042, 20-3043, 20-3044, 20-3045 and 20-3046 (7th Cir.) Additionally, in response to the Commission's PJM MOPR Orders, the New Jersey State Senate unanimously approved a bill to investigate whether to take steps in the near term to pull out of PJM's capacity market. "BPU PJM Study Bill Passes Senate Today," Insider NJ (Oct. 29, 2020) at https://www.insidernj.com/press-release/bpu-pjm-study-bill-passes-senate-today/, which is currently before the New Jersey Public Service Commission; *see also* In the Matter of BPU Investigation of Resource Adequacy Alternatives, Order Initiating Proceeding, Docket No. EO20030203, 2020 WL 1902995, (Mar. 27, 2020) https://www.nj.gov/bpu/pdf/boardorders/2020/20200325/3-27-20-2H.pdf. Lawmakers and commissioners in Illinois and Maryland have also made public statements resoundingly criticizing the PJM MOPR Orders and are considering similar steps. *See, e.g.*, Catherine Morehouse, "Maryland taking a 'serious look' at exiting PJM capacity market through FRR, says PSC Chair," Utility Dive, April 29, 2020, *https://www.utilitydive.com/news/maryland-taking-a-serious-look-at-exiting-pjm-through-frr-says-psc-chair/576957/*; Jeffrey Tomich and Arianna Skibell, "Deadlines loom for states mulling exit from FERC grid order," E&E News (June 1, 2020), https://www.eenews.net/stories/1063286497.

[170] Complaint at 10, 23; Clean Energy Parties incorporate herein by reference the same expert and legal criticisms leveled against its application in PJM by the members of Clean Energy Advocates participating in that proceeding, review of which is pending before the 7th Circuit Court of Appeals. *See, e.g.*, Protest of Clean Energy Advocates, Docket No. EL 18-169 May 7, 2018; Protest of Clean Energy Advocates, Docket No. El 18-169, June 20, 2018; Request for Rehearing of Clean Energy Advocates, Docket Nos EL-16-49, EL18-178, ER18-1314-000, ER1314-001, January 21, 2020; *Environmental Defense Fund v. FERC*, Petition for Review Case No. 20-3032, Docketed October 20, 2020 (7th Cir.).

[171] Complaint at 24.

currently in litigation, such as whether the definition of State Subsidy was arbitrarily overbroad, whether the MOPR arbitrarily differentiates between subsidies with an identical price impact, and whether the Commission failed to properly consider and balance the increased costs of the MOPR on consumers against the benefits to investors.[172] The MOPR in PJM evolved over a series of Orders and in response to the specificity of the PJM market and its stakeholders that is very different from NYISO;[173] Complainants do not acknowledge these concerns or their underlying complexity, nor explain whether and how they are equally applicable in the context of a very different market with a different design and substantially different stakeholders. Accordingly, they have not established a record sufficient for the Commission to justify application of the PJM MOPR wholesale to NYISO.

As the basis for its request, the Complainants cite to the "first principles" of organized capacity markets articulated by the Commission in its 2018 order in ISO-NE, namely that:

> A capacity market should facilitate robust competition for capacity supply obligations, provide price signals that guide the orderly entry and exit of capacity resources, result in the selection of the least-cost set of resources that possess the attributes sought by the markets, provide price transparency, shift risk as appropriate from customers to private capital, and mitigate market power. Ultimately, the purpose of basing capacity market constructs on these principles is to produce a level of investor confidence that is sufficient to ensure resource adequacy at just and reasonable rates.[174]

Complainants argue that the ICAP cannot continue to advance these so-called "first principles" in the face of state policy actions.[175]

Complainants claim that achievement of these principles form the core benchmark for approval of their proposal, structuring their argument and evidence against this rationale.[176]

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[172] *See, e.g., Envtl. Def. Fund v. FERC.*, Non-Binding Statement of Issues, Case No. 20-1131 (D.C. Cir. May 22, 2020)
[173] *See supra,* Section III.A.5.
[174] Complaint at 10 (citing *ISO New England, Inc*., 162 FERC ¶ 61,205, at P 21 (2018) ("CASPR Order").
[175] *Id.* at 14.
[176] *See, e.g., id.* at 23–24 (arguing that the an Expanded BSM would satisfy each of the CASPR Order's "first principles").

Fatally, however, much like the Commission's twisted application of these principles in its recent PJM MOPR Orders, Complainants' proposal to extend BSM to state environmental policy resources in NYISO relies on a deeply flawed theory totally detached from fundamental economic principles—including those Complainants purport to hold sacrosanct—and fails to meet statutory requirements to ensure just and reasonable rates that are not unduly discriminatory. As a result, Complainants fail to establish the record necessary for the Commission to justify application of the PJM MOPR to the NYISO capacity market.

1. Complainants' basis for requested relief is not supported by Section 206

As a threshold legal flaw, Complainants cannot demonstrate that their Expanded BSM proposal is just and reasonable because they rely on a standard that lacks a basis in the FPA and longstanding Commission precedent that would leave consumers without statutory protection. By focusing on the wrong, investor-focused standard, Complainants fail to address how their proposal will impact wholesale customers and thereby deny the Commission the record it requires to evaluate whether the approach is just and reasonable.

Complainants adopt the novel rationale set forth in FERC's recent PJM MOPR Orders that mitigation of state policy resources

> protect[s] the integrity of competition in the wholesale capacity market against unreasonable price distortions and cost shifts caused by out-of-market support to keep existing uneconomic resources in operation, or to support the uneconomic entry of new resources, regardless of the generation type or quantity of the resources supported by such out-of-market support. The resulting price distortions compromise the capacity market's integrity.[177]

Complainants, like FERC, fail to define key ingredients of this economic word salad, such as "uneconomic entry," "out-of-market support," "integrity of competition," or "capacity market

[177] Complaint at 18 (citing 163 FERC ¶ 61,236 at P 155 (footnotes omitted)).

integrity," nor do they lay a clear theoretical path linking this jumbled theory to consumer harm or explain how it applies to the specifics of applying BSM to state policy resources. Further, to the extent that Complainants set forth potential benefits from the application of the PJM MOPR in NYISO, they fail to explain the theoretical logic of how its proposed market reforms even relate to—much less support—their unsupported assertions.[178] Instead, Complainants and their expert focus almost entirely on how this theory will maximize potential returns for merchant investors.

But Complainants' approach is wholly unrooted in the FPA or in prior precedent and thus lacks a reasoned basis. Section 206 of the FPA charges the Commission with ensuring that rates are "just and reasonable" and "not unduly discriminatory or preferential."[179] It does not charge the Commission with safeguarding competitiveness or other abstract notions of market functioning divorced from the resulting rates. The authority the Commission has pursuant to Section 206 to alter rates is limited to where it is necessary to its core statutory task. Thus, courts have upheld the Commission's use of market-based forces *because* the Commission connected the use of markets to the outcome that matters: rates.[180]

Yet, here, Complainants lack a coherent rationale connecting their proposed intervention into the NYISO capacity market to impacts on rates. By refusing to articulate how certain

[178] Complaint, at Attach. A, Shanker Aff. at 20–21.
[179] 16 U.S.C. §§ 824d(a)–(b).
[180] *See e.g.*, *Blumenthal v. FERC.*, 552 F.3d 875, 882–83 (D.C. Cir. 2009) (listing cases holding that FERC shirks its statutory mandate where it "resorts to largely undocumented reliance on market forces as the principal means of rate regulation.") (internal quotation omitted); *Envtl. Action, Inc. v. FERC*, 939 F.2d 1057, 1061 (D.C. Cir. 1991) ("Competition is valued not for its own sake but because it is most likely to maximize the satisfaction of consumer wants."); *see also California ex rel. Lockyer v. FERC.*, 383 F.3d 1006, 1012–13 (9th Cir. 2004) ("The principle justifying this approach as 'just and reasonable' was that '[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'"), review granted, cause remanded sub nom. *California ex rel. Harris v. FERC.*, 784 F.3d 1267 (9th Cir. 2015).

policies more or less directly affect the efficiency of the market or its ability to ensure reliability at lowest cost, Complainants advance "competition" in name without accountability to the FPA's north star: rates that balance consumer and investor interests.[181] Lacking such a compass, Complainants cannot say that imposing an Expanded BSM in NYISO will produce a more or less efficient market outcome than currently exists.

To the extent that Complainants focus on rates at all, it is only within the context of potential impacts to merchant resource investors. Complainants make little mention and no analysis of potential impacts to ratepayers beyond suggesting emphatically that if states want a carbon-free electric system they can eat cake.[182] But this singular focus on certain investors' earnings neglects that the FPA's "primary aim" is to protect consumers "from excessive rates and charges."[183] Such "protection of the public interest" must be clearly "distinguished from the

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[182] Complaint at 27, *citing New Jersey Bd. of Pub. Utils.*, 744 F.3d at 97 (quoting Connecticut DPUC, 569 F.3d at 481). Complainants' reliance on *New Jersey Bd. of Pub. Utils.* (*NJBPU*) as quoted is misplaced. The Third Circuit's conclusion that the Commission has jurisdiction to order mitigation that will have the effect of forcing states to pay for contracted-for capacity outside the capacity market does not eliminate the obligation under the FPA to protect consumers from excessive rates when exercising that jurisdiction. In other words, while NJBPU held that FERC does not exceed its jurisdiction by imposing a tariff that requires a state to pay twice for capacity, it did not hold that doing so necessarily results in just and reasonable rates. The Commission must still fulfill its statutory duty to consider whether the enormous additional costs associated with applying BSM to the entire NYISO ICAP is necessary to incent sufficient entry into the capacity market. That states may have chosen to compensate certain generators for avoiding emissions and increasing grid stability does not absolve the Commission of its responsibility for addressing the increased costs to all NYISO ratepayers of its decision to exclude state-supported resources from the market. *NJBPU*, which addresses whether the Commission may impose those costs consistent with the limits on its jurisdiction, does not hold otherwise. Nor does *NJBPU's* holding that the Commission may prevent states from using the capacity market as a means of fulfilling their back-end contractual capacity obligations allow the Commission to ignore the effects of its price manipulation on customers throughout NYISO who benefit from states' front-end subsidies to encourage environmentally responsible generation. It is the Commission's choices, not the states', that would make capacity more expensive to ratepayers through the application of BSM.

[183] *Fed. Power Comm'n v. Sierra Pac. Power Co.*, 350 U.S. 348, 355 (1956) ("That the purpose of the power given the Commission by [section] 206(a) is the protection of the public interest, as distinguished from the private interests of the utilities, is evidenced by the recital in [section] 201 of the Act that the scheme of regulation imposed 'is necessary the public interest.'"); *Pa. Water & Power Co. v. Fed. Power Comm'n*, 343 U.S. 414, 418 (1952) ("A major purpose of the whole Act is to protect power consumers against excessive prices."); *Xcel Energy Servs. Inc. v. FERC*, 815 F.3d 947, 952 (D.C. Cir. 2016) ("It is long-established that 'the primary aim [of the FPA] is the protection of consumers from excessive rates and charges.'" (quoting *Mun. Light Bds. of Reading & Wakefield v. FPC*, 450 F.2d 1341, 1348 (D.C. Cir. 1971)); *Jersey Cent. Power & Light Co. v. FERC*, 810 F.2d 1168, 1177 (D.C.

private interests of the utilities."[184] Of course, whether prices provide adequate signals the entry and exit of capacity is an important factor in the Commission's balancing test. But it has never been an exclusive factor that overrides the need to consider other factors and their impacts on consumer and supply interests. The Commission's long-standing interpretation of the FPA entails consideration of the inherent trade-offs across consumer and supply interests in determining whether a rate is just and reasonable, and does not permit such shortcuts.[185] In fact, the Expanded BSM proposal represents a classic case where confidence for investors in supply resources will not translate into customer benefits. As further explained below in section III.B.3, the Expanded BSM benefits suppliers at the expense of customers by channeling customer dollars toward unnecessary, redundant capacity. In simply assuming that what is good for suppliers is good for customers, Complainants have failed to put forward the record necessary for the Commission to conduct its vital task of balancing consumer and supplier interests.

2. Complainants' Expanded BSM Proposal Is Based on Flawed Economic Logic

The economic theory presented to the Commission by Complainants and their witness Dr. Roy Shanker alleges that states with aggressive clean energy mandates are incenting the

Cir. 1987) ("[F]rom the earliest cases, the end of public utility regulation has been recognized to be protection of consumers from exorbitant rates.").

[184] *Fed. Power Comm'n v. Sierra Pac. Power Co.*, 350 U.S. 348, 355 (1956).

[185] *Fed. Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 603 (1944); *New England Power Generators Ass'n, Inc.*, 146 FERC ¶ 61,039 at P 52 (Jan. 24, 2014) ("[I]t has long been established that 'the fixing of "just and reasonable" rates, involves a balancing of the investor and consumer interests'"). *Promoting Transmission Investment through Pricing Reform*, 116 FERC ¶ 61,057 at P 21 (July 20, 2006), reh'g granted in part by 117 FERC ¶ 61,345 (Dec. 22, 2006), decision clarified on denial of reh'g by 119 FERC ¶ 61,062 (Apr. 19, 2007) ("The longstanding rule is that utility rate regulation must adequately balance both consumer and investor interests. It is not enough to ensure that investors are properly compensated, and it is not enough to ensure that consumers are protected against excessive rates. Our polices must ensure both outcomes and, in doing so, strike the appropriate balance between these twin objectives."); *New York Indep. Sys. Operator, Inc.*, 122 FERC ¶ 61,064 at P 54 (Jan. 29, 2008), order on reh'g, 125 FERC ¶ 61,299 (Dec. 18, 2008) (rejecting use of updated demand curve factors that "do not recognize the need to balance the impact on consumers with the need to provide correct price signals for new generation entry").

development of large quantities of new zero- or low-carbon resources to meet system-wide transition deadlines through a variety of programs and contract solicitations that Complainants and the Commission describe as "subsidies."[186] Because these activities can sometimes lower near-term capacity market prices and/or displace "non-subsidized" resources, Complainants argue that intervention is necessary to "protect" wholesale capacity market prices. Complainants allege that without intervention, market prices will be too low for merchant capacity suppliers (particularly fossil fuel resources) to earn adequate returns on investment and that, over time, these low capacity market prices will lead to insufficient entry of new generating resources and exit of inefficient resources that will ultimately threaten reliability of the whole electric system.[187] Complainants' proposed remedy is to offset any incentives provided to state policy resources by applying BSM to the entire NYISO capacity market. This would force resources benefiting from state policies to bid at administrative-determined rates that would reflect the higher prices that would prevail in the absence of state clean energy policies.[188]

As explained by the experts routinely employed to advise NYISO and the NYPSC on the economics of its markets, the Complainants' economic arguments are incomplete and flawed.[189] A corrected economic analysis should consider the following fundamental economic principles.

a. The State Policies at Issue Address Well-Understood Market Failures Such as Environmental Externality Costs

[186] Complaint at 12; Brattle Testimony at Sec B *generally*, 12, 19–20.
[187] *Id.* at 12-21. Drs. Spees and Newell have done extensive work on both BSM and MOPR in the NYISO and PJM regions. *Id.* at 1-2.
[188] *Id.*
[189] *Id.* at Sec. B, *generally*.

Complainants' theory that state policy resources receive a "subsidy" that "impede[s] a market's ability to set prices that accurately reflect market forces"[190] is an overly simplistic and incomplete analysis that overlooks a well-understood fact that market forces often fail to account for negative externalities—i.e., a negative side effect of production that adversely affects a party not involved in the transaction who has no influence on whether the transaction occurs, but is nevertheless harmed by it.[191] Absent intervention to address them, neither the purchaser nor the seller pays the full costs associated with the negative externality.[192] When externalities are at play, markets fail to allocate resources efficiently and current market price of that good is not the economically "correct" one, such that what looks like "market forces" are really market failures.[193]

Environmental externalities (for example, unregulated pollution emitted as a byproduct of fossil fuel electric generation) are a textbook example of market failures that have grievous harms such as asthma and early deaths, resulting from particulate pollution to the current climate change crisis.[194] Market pricing that does not account for such negative externalities would drive resource investments and operations toward an inefficiently large quantity of fossil-fuel-fired power plants, imposing inefficiently large externality costs.[195]

As explained by Brattle, market externalities can be addressed in one of two ways: command-and-control policies that directly regulate behavior, or market-based policies that align private incentives with social efficiency.[196] In the case of electricity markets, environmental externalities

[190] Complaint at 18 (citing Danly, ER16-1404 Rehearing Order, 172 FERC ¶ 61,058, Concurring Statement at P 2 (Danly, Comm'r,concurring)); Brattle Testimony at B.1.
[191] Brattle Testimony at 13.
[192] *Id.*
[193] *Id.* at 13, 15.
[194] *Id.* at 13.
[195] *Id.*
[196] *Id.* at B.1, 13.

can be addressed through policy mechanisms such as pollutant pricing mechanisms, carbon pricing, or through clean energy attribute payments paid directly to resources. These policies deliberately reward non-polluters and discourage polluters by forcing generators to internalize the environmental costs of production, and both will have the effect of raising market prices for generators who pollute and lowering it for those who do not.[197] The Commission's recent line of cases that would nullify state policy actions that it deems to provide a direct benefit (e.g., a ZEC), while expressing policy support for policy actions that impose a direct penalty (e.g., a carbon tax), ignores that these are two sides of the same economic coin with the same end result: higher prices for fossil fuels and lower prices for clean energy.[198]

When viewed through the proper lens, Complainants' description of the payments made to non-polluting resources as "subsidies" are not subsidies in the traditional sense of the term of propping up an "economically inefficient" market player. Rather, the incentives provided by states in this context are more appropriately described as compensation provided for the environmental benefits these resources provide that are necessary to correct a market failure.[199] Compensation for the environmental value of policy-supported resources should not be considered an illegitimate distortion of markets that must be excluded, but rather a correction that is needed to achieve a more efficient outcome.[200]

b. The "Correct" Capacity Price Is the One that Aligns Supply with Demand (Not the Price That Would Prevail in the Absence of State Policies)

[197] *Id.*
[198] *Id.*
[199] Brattle Testimony at Sec. B, *generally* at 12–15.
[200] *Id.* at Executive Summary, 1–2.

Complainants inaccurately characterize the low market prices of state policy resources as reflecting inappropriate "price suppression" that threatens the long-term capacity market supply and propose applying a MOPR to policy resources in order to "correct" market pricing signals.[201]

But compensating non-emitting resources for their environmental value simply lowers their net cost of production and makes them correctly appear more competitive as capacity providers with high energy and ancillary services value.[202] These resources should therefore be allowed to bid into the capacity market at a price that reflects their true value to the system; forcing them to ignore their environmental value simply perpetuates the market failure that allows fossil fuel resources to effectively underbid their true costs.[203]

That the ICAP consequently produces low prices is not a system reliability alarm that needs to be corrected; rather, the market's current low prices correctly reflect that there is an oversupply of capacity in the market as discussed earlier, and correctly signals that the least valuable resources in the market—in this case, expensive fossil fuel generators who are utilized in the energy market with decreasing frequency—should retire.[204] Complainants' argument, in the face of years of excess supply, that a MOPR is necessary now to prevent the possibility of insufficient capacity in the future, ignores the fundamental tenets of market theory, namely, that if supply becomes constrained in the face of increased demand, prices will rise to encourage greater investment.[205] Complainants' desire to "correct" the market by artificially raising the prices of the most competitive resources in the system in order to prop up the least valuable generators would stand elemental market economics on its head.

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[201] *Id.* at B.2, 15–16.
[202] *Id.*
[203] *Id.*
[204] *Id.*
[205] *Id.*

Even if one were to find the MOPR justified in the context of an RTO like PJM that has thirteen member states and the District of Columbia, with widely varying state energy policies across the RTO, copying and pasting that location-developed rule to a single state ISO with a mandate to transition rapidly to 100% clean energy engenders particularly perverse results.[206] As discussed further in Section [B.4] *infra*, Complainants' proposal to simply copy the PJM MOPR to NYISO would quickly render the ICAP an entirely redundant energy market that requires NYISO customers to pay artificially high prices for a product they do not wish to buy, nor will they be allowed to use.[207] Such a result is the height of economic absurdity.

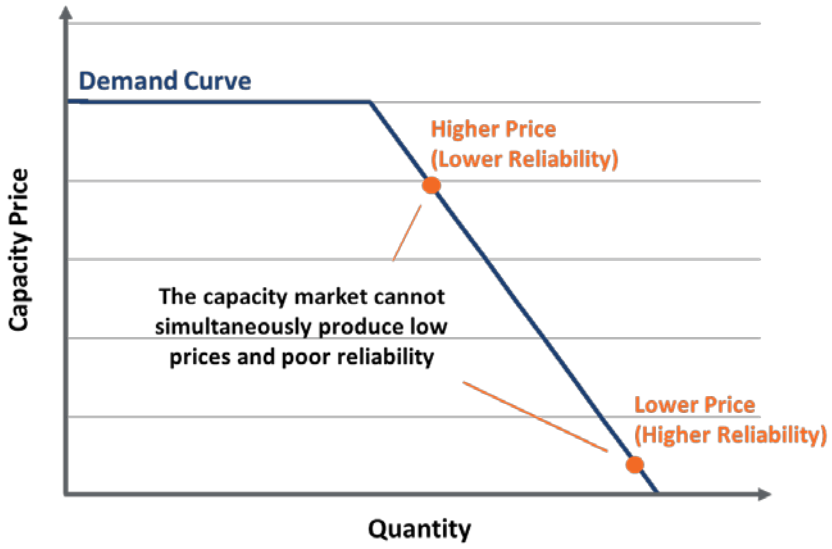
Contrary to Complainants' theory, the "correct" price for capacity is one that aligns desired supply with actual demand, not the price and resource mix that would prevail in the absence of state policies, as the Complainants' BSM proposal would aim to produce.

c. Capacity Markets with Sloping Demand Curves Cannot Simultaneously Produce Low Prices and Poor Resource Adequacy

Complainants also express a misguided concern that low prices resulting from a growth in state policy resources will threaten reliability by discouraging investment.[208] This concern is a mathematical impossibility.[209] By their very nature, capacity markets with downward sloping demand curves cannot simultaneously produce low prices and poor resource adequacy as the Complainants assert, as reflected in the graphic below:[210]

[206] *Id.*
[207] *Id.*
[208] *Id.* at B.3, 17
[209] *Id.*
[210] *Id.* at Figure 3.

FIGURE 1: CAPACITY MARKETS WITH DOWNWARD-SLOPING DEMAND CURVES CANNOT SIMULTANEOUSLY PRODUCE LOW PRICES AND POOR RESOURCE ADEQUACY



As discussed above, and reflected in this figure, if prices are low due to the entry of policy resources, this means that there is ample supply of capacity on the system. Low capacity prices signal that high-cost resources should retire and new entry is not needed and are not inherently a basis for imposing an Expanded BSM.[211]

d. Broad Application of Buyer-Side Mitigation to Policy Resources will Amplify (Not Mitigate) Regulatory Risks

Complainants also lay blame for their current financial woes of it and other similar facilities on the "significant uncertainty" associated with the low prices associated in part with renewable generation that has been "driven" in part by regulatory policy."[212] They assert that these low prices

[211] *Id.* at Fig. 3, 17.
[212] Complaint at 34.

"create significant uncertainty which may further compromies the market" and lead to "unjust and unreasonable rates, terms, and conditions of service.[213]

While elevated prices from an Expanded BSM would offset some immediate issues, they "should not be conflated with less-risky prices . . . . On the contrary, a market whose price is artificially inflated by a rule as controversial and economically irrational as MOPR is unsustainable."[214] The pressure to eliminate MOPR is already well underway and will only increase as the sting of it reaches customers already reeling from the economic downturn. Certainty will be more likely from long-term planning—as New York has done through its CLCPA and associated planning efforts—that will allow investors to plan around known policies.

Contrary to its assertions that it cannot survive without a MOPR, analysis by the Brattle Group for NYISO shows several past, current, and future benefits for merchant investment in capacity without BSM that could complement a future with large amounts of new state resources. These simulated markets retained enough existing capacity and new storage investment to maintain resource adequacy through 2040.[215]

As noted repeatedly by Chairman Glick, investor uncertainty that could doom capacity markets is far greater from the imposition of BSM than it is without it. The Governor of New York has described climate change as the "transcendent threat of our times."[216] Over eighty percent of New Yorkers believe climate change is real, and recent polling indicates that climate change was

[213] *Id.* at 18–19 (citing *PJM I*, 163 FERC ¶ 61,236 at P 155 (footnotes omitted) n.79).
[214] Brattle Testimony at B.4, 18.
[215] *Id.* at B.5, 19–20.
[216] Gwendolyn Craig, *Survey shows most New Yorkers believe in climate change*, The Post Star (Jan. 16, 2019), https://poststar.com/news/local/survey-shows-most-new-yorkers-believe-in-climate-change/article_4e51ee5a-e79c-5def-8813-2e90d95a5318.html; Gary Wilson, *Green Spotlight: New York Gov. Cuomo leads with climate change, restoring nature in annual priorities speech*, GreatLakesNow (Feb. 3, 2020), https://www.greatlakesnow.org/2020/02/state-governors-priorities-climate-change-new-york-michigan/.

the second biggest concern listed by voters in the 2020 election.[217] Should the Commission take steps to turn the capacity market as an impediment to achieving the state's widely-supported and jurisdictionally permitted resource goals, it is far more likely that New York will leave the ICAP market (as it is currently investigating[218])—a result that would actually engender far greater regulatory upheaval and investor uncertainty—and would be directly contrary to the purported desire of the Commission to foster and protect market competition.

e. Merchant Investors Operate in a Context that Includes Environmental Policies from Which They Never Should Have Expected to be Indemnified

The financial woes Complainants attribute to state policy resources resulting in lower-than-expected returns on investment, while unfortunate for them, is not a concern from a market design perspective.[219] Merchant generation investors operate in a market and regulatory context that has always required them to face uncertainties associated with environmental regulations. Complainants never should have expected to be indemnified against risks associated with these policies (nor should they be required to return revenues to customers when policy changes favor their investments). And, contrary to its assertions, the zero-emission electricity goals enshrined in New York's CLCPA have been the writing on the wall since 2002.[220] All investors choose to bear the risks and rewards associated with changing market conditions and regulations; there is no reason why Complaints should be inured to a risk faced by all private investors. A major purpose and oft-cited benefit of capacity markets is to shift the risk burden from consumers to investors, not the reverse.

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[217] Climate Nexus et al., *Poll Toplines* (Feb. 2020), https://newsletter.climatenexus.org/hubfs/Upcoming%20Primary%20State%20Poll%20Toplines%20and%20Crosstabs%20Climate%20Nexus.pdf.
[218] *See* NYPSC, *Proceeding on Motion of the Commission to Consider Resource Adequacy Matters*, Case No. 19-E-0530.
[219] Brattle Testimony at B.5, 19–20.
[220] *Id.*

f. BSM Should Be Applied for Its Narrow Original Purpose of Mitigating Market Power Abuses (Not Repurposed to Undo the Effects of State Policies)

Clean Energy Advocates do not dispute that BSM is an appropriate mechanism for its original purpose: prevention of manipulative price suppression by entities with market power. But the valid rationale behind BSM does not apply in the context of policy-supported clean energy investments for a number of reasons: (1) state policies are pursued for the purpose of addressing climate change, not in order to suppress market prices; (2) addressing environmental externalities is not "uneconomic"—it is a necessary market correction; and (3) applying BSM as proposed by Complainants actually *causes* uneconomic behavior by incentivizing the retention of truly uneconomic, unnecessary resources. As explained by Brattle:

> There is no sensible economic rationale for applying BSM to resources that are developed or maintained to address the harms of climate change or other environmental externalities. The policy support awarded to such resources reflects their environmental value; these resources are not "uneconomic" and their introduction is not in any way related to schemes of manipulative price suppression with uneconomic entry that the BSM was designed to address. Further, expanding BSM does not "level the playing field" as Complainants claim, since it does not privatize the costs of environmental externalities and does not attempt to undo the effects of all local, state, and federal policies that have always shaped the resource mix, including supporting the development of existing fossil plants and reduced the delivered cost of fossil fuels.[221]

In sum, Complainants aim to create a market solution in want of a problem. Their primary concern appears to be that as incumbent fossil generation owners, they no longer expect to earn a satisfactory return on their investments. While certainly a concern for Complainants, low capacity prices are not a problem from a societal or market design perspective. The real distortions before the Commission come from Complainants' travels through the economic looking glass, not the presence of state policy resources in NYISO's capacity market. Complainants' topsy-turvy

[221] *Id.* at 4.

economic theory provides no basis in the record for supporting the imposition of an expanded BSM in the NYISO ICAP market.

3. Expanded BSM would unjustly disconnect the capacity market from its intended purpose of providing resource adequacy and thwarts New York's clean energy transition

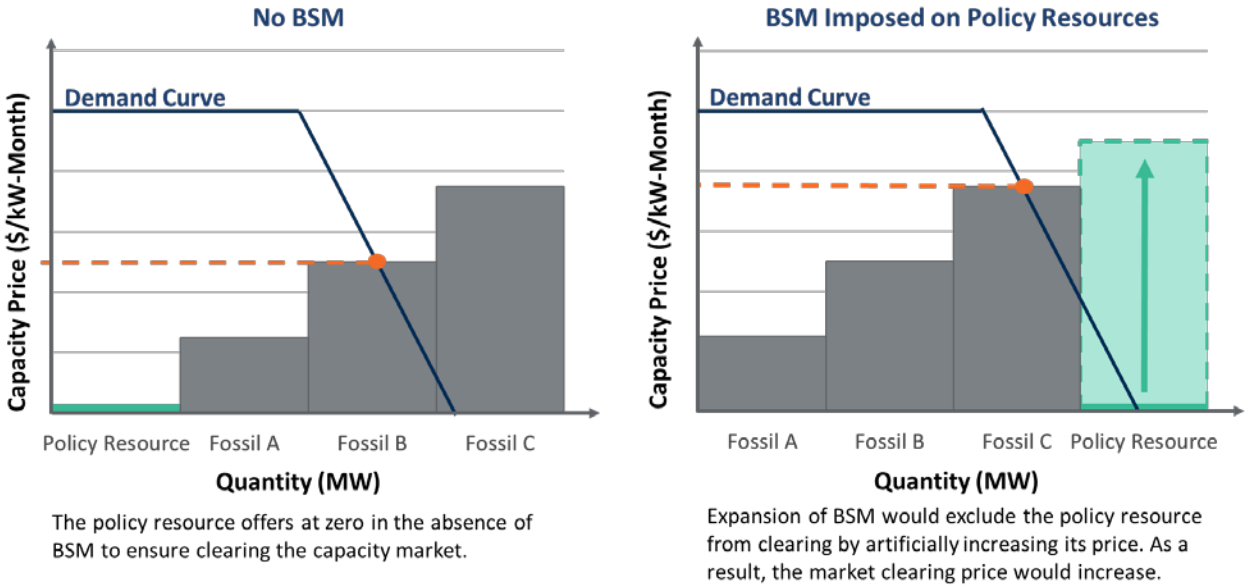
The Brattle Group analyzed the impact of applying BSM to state policy resources and determined that the overall effect excludes policy resources from clearing the capacity market and induces the uneconomic retention of fossil fuel resources, both of which pose a significant barrier to the achievement of the State's mandate under the CLCPA to achieve 100% clean electricity by 2040.[222]

a. An Expanded BSM Inflates Capacity Rates and Requires Redundant Capacity Without Benefiting Customers

Applying BSM to policy resources forces them to bid into the capacity market at administratively set prices designed to offset any benefits they receive as a result of state policies. The result is that capacity market prices increase for consumers and policy resources are pushed out of the capacity market as depicted in Figure 2 below:[223]

[222] *Id.* at Sec. C, 22–23.
[223] *Id.* at Sec. A, 9–12.

FIGURE 2: EXPANSION OF BSM WOULD INCREASE THE CLEARING PRICE



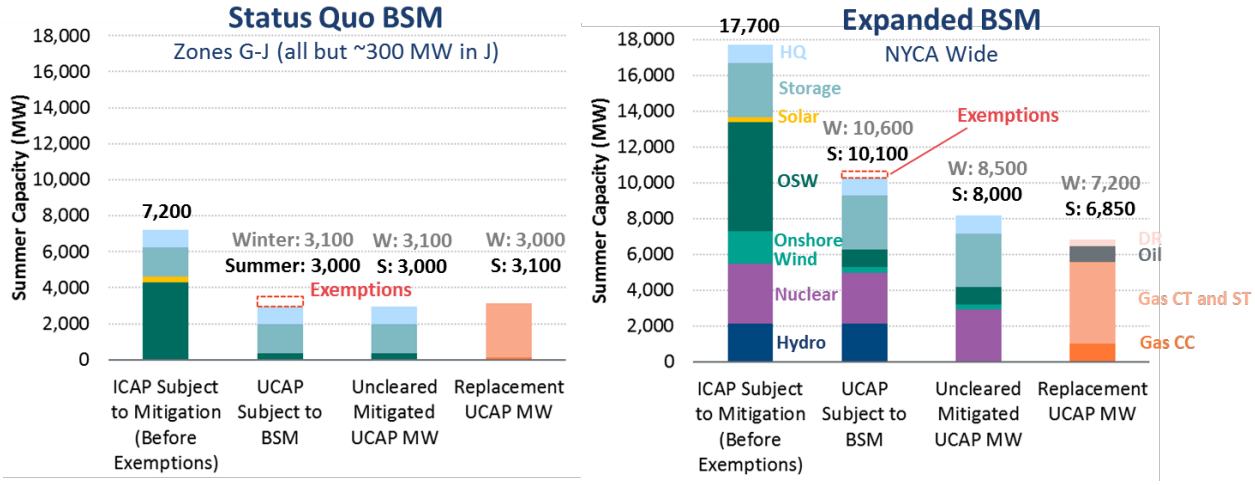
In addition to the "price effect" of BSM shown above, because NYISO utilities are also subject to the CLCPA, in addition to paying higher prices to meet ICAP reliability requirements, consumers are still required to purchase (and utilize) state policy resources required to meet clean energy mandates—this is known as the "quantity effect" or "double-payment issue", whereby consumers have to "pay twice" for capacity—first, to retain the policy resources required by CLCPA, and second, to pay for the redundant ICAP resources required to meet resource adequacy requirements under the NYISO Tariff.[224]

According to Brattle's analysis, Complainant's proposal to impose an Expanded BSM on the NYISO ICAP would immediately subject approximately 17,700 ICAP MW (10,200 UCAP MW) of policy resources to BSM by 2030. Approximately 8,100 UCAP MW would fail to clear the capacity market. As set forth in Figure 4 below, Complainant's Expanded BSM proposal would exclude a seasonal average of approximately 8,250 UCAP MW of clean energy resources from the ICAP market within 10 years.[225] Worse yet, as indicated by the fourth column, an

[224] *Id.* at 12.
[225] *Id.* at C.1, 22.

average of 6,930 UCAP MW of uneconomic capacity resources would be retained by an Expanded BSM, constituted primarily of aging, high-emitting gas- and oil-fired plants.[226]

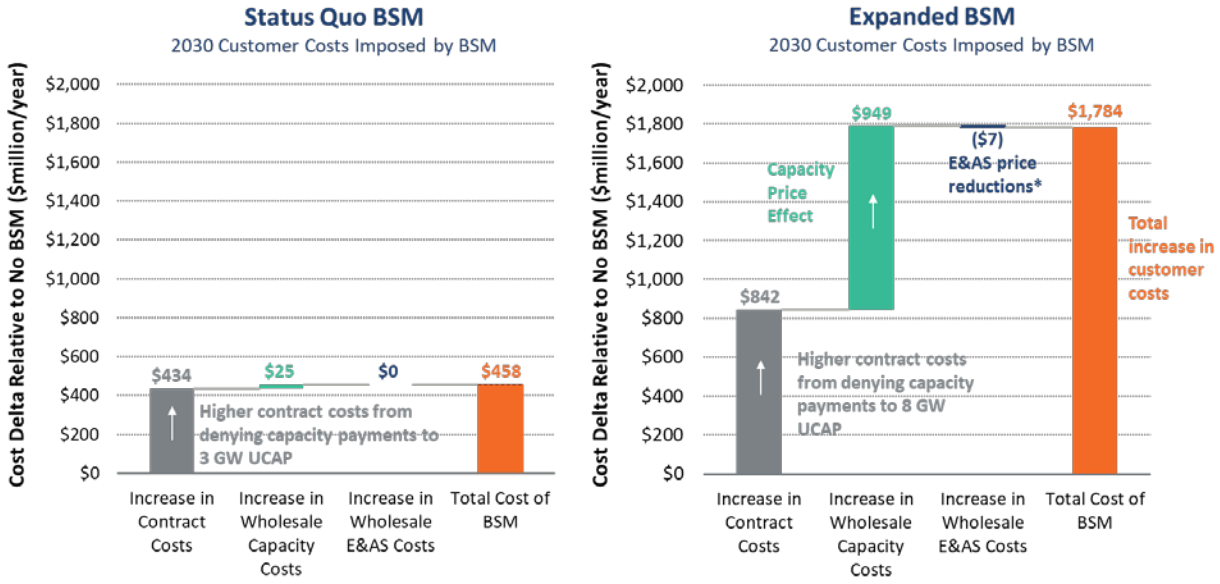
Figure 3: Projected Impacts of BSM on Capacity Market Clearing by 2030



According to Brattle, Expanded BSM would have an immediate overnight price effect for consumers of **$329 million per year** starting in 2021 that would grow over time to between **$1.78 billion per year by 2030**.[227] Part of these costs include the economic waste of keeping the uneconomic and undesired plants referenced in Figure 5 online, which induces excess societal costs amount to about $793 million per year by 2030.

[226] *Id.* at C.2, 22. This increase in unnecessary capacity would exacerbate NYISO's existing issues with excessive capacity.
[227] *Id.* at D.1, 24. Under alternative assumptions, Brattle estimates that Expanded BSM could range between $1.3 and $2.75 billion per year by 2030.

FIGURE 4: CUSTOMER COSTS FROM IMPOSING BSM ON POLICY RESOURCES BY 2030



While incumbent capacity sellers like Complainants benefit from an Expanded BSM, the benefits to them – estimated by Brattle to be approximately $998 million per year by 2030 - are still significantly less than the $1.78 billion in annual costs to consumers.[228] Although much of this information was publicly available when Complainants filed their complaint, they fail to explain, much less justify, the costs to consumers. But as discussed *infra* in Section [x], just and reasonable rates require a balancing of costs to consumers and benefits to investors, and consumers must receive something of value in order to justify increased rates. But again, the context of NYISO being located within a single state with an ambitious clean energy mandate has a significant impact on the cost-benefit analysis. Here, the cost increases to NYISO customers under an Expanded BSM would essentially entail a giant wealth transfer from consumers to fossil fuel investors used to funding uneconomic investments for maintaining aging fossil fuel plants that would otherwise retire (benefitting neither customers nor generators).[229] The increased rates of an Expanded BSM would thus be egregiously unjust and unreasonable.

[228] *Id.* at D.3, 25–26.
[229] *Id.*

b. Expansion of Buyer-Side Mitigation Threatens to Undermine the Future of Competitive Wholesale Electricity Markets

The Expanded BSM proposed by Complainants to state policy resources in NYISO threatens to undermine the benefits and eventually, the very existence of the ICAP market.[230] In a state such as New York—and any other state with a 100% clean energy mandate—rates cannot justifiably ignore the connection between CLCPA requirements for supply and the mandatory reliability requirements of the capacity market (demand). Rates that impose BSM or MOPR on state policy resources in order to encourage delayed exit or new entry of fossil fuel generators, while prematurely forcing out and blocking entry of the clean energy resources necessary to meet state policy requirements, disconnect the capacity market from the demand of its customers or their desired supply, and are inherently unjust and unreasonable. As explained by Brattle:

> Eventually, the scope and scale of an Expanded BSM would become so great that it would exclude the large majority of all resources from participating. At the same time the capacity market would continue to produce the high prices that would be necessary to retain excess fossil plants consistent with a fictional scenario as if the State's 100% clean electricity policy did not exist at all. This outcome is nonsensical and unsustainable. Rather than force customers to endure persistent, growing, and unnecessary excess costs, state policymakers would be forced to exit the capacity market entirely. In fact, state policymakers in New York have initiated a proceeding on the future of resource adequacy in the state for this very reason.[231]

If capacity markets are to survive, ISOs/RTOs and FERC must accommodate state environmental policies that are not designed or implemented to manipulate FERC wholesale markets, but rather to prevent irreversible environmental catastrophe.

4. Complainants' requested "Clean MOPR" is unjust and unreasonable, because it would undermine New York's lawful exercise of power to protect its citizens and ensure reliability

[230] *Id.* at E.1, 28.
[231] *See* NYPSC, *Proceeding on Motion of the Commission to Consider Resource Adequacy Matters*, Case No. 19-E-0530.

a. Collaborative Federalism and New York's Legitimate Regulatory Role

The FPA assigns to the Commission and state governments complementary, but distinct, regulatory roles. For this reason, the FPA has been characterized as a statute of "collaborative federalism" that "envisions a federal-state relationship marked by interdependence."[232] The Commission's role is to regulate "the sale of electric energy at wholesale in interstate commerce."[233] A "wholesale" sale of electricity is defined as a "sale of electric energy to any person for resale."[234] The FPA charges the Commission with the task of ensuring that wholesale sales of electricity occur at rates that are "just and reasonable" and not "unduly discriminatory or preferential."[235]

However, the FPA leaves to state governments the regulation of "any other sale of electric energy," as well as "facilities used for the generation of electric energy."[236] This state regulatory authority encompasses "questions of need, reliability, cost, and other related state concerns"[237] as well as "environmental and social impacts."[238]

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[232] *Hughes*, 136 S. Ct. at 1300 (Sotomayor, J., concurring).
[233] 16 U.S.C. § 824(b)(1).
[234] *Id.* § 824(d).
[235] *Id.* § 824e(a).
[236] *Id.* § 824(b)(1); *Hughes*, 136 S. Ct. at 1292 ("[T]he [FPA] places beyond FERC's power, and leaves to the States alone, the regulation of 'any other sale'—most notably, any retail sale—of electricity."); *EPSA*, 136 S. Ct. at 775, *as revised* (Jan. 28, 2016).
[237] *Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n*, 461 U.S. 190, 205 (1983).
[238] *Californians for Renewable Energy, Inc. v. CAISO*, 117 FERC ¶ 61,072, at P 10 (2006); *Re S. Cal. Edison Co.*, 70 FERC ¶ 61,215, 61,676 (Feb. 22, 1995) ("We respect the fact that resource planning and resource decisions are the prerogative of state commissions and that states may wish to diversify their generation mix to meet environmental goals in a variety of ways.").

States can exercise this authority by "direct[ing] the planning and resource decisions of utilities under [the state's] jurisdiction."[239] Notably, states' "role as regulators of generation facilities" can include "the right to forbid new entrants from providing new capacity, to require retirement of existing generators, [and] to limit new construction to more expensive, environmentally-friendly units."[240]

States may exercise these regulatory prerogatives even if such regulations "incidentally affect" wholesale electricity markets.[241] The Supreme Court has emphasized that "[s]tates, of course, may regulate within the domain Congress assigned to them even when their laws incidentally affect areas within FERC's domain."[242]

As the Court has explained, "[i]t is a fact of economic life that the wholesale and retail markets in electricity, as in every other known product, are not hermetically sealed from each other."[243] The Court has also noted with respect to the Natural Gas Act, a statute closely analogous to the FPA, it would "strange indeed" if states could only regulate natural gas production "in furtherance of legitimate conservation goals" if doing so had no "effect on interstate rates."[244]

The Court's observations make sense, given that it would not be feasible for the Commission to attempt to cancel out the effect of all state actions on wholesale rates, however legitimate the action or minor its effects. As Commissioner Glick has noted, quoting former

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[239] *Entergy Nuclear Vt. Yankee, LLC v. Shumlin*, 733 F.3d 393, 417 (2d Cir. 2013) (internal quotation marks omitted).
[240] *Conn. Dep't of Pub. Util. Control v. FERC*, 569 F.3d 477, 481 (D.C. Cir. 2009).
[241] *Hughes*, 136 S. Ct. at 1298.
[242] *Id.*
[243] *EPSA*, 136 S. Ct. at 776.
[244] *Nw. Cent. Pipeline Corp. v. State Corp. Comm'n of Kansas*, 489 U.S. 493, 512–13 (1989).

Commission Chairman Norman Bay, an "idealized vision of markets free from the influence of public policies ... does not exist, and it is impossible to mitigate our way to its creation."[245]

More broadly, beyond the FPA's division of authority over the electric grid between FERC and the states, states have the independent authority reserved to them under the U.S. Constitution to legislate for the general welfare of its people. "The power to promote the general welfare is inherent in government," and the "states in their sovereign capacity" possess this power for "all subjects jurisdiction of which is not surrendered to the federal government."[246] This power extends to legislation to promote the health of a state's people and natural environment—"Legislation designed to free from pollution the very air that people breathe clearly falls within the exercise of even the most traditional concept of what is compendiously known as the police power."[247] State policies that regulate the negative externalities of power generation, including policies that aim to replace polluting resources in the generation mix with clean ones—fall squarely within states' inherent power to protect the health and welfare of their citizens, and its sovereignty over those police powers is independent of its authority under the Federal Power Act.

Here, New York's policies to promote the deployment of clean energy resources, are legitimate regulatory actions aimed at environmental and social impacts, ones that falls well within "the domain Congress assigned"[248] to New York to regulate.[249] As such, they are perfectly consonant with the role prescribed for state regulation under the FPA.

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[245] 170 FERC ¶ 61,119 (Glick, Comm'r, dissenting at P 11).
[246] *Nebbia v. People of New York*, 291 U.S. 502, 524 (1934); *see also New York v. United States*, 505 U.S. 144, 156 (1992) ("The States unquestionably do retai[n] a significant measure of sovereign authority ... to the extent that the Constitution has not divested them of their original powers and transferred those powers to the Federal Government.").
[247] *Huron Portland Cement Co. v. City of Detroit*, 362 U.S. 440, 442 (1960).
[248] *Hughes*, 136 S. Ct. at 1298.
[249] *See supra* at Section III.B.

b. Expanded BSM Would Usurp States' Role under the Federal Power Act

Under the FPA, the Commission does not set its own environmental policies. Instead, the FPA allows the Commission to recognize the actions of environmental regulators and to provide for the efficient administration of markets when accounting for their policies. Rather than facilitating efficient market operations given the choices of other regulators, an Expanded BSM would frustrate the decisions of state environmental regulators by undoing their economic consequences.[250]

That was not what was envisioned when grid operators created capacity markets and the Commission approved them. As the D.C. Circuit explained in upholding the Commission's authority to create capacity markets, the markets were designed to take state regulation of generation mix as an input. Rather than forcing a particular generation mix on states, capacity markets were designed merely to ensure a reserve margin is hit so as to reduce the likelihood of future blackouts:

> The 'Installed Capacity Requirement' is misnamed because increasing it doesn't actually 'require' anyone to 'install' any new 'capacity' at all. State and municipal authorities retain the right to forbid new entrants from providing new capacity, to require retirement of existing generators, to limit new construction to more expensive, environmentally-friendly units, or to take any other action in their role as regulators of generation facilities without direct interference from the Commission. Of course, those choices affect the pool of bidders in the Forward Market, which in turn affects the market clearing price for capacity.[251]

Complainants' proposed expansion of BSM would upend this market organization, and would have the Commission replace the environmental regulatory choices of New York regulators to address climate change with a rule that ignores the costs of pollution and the benefits of avoiding

[250] *See supra* at Section III.A.2.
[251] *Connecticut Dep't of Pub. Util. Control*, 569 F.3d at 481.

it. This infringes on states' explicitly reserved authority to regulate generation under the FPA.[252] As explained by the Second Circuit:

> While FERC's authority extends to 'rules or practices affecting wholesale rates,' this affecting jurisdiction is limited to 'rules or practices that directly affect the [wholesale] rate' so that FERC's jurisdiction does not 'assum[e] near-infinite breadth.' … However, 'the law places beyond FERC's power, and leaves to the States alone, the regulation of 'any other sale'—most notably, any retail sale—of electricity. . . The states are thus authorized to regulate energy production, 16 U.S.C. § 824(b), and facilities used for the generation of electric energy, 16 U.S.C. § 824(b)(1).'[253]

In holding that New York's ZECs program was a valid exercise of state authority under the FPA and not pre-empted by FERC, the Court continued: "[t]o the extent the ZEC program distorts an efficient wholesale market, it does so by increasing revenues for qualifying nuclear plants, which in turn increases the supply of electricity, which in turn lowers auction clearing prices. But that is (at best) an incidental effect resulting from New York's regulation of producers. In any event, ZECs do not guarantee a certain wholesale price that displaces the NYISO auction price."[254] So

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[252] *See Grand Council of the Crees (of Quebec) v. FERC*, 198 F.3d 950, 957 (D.C. Cir. 2000); *ISO New England, Inc.*, 138 FERC ¶ 61,027, at P 91 (Jan. 19, 2012); *ISO New England, Inc.*, 155 FERC ¶ 61,023, at P 23 (Apr. 8, 2016); *PJM Interconnection LLC*, 135 FERC ¶ 61,022, at P 143 (Apr. 12, 2011); *PJM Interconnection LLC*, 137 FERC ¶ 61,145, at P 3 (Nov. 17, 2011) (States and localities have their own policies and objectives, which may not be reflected in the wholesale market design and with which the Commission intends to not "unreasonably interfere").

[253] *Coal. for Competitive Electricity, Dynergy Inc. v. Zibelman*, 906 F.3d 41, 49–50 (2d Cir. 2018) (citing *FERC v. Elec. Power Supply Ass'n*, 136 S.Ct. 760, 774 (2016) and *Pac. Gas & Elec. Co. v. State Energy Res. Conservation and Dev. Comm'n*, 461 U.S. 190, 205 (1983). "Need for new power facilities, their economic feasibility, and rates and services, are areas that have been characteristically governed by the States.")

[254] *Id.* at 57. The Court also noted that "FERC itself has sanctioned state programs that increase capacity or affect wholesale market prices, so long as the states regulate matters within their jurisdiction. Thus, states may 'grant loans, subsidies or tax credits to particular facilities on environmental or policy grounds,' *Cal. PUC*, 133 FERC ¶ 61,059, P 31 n.62, including when that makes clean generation 'more competitive in a cost comparison with fossil-fueled generation' or 'allow[s] states to affect' the price, *S. Cal. Edison Co*., 71 FERC ¶ 61,269, 62,080 (1995). States may 'require retirement of existing generators' or construction of 'environmentally-friendly units, or ... take any other action in their role as regulators of generation,' even though it may 'affect[ ] the market clearing price.' *Conn. Dep't of Pub. Util. Control v. FERC*, 569 F.3d 477, 481 (D.C. Cir. 2009)."; *see also New England States Comm. on Elec. v. ISO New England Inc*., 142 FERC ¶ 61,108, 61,490 (Feb. 12, 2013) (LaFleur, Comm'r, concurring that "[S]tates have the unquestioned right to make policy choices through the subsidization of capacity."); *N.Y. State PSC*, 158 FERC ¶ 61,137, 2017 WL 496267, at *11 (Feb. 3, 2017) (Bay, Comm'r, concurring) (observing that "all energy resources" receive subsidies, and that "an idealized vision of markets free from the influence of public policies ... does not exist"). Similarly, FERC told the Supreme Court in *Hughes* that states are "free" to adopt such programs, "even if the price signals in the regional wholesale capacity market indicate that no [such] resources are needed." *Hughes*, 2016 WL 344494, 33.

too, here: where the state decides to expend its revenues to pay for environmental services provided by generators, independent of their participation in the capacity market, those valuations are within the state's authority to make. Any impact state support for clean energy resources may have on the NYISO ICAP is incidental at best and not within FERC's authority to nullify through mitigation.[255]

c. An Expanded BSM Will Thwart New York's Legitimate Regulatory Goals

The Complaint fails to seriously address either New York State's lawful aims in shaping its generation mix, or the unique operation of New York's electric reliability and capacity procurement mechanisms. In *Hughes*, the Supreme Court made clear that this state authority cannot be "[]tethered" to participation in Commission-jurisdictional markets, [256] including New York's ICAP market. However, no such impermissible "tether" is present here, as New York has focused on wholly permissible aims – reduction of local pollution and climate harm to its citizens, while encouraging economic development based upon a transition to clean energy. While the state's aims are not "hermetically sealed" from wholesale markets, [257] and inevitably affect the ICAP market, they are no less permissible. These legitimate state goals should not be the target of expanded mitigation measures.

Nor does the Complaint meaningfully address the clear intent behind New York's actions. The 2019 Climate Leadership and Community Protection Act[258] contains detailed

[255] *Coal. for Competitive Electricity, Dynergy Inc.*, 906 F.3d at 57 ("FERC uses auctions to set wholesale prices and to promote efficiency with the background assumption that the FPA establishes a dual regulatory system between the states and federal government and that the states engage in public policies that affect the wholesale markets. Accordingly, the ZEC program does not cause clear damage to federal goals," and is not preempted.).
[256] *Hughes*, 136 S. Ct. at 1299.
[257] *See Elec. Power Supply Ass'n*, 136 S. Ct. at 776 ("It is a fact of economic life that the wholesale and retail markets in electricity, as in every other known product, are not hermetically sealed from each other.").
[258] *See* S. 6599, 2019 Sess. Laws of N.Y., https://legislation.nysenate.gov/pdf/bills/2019/s6599.

findings of the likely harms of climate change for New York, including extreme weather, rising seas, declining fish populations, rising average temperatures, increasing air pollution, and increasing negative health outcomes – as well as the state's goal of encouraging economic development and job growth. Similarly, the NYPSC's 2016 Order Adopting a Clean Energy Standard, [259] which established the state's Clean Energy Standard and ZEC requirements (which Complainants decry as "out-of-market support") make clear that the Order's aims are:

> "to achieve State environmental, public health, climate policy and economic goals; to enhance and animate voluntary retail markets for energy efficiency, clean energy and renewable resources; to preserve existing zero-emissions nuclear generation resources as a bridge to the clean energy future; to ensure a modern and resilient energy system; and to accomplish its objectives in a fair and cost-effective manner."

The aims of these environmental mandates are clearly within any state's authority.

These and the other rules and programs mentioned *supra* in Section [x] are all aimed at fulfilling New York's traditional police powers to protect the health of its citizens and its environment. Any economic affect resources benefiting directly from these programs might have on the NYISO capacity market is purely incidental to compliance with state environmental authority. FERC has consistently acknowledged that it is not an environmental regulator,[260] but neither can it use its rate setting authority to be an environmental *de*regulator.

Additionally, the Commission should view Complainant's arguments with even greater skepticism because of unique aspects of the New York ICAP framework. Congress specifically

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[259] NYPSC, *Order Adopting a Clean Energy Standard*, Case Nos. 15-E-0302 and 16-E-0270 (Aug. 1, 2016) ,http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B44C5D5B8-14C3-4F32-8399-F5487D6D8FE8%7D.

[260] FERC most recently acknowledged this jurisdictional limit in its October 15, 2020 Proposed Policy Statement on Carbon Pricing in Organized Wholesale Electricity Markets; Docket No. AD20-14-000 (Oct. 15, 2020) at PP 4-5, acknowledging that the Commission has long recognized that environmental compliance costs are appropriately considered in wholesale rates "and there is no basis for the Commission to treat carbon price costs any differently." *Id*. at fn 14, *citing* Policy Statement on Costs of Emissions Allowances, 59 Fed. Reg. 65,930 at 65,935. There is no legitimate reason why wholesale rates can only consider environmental compliance that requires an *increase* in wholesale rates; ratepayers should also benefit when environmental compliance causes electricity rates to *decrease*.

granted New York the ability to "establish rules that result in greater reliability within that State," [261] and the state has developed a structure to ensure resource adequacy and establish capacity requirements that do not begin and end with NYISO. The New York State Reliability Council ("NYSRC"), comprised of representatives including the state's transmission owners, generators, large consumers, municipal and electric cooperative utilities, has the responsibility to set the IRM for the New York Control Area, as well as the Locational Capacity Requirements ("LCR") in constrained zones. [262] The NYSRC's rules are reviewed and approved by the New York Public Service Commission, which must account for relevant provisions of state law.[263] The NYSRC submits an advisory filing to FERC on the annual requirements, which take stock of any planned retirements. NYISO then conducts its ICAP auctions consistent with the required IRM and LCR quantities.

The unique interplay of the ICAP market with state-jurisdictional reliability criteria, which Congress specifically allowed to exceed otherwise-applicable national reliability rules, should give the Commission pause before adopting the bull-in-a-china-shop approach that Complainants seek. The "Clean MOPR" would result in mitigation of lawful state aims, while upsetting a carefully designed reliability and capacity procurement construct in which NYISO plays an essential role. The Commission should instead uphold New York's ability to pursue lawful goals untethered from affecting wholesale markets. Finally, Clean Energy Parties note that the Commission has no authority to directly pre-empt such lawful state programs, nor can

[261] 16 USC 824o(i)(3).
[262] *See NYSRC Website*, http://www.nysrc.org/; NYSRC and Installed Capacity Subcommittee, *Technical Study Report* (Dec. 6, 2019), http://www.nysrc.org/PDF/Reports/2020%20IRM%20Study%20Body%20Final%2012-9-19.pdf.
[263] *See e.g.*, *Order Adopting Modifications to New York State Reliability Rules*, Case No. 05-E-1180 (Dec. 20, 2017), http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B538C35B3-929B-4E81-A8BF-A23BF493BF0A%7D.

the Commission require that all revenue for generators come via a Commission-jurisdictional market; such requirements are difficult to implement in practice, as Complainants have received certain out-of-market payments that were permitted under the Competitive Entry Exemption, but might run afoul of a "Clean MOPR."[264]

IV. CONCLUSION

Complainants have failed to carry their burden under section 206 of the Federal Power Act. Complainants failed to demonstrate that the current NYISO rates are unjust and unreasonable. Moreover, they have not shown that their proposed alternative, the "Clean MOPR", is itself just and reasonable. Accordingly, the Commission must reject their complaint.

Dated: November 18, 2020.

Respectfully submitted,

/s/ *Danielle C. Fidler*

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[264] *Compare Calpine Corp. v. PJM Interconnection LLC*, 169 FERC ¶ 61,239, at P 83 ("We adopt PJM's proposal to exclude generic industrial development and local siting support from those types of support that will be treated as a State Subsidy for the purposes of the expanded MOPR. We find that PJM's proposed exclusions are reasonable, given that the support at issue is available to all businesses and is not "nearly 'directed at' or tethered to the new entry or continued operation of generating capacity in the federally-regulated multi-state wholesale capacity market administered by PJM.") *with* Dutchess County Tax Abatement for Cricket Valley Energy Center (showing over $47.6 million in costs to Dutchess County from mortgage, sales tax, and real property tax exemptions and abatements), https://thinkdutchess.com/wp-content/uploads/2019/01/10-Cricket-Valley-Project-Summary-for-Website.pdf.

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CERTIFICATE OF SERVICE

Pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.2010, I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding by electronic means.

Dated this 18th day of November, 2020.

/s/ Danielle C. Fidler
Danielle C. Fidler

EXHIBIT A

Dr. Kathleen Spees and Dr. Samuel A. Newell, *The Economic Impacts of Buyer-Side Mitigation in New York ISO Capacity Market*, at 4, The Brattle Group (Nov. 18, 2020)

UNITED STATES OF AMERICA

BEFORE THE

FEDERAL ENERGY REGULATORY COMMISSION

Cricket Valley Energy Center LLC and	)	
Empire Generating Company LLC	)	
v.	)	**Docket No. EL21-7-000**
New York Independent System	)	
Operator Inc.	)	

WRITTEN TESTIMONY OF DR. KATHLEEN SPEES AND DR. SAMUEL A. NEWELL

The Economic Impacts of Buyer-Side Mitigation in New York ISO Capacity Market

Our names are Dr. Kathleen Spees and Dr. Samuel A. Newell. We are employed by The Brattle Group as Principals. On behalf of the Natural Resource Defense Council, the Sustainable FERC Project, Earthjustice, Sierra Club, American Wind Energy Association, Alliance for Clean Energy New York, and Advanced Energy Economy, we submit this affidavit on The Economic Impacts of Buyer Side Mitigation in the New York Independent System Operator (NYISO) Capacity Market.

Our qualifications as experts derive from our extensive experience evaluating capacity markets and related market design questions. Our experience working for system operators across North America and internationally has given us a broad perspective on the practical implications of nuanced capacity market design rules under a range of different economic and policy conditions.[1] In New York, we have conducted analyses on behalf of the New York State Energy Research and Development Authority (NYSERDA) and the New York State Department of Public Service (NYSDPS) to analyze the costs of Buyer Side Mitigation (BSM) and potential expansions thereof, and to evaluate alternatives to BSM. We are also very familiar with the Minimum Offer Price Rule (MOPR) in PJM Interconnection, LLC's (PJM) capacity market that Cricket Valley Energy Center (CVEC) LLC and Empire Generating Company LLC (the "Complainants") seek to

[1] We have worked with regulators, market operators, and market participants on matters related to resource adequacy and investment incentives in PJM Interconnection, ISO New England, New York, Ontario, Alberta, California, Texas, Midcontinent ISO, Italy, Russia, Greece, Singapore, and Western Australia.

emulate. We have supported PJM by conducting every one of its periodic reviews of its capacity market and have developed design recommendations for competitive and self-supply exemptions to MOPR.[2] Dr. Newell has submitted testimony to the Federal Energy Regulatory Commission (FERC) on behalf of PJM in developing economic estimates of offer floor prices to implement the MOPR rules in that region. Dr. Newell has also submitted testimony on behalf of the Competitive Markets Coalition group of generating companies seeking to strengthen PJM's MOPR in its original purpose to prevent and mitigate the exercise of buyer market power.[3]

Dr. Spees is an economic consultant with expertise in wholesale electric energy, capacity, and ancillary service market design and analysis. She earned a Ph.D. in Engineering and Public Policy, an M.S. in Electrical and Computer Engineering from Carnegie Mellon University, and a B.S. in Mechanical Engineering and Physics from Iowa State University. Dr. Newell is an economist and engineer with more than 20 years of experience analyzing and modeling electricity wholesale markets, the transmission system, and ISO/RTO market designs. He earned a Ph.D. in Technology Management and Policy from the Massachusetts Institute of Technology, an M.S. in Materials Science and Engineering from Stanford University, and a B.A. in Chemistry and Physics from Harvard College.

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[2] See our four independent reviews of PJM's capacity market and associated design parameters published in 2008, 2011, 2014, and 2018. The most recent of these is: Samuel A. Newell, David Luke Oates, Johannes P. Pfeifenberger, Kathleen Spees, J. Michael Hagerty, John Imon Pedtke, Matthew Witkin, and Emily Shorin, *Fourth Review of PJM's Variable Resource Requirement Curve*, Prepared for PJM Interconnection L.L.C., April 19, 2018.

[3] FERC Docket No. ER13-535-000, filed "The Competitive Markets Coalition's Supporting Comments, at Attach. A, Affidavit of Dr. Samuel A. Newell on Behalf of the 'Competitive Markets Coalition' Group Of Generating Companies," supporting PJM's proposed tariff revisions to change certain terms regarding the Minimum Offer Price Rule in the Reliability Pricing Model, December 28, 2012 ("Affidavit of Dr. Samuel A. Newell on Behalf of the Competitive Markets Coalition").

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Executive Summary

The original and proper economic purpose of buyer-side mitigation (BSM) rules is to protect the market from the exercise of buyer market power: schemes where large net buyers or their representatives offer a small amount of uneconomic supply into the market below cost in order to suppress market clearing prices.[4] By taking a loss on that small position, a large net buyer could then benefit from a much larger short position in the market. The BSM was designed to prevent this behavior. The concept was to ensure that entities with the incentive and ability to engage in manipulative price suppression will be unable to do so by requiring their capacity market offers to reflect their full costs. Thus uneconomic new resources sponsored by large net buyers would fail to clear (or would set the prices at a higher level) and prevent the would-be gaming entity from achieving the benefits of manipulative price suppression. Symmetrical rules are imposed on large net sellers of capacity in order to prevent them from exercising economic or physical withholding.

More recently, the BSM has been inappropriately repurposed to exclude from the capacity market resources that earn revenues for supporting states', communities', or private consumers' clean energy mandates or sustainability goals; and the Complainants want to extend BSM's application even further along these lines. There is no sensible economic rationale for applying BSM to resources that are developed or maintained to address the harms of climate change or other environmental externalities. The policy support awarded to such resources reflects their environmental value; these resources are not "uneconomic" and their introduction is not in any way related to schemes of manipulative price suppression with uneconomic entry that the BSM was designed to address. Further, expanding BSM does not "level the playing field" as Complainants claim, since it does not privatize the costs of environmental externalities and does not attempt to undo the effects of all local, state, and federal policies that have always shaped the resource mix, including supporting the development of existing fossil plants and reduced the delivered cost of fossil fuels.

Applying BSM to clean energy resources may prevent them from clearing the market, with several undesirable effects. First, it will deprive clean energy resources of revenues reflecting the capacity value they provide, which will interfere with the State's fulfillment of its clean energy mandates. Second, it will favor the retention of uneconomic fossil-fired generation that are not needed for reliability, further conflicting with the State's transition. Third, it will produce higher market clearing prices exceeding the level corresponding to actual supply conditions and effectuate a large wealth transfer from customers to incumbent suppliers. And fourth, contrary to the Complainants' claims, BSM's application to policy resources will eventually render the market unsustainable as these distortions become larger over time under New York's statutory mandate to achieve 70% renewable electricity by 2030 and 100% clean electricity by 2040.[5] The end state of applying BSM to clean energy resources would be a capacity market that excludes a large majority of the fleet, with market clearing outcomes having no relationship to underlying supply and demand fundamentals.

These distortions would be amplified by the Complainant's proposal to expand the applicability of BSM to all policy-supported resources throughout the state and to increase their minimum offer prices in the capacity auctions. Instead, BSM should be changed in the other direction to limit its

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[4] Federal Energy Regulatory Commission (FERC), Docket No. EL07-39-000, "Order Conditionally Approving Proposal" at PP 100–P100106, March 7, 2008.

[5] State of New York, Senate – Assembly, S. 6599 – A. 8429, "Article 75, Climate Change," June 18, 2019.

applicability to its original purpose. The most appropriate capacity price is the one that will prevail after the elimination of BSM rules from policy resources, such that the capacity market can continue supporting economic entry and exit by providing an accurate reflection of capacity surplus or shortfall.

THE APPLICATION OF BUYER-SIDE MITIGATION TO POLICY RESOURCES IS BASED ON FLAWED ECONOMIC LOGIC

The Complainants in this proceeding and their witness Dr. Roy Shanker claim that BSM should be applied to policy resources in order to protect the capacity market from the effects of state policies.[6] Similar to prior economic arguments presented to the FERC, the Complainants assert that state-supported resources inappropriately suppress capacity market prices, thus undermining investment signals and ultimately system reliability. Their proposed remedy is to apply BSM to policy resources, thus restoring prices to the levels that would prevail in the absence of state policies.

The Complainants' economic arguments are incomplete and flawed. A corrected economic analysis should consider that:

- State environmental policies address a well-understood market failure to reflect environmental externalities. The environmental value of policy-supported resources should not be considered an illegitimate distortion of markets that must be excluded, but rather a correction that is needed to achieve a more efficient outcome;
- The "correct" price for capacity is one that aligns supply and demand, not the price that would prevail in the absence of state policies as the Complainants' BSM proposal would aim to produce;
- Capacity markets with sloping demand curves cannot simultaneously produce low prices and poor resource adequacy as the Complainants assert;
- Broad application of BSM to policy resources will amplify (not mitigate) the regulatory risks affecting capacity investments; and
- Merchant generation investors operate in a market and regulatory context that has always required them to face uncertainties associated with a wide range of energy and environmental regulations at the federal, state, and local levels; these policies and associated economic subsidies have always influenced the resource mix (some in favor of incumbent fossil resources and others in favor of clean energy resources). Merchant investors should never have expected to be indemnified against risks associated with these policies (nor should they be required to return revenues to customers when policy changes favor their own investments).

Overall, the Complainants aim to solve a problem that doesn't exist. Their primary concern appears to be that as incumbent fossil generation owners, they no longer expect to earn a satisfactory return on their investments. While certainly a concern for incumbents, low capacity prices are not a problem from a societal or market design perspective. Low prices are simply a reflection of market conditions indicating ample capacity supply; they appropriately signal that no

[6] FERC, Docket No. EL21-7-000, "Complaint and Request for Fast Track Processing," at p. 14, October 14, 2020 ("Complaint").

new capacity is needed and that high-cost existing resources should retire. In fact, prices that are low enough to signal retirement of aging fossil resources will be necessary to achieve an orderly transition from fossil resources and toward clean energy.

The BSM should be maintained only for its narrow original purpose of addressing manipulative price suppression, not applied to clean energy policy resources. That will enable the capacity market to continue offering competitive benefits by producing accurate price signals that align with market fundamentals.

APPLYING BUYER-SIDE MITIGATION TO POLICY RESOURCES WILL INTERFERE WITH NEW YORK'S STATUTORY MANDATE TO TRANSITION TO A 100% CLEAN ELECTRICITY GRID BY 2040

New York's Climate Leadership and Community Protection Act (CLCPA) mandates a transition to 70% renewable electricity by 2030, 100% clean electricity by 2040, an 85% reduction in economy-wide greenhouse gas emissions, and another 15% greenhouse gas reduction via offsets by 2050.[7] Applying BSM to policy resources will interfere with the State's CLCPA mandates by excluding clean energy resources from clearing in the capacity market and causing the uneconomic retention of high-cost fossil fuel resources that would otherwise retire.[8] Specifically:

- Under the Status Quo BSM rules, approximately 7,200 MW of installed capacity (ICAP) (3,050 MW, reported as the annual average of summer and winter unforced capacity (UCAP) ratings) of policy resources will be subject to BSM by 2030. We project that none of that capacity will clear the capacity market. Instead, approximately 3,050 UCAP MW annual average of aging steam turbine plants will clear that would otherwise retire.
- Under an Expanded BSM rule with the same primary elements as proposed by the Complainants, approximately 17,700 ICAP MW (10,350 UCAP MW annual average) of policy resources would be subject to BSM by 2030. Approximately 8,250 UCAP MW would fail to clear the capacity market, replaced by approximately 7,025 UCAP MW annual average of primarily gas- and oil-fired power plants.

Overall, the application of BSM to policy resources would interfere with the transition to a 100% clean electricity mix. A more appropriate capacity market design would acknowledge the reality of the clean energy transition, support the orderly retirement of aging fossil plants, and adapt to an increasing reliance on clean energy resources to support resource adequacy.

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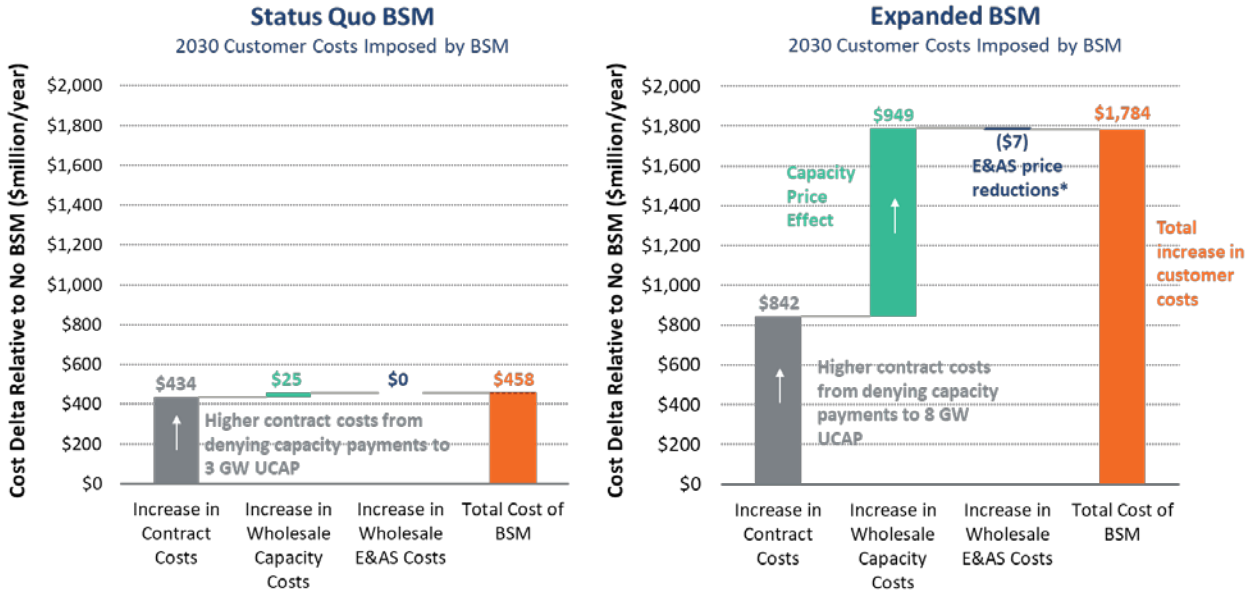
7 State of New York, Senate – Assembly, S. 6599 – A. 8429, "Article 75, Climate Change," June 18, 2019.

8 The assumptions and methodology used to develop the analytical results reported here are described in more detail in Exhibit B (Spees, *et al.*, "Quantitative Analysis of Resource Adequacy Structures," Prepared for NYSERDA and NYSDPS, July 1, 2020); the assumptions adopted at the time reflected our expectations regarding how various dockets and appeals would be resolved regarding the "Status Quo BSM" rules and an "Expanded BSM" rules assumptions and associated uncertainties. Those assumptions remain largely consistent with the current NYISO capacity market rules and the Complainants' proposal. These results were originally developed on behalf of the New York State Energy Research and Development Authority, and the New York Department of Public Service. *See* Exhibit B, Spees, *et al.*, "Quantitative Analysis of Resource Adequacy Structures," Prepared for NYSERDA and NYSDPS, July 1, 2020.

APPLYING BUYER-SIDE MITIGATION TO POLICY RESOURCES IMPOSES UNECONOMIC EXCESS COSTS ON CUSTOMERS AND ON SOCIETY AS A WHOLE

Misapplying BSM to policy resources will impose significant excess costs on customers, amounting to approximately $460 million per year under Status Quo BSM rules or $1,780 million per year by 2030 under the Expanded BSM rules proposed by the Complainants, as summarized in Figure 1. These excess costs appear in two ways: (1) as an increase in capacity prices affecting all transactions; and (2) as an increase in contract payments to policy resources because they are deprived of capacity market revenues that go instead to unnecessary substitute resources. Excess costs would be imposed immediately upon application of the Expanded BSM rules as approximately 3,100 UCAP MW of nuclear resources would immediately be affected. The costs would grow over time alongside the scope of the clean energy transition; by 2030 the excess customer costs would rise to approximately $950 million per year from inflated capacity prices plus $840 million per year in excess contract payments under the expanded BSM rules proposed by the Complainants. The excess contract payments reflect paying capacity to non-policy resources that are not actually needed to meet the reliability targets underlying the capacity market, rather than paying the policy resources for the capacity they provide.

FIGURE 1: CUSTOMER COSTS FROM IMPOSING BSM ON POLICY RESOURCES BY 2030



Sources and Notes: * Energy and AS prices decrease in some cases because excess capacity depresses prices in tight hours; and because higher contract payments (due to lack of capacity payments) cause energy prices to be more negative in over-generation hours. Costs reported in 2030$. *See* Exhibit B at p.7.

The primary beneficiaries of BSM are incumbent capacity market sellers, who enjoy elevated capacity prices and gain a greater share of capacity market sales. However, the net benefits enjoyed by these incumbent capacity suppliers would be much smaller than the excess costs imposed on consumers. By 2030, Status Quo BSM and Expanded BSM would increase capacity sellers' revenues by $460 million and $1,790 million annually; but their costs would also increase to maintain the excess capacity cleared by roughly $450 million and $790 million annually.[9] Hence their producer surplus would increase by only approximately $10 million and $1,000 million per year. That increase in producer surplus mostly reflects a wealth transfer from

[9] These estimates rely entirely upon the public presentation attached hereto as Exhibit B.

customers. The increased costs to maintain unneeded supply represents excess societal expenditure that benefits neither consumers nor producers.

TO CONTINUE OFFERING BROAD BENEFITS TO CONSUMERS, COMPETITIVE MARKETS MUST ALIGN WITH AND SUPPORT ENVIRONMENTAL POLICY GOALS

Far from "protecting" the capacity market, maintaining and expanding the application of BSM to policy resources will erode and eventually eliminate the benefits of the competitive capacity market. With Status Quo BSM and particularly with an Expanded BSM, the disconnect between market fundamentals and market clearing prices will grow as greater quantities of policy-supported clean energy resources come online over the coming years. The consequential growth in excess customer costs, societal costs, and wealth transfers to incumbent fossil plants will rapidly become unsustainable from a policy and economic perspective.

A better path forward is to eliminate the application of BSM to energy policy-supported resources so that the wholesale markets can help meet clean energy and reliability needs at low cost. The wholesale electricity markets are already largely set up to do so, with the energy, ancillary services, and capacity markets (absent BSM) complementing the State programs that reward resources for their environmental attributes. Together, all of these markets can guide the supply mix to cost effectively meet the state's energy and environmental needs, and can do so even more effectively with continued enhancements.

Regulators, the NYISO, and stakeholders in New York and other regions are already considering several enhancements to better align wholesale markets with states' environmental policies, including enhanced carbon pricing, enhanced energy and ancillary service market designs, and more accurate accreditation of storage and intermittent resources in the capacity market.[10] These reforms may take some time but will ultimately support the evolution of toward a fit-for-purpose wholesale market for the decarbonized grid.

[10] For example see NYISO, "Reliability and Market Considerations for a Grid in Transition," December 20, 2019; and NYISO, "IPPTF Carbon Pricing Proposal Prepared for the Integrating Public Policy Task Force," December 2018.

A. Background on Buyer Side Mitigation and its Proposed Expansion in New York

The New York capacity market is a centralized competitive platform within which the market operator procures the quantity of resources needed to meet regional resource adequacy or reliability needs. The NYISO uses an administrative demand curve to procure the quantity of capacity that it estimates will be needed to ensure that bulk system supply shortages are infrequent, occurring no more often than once in ten years in expectations (the "1-in-10" reliability standard). Import-constrained subregions such as New York City are represented by separate demand curves establishing a minimum quantity of capacity that must be located in that subregion.

Capacity sellers offer their resources into the market at the minimum price they are willing to accept to come online or stay in the market. For any given resource, the minimum price they are willing to accept is driven by a number of factors including primarily: (a) costs associated with bringing new supply into the market or maintaining an existing facility that needs re-investment; and (b) minus any anticipated net revenues that could be earned from energy markets, ancillary service markets, or other revenue sources (such as sales of renewable energy credits (RECs), steam, or gypsum). Many sellers would also adjust their capacity offer price based on any bilateral sales agreements for capacity or any co-products they may produce and based on their long-term view of future energy and capacity prices. Sellers that are able to pre-sell most of their capacity or energy through bilateral contracts would typically offer at a zero price, as would most sellers that have already come online and have few going-forward capital investments.

Capacity prices are set at the intersection of sellers' capacity market supply offers and the administrative demand curve in each location and system-wide. Under this framework, the market produces prices consistent with supply-demand conditions. The market produces low prices when the region has more than enough supply to meet resource adequacy needs; it produces high prices when capacity supply is scarce. For the two decades since New York's capacity market was implemented, it has produced competitive prices that signal the need for new entry; attracted new entry from generation, imports, and demand response when needed; and allowed for the orderly retirement or net exports of higher-cost resources when supply was long.[11]

One of the design elements of the capacity market is a comprehensive framework for mitigating the potential for both supply-side and demand-side market power abuses. The framework consists of a number of inter-related design elements. Chiefly, the monitoring and mitigation framework includes: (a) *sell side mitigation* provisions that impose capacity price offer caps that are intended to limit the ability of large net sellers from manipulative economic or physical withholding that could inflate market prices; (b) largely symmetrical *buy side mitigation* provisions that similarly impose offer floors on large net buyers to prevent manipulative suppression of market prices; and (c) *independent monitoring and mitigation* activities to regularly review market efficiency and competitiveness. Together, these comprehensive monitoring and mitigation rules support price formation that market participants can anticipate will largely reflect economic fundamentals and supply-demand conditions, without being driven by the private interests of a player with large buy- or sell-side market share.

[11] Potomac Economics, Market Monitoring Unit for the NYISO, "2019 State of the Market Report for the New York ISO Markets," May 2020, at p.57 (Capacity Market Results and Design).

The original purpose of BSM rules in the context of the overall market monitoring and mitigation framework was to prevent manipulative price suppression. The rules were intended to prevent entities with a large net buyer position from exercising buy-side market power. Without such a rule, a large net buyer could be in a position to game the capacity markets by bringing a small quantity of incremental capacity supply into the market, offering the supply at a zero price, and producing a low capacity price. In some cases, a large buyer supporting new entry would not be a problem. For example, if the incremental supply is relatively low cost and thus a better deal than purchasing generalized capacity from the market. However, the purchase can be viewed as manipulative price suppression if the incremental supply is very high cost, higher than the but-for capacity price that would otherwise have materialized. In that circumstance, the buyer would develop uneconomic supply (taking a financial loss on a small quantity of high-cost capacity supply) in order to achieve a lower capacity price (thus benefitting the much larger net buy position). This behavior is, by definition, manipulative because the uneconomic incremental supply resource is not a rational resource to develop when viewed in isolation. The incremental supply is pursued only for the purpose of suppressing market prices below the competitive levels that would prevail from individually rational entry and exit.

To prevent this manipulative price suppression, the BSM would restate the offer price from zero to a higher level based on the minimum offer price rule (MOPR). The higher MOPR price prevents this scheme from producing price suppression and makes it less likely that the resource in question would clear the capacity market. When applied to large net buyers and their supported resources, the BSM rules privatize the cost of any potentially uneconomic investments, while holding other parties in the market harmless. More importantly, the existence of the rule is intended to disincentivize the manipulative behavior and associated economic waste from taking place at all.

In New York, the current or "Status Quo BSM" rules currently apply to the downstate capacity zones G-J, apply only to new resources, and apply a MOPR price at the lesser of 0.75× Mitigation net Cost of New Entry (CONE) or a resource-specific value.[12] The rules further allow for Part A and Part B exemption tests that allow some resources to avoid the application of the BSM, if a forecast of future market conditions indicates that the supply will be needed or likely to clear the future capacity auctions; if the resources appear likely to clear then they can gain an exemption from BSM. This limited application of BSM is associated with the original narrow purpose of the rule, which was to prevent manipulative price suppression; these capacity zones were the only locations within which the market structure indicated that any large net buyer might have the incentive and ability to exercise market power.

The FERC has recently expanded the role of BSM in New York and in other regions to impose a MOPR more broadly to apply to resources that earn policy payments. The large majority of these resources in New York and other regions are those awarded policy payments in recognition of their contribution toward achieving states' environmental policies. The Complainants propose to expand BSM in New York further through several reforms: (1) to increase the applicable MOPR price to a technology-specific value in all cases (which will typically be much higher than the current default value); (2) to eliminate Part A and Part B exemptions that can allow certain resources to avoid BSM application in the delivery year; (3) to apply BSM broadly across all capacity zones in New York; and (4) to apply BSM to existing as well as new resources, with the

[12] "Mitigation Net CONE" is an administrative estimate of the levelized cost of new supply that could be attracted into the capacity market.

greatest effect being the immediate application of BSM to approximately 3,100 UCAP MW of existing nuclear resources.[13] Overall these changes will substantially expand the scope of capacity resources affected by BSM.

The mechanics of BSM as applied to policy resources are illustrated in Figure 2. The left panel illustrates clearing outcomes if all capacity resources are allowed to offer at their preferred offer price. Most (though not necessarily all) policy resources will typically offer at a zero. These resources earn the (large) majority of their revenues through energy market and policy payments reflecting their environmental value; thus, these resources will be developed and online regardless of the capacity price. So, they would typically choose to offer at zero in the capacity market. Fossil plants and other capacity resources would offer at the minimum capacity price needed to earn a return on going-forward investments.[14] Clearing prices are set at the intersection of supply and demand.

When BSM is applied to a policy resource, its offer price is increased from zero to a higher level for the purposes of auction clearing. As illustrated in the right panel of Figure 2, the higher BSM-based price will re-order the capacity market offer supply curve, make it less likely for the policy resource to clear the market, and cause higher clearing prices.

When applied to policy resources, the mechanics of the BSM are identical as compared to the application in the context of manipulative price suppression. However, the economic purpose and impact are entirely different. Unlike in the context of manipulative price suppression, BSM, when applied to policy resources, is not intended to prevent the investments from taking place. The policy investments will proceed regardless of BSM because they are developed for the primary purpose of addressing climate change (they are not developed as a means of achieving capacity market price suppression, and would not be a cost-effective means of achieving price suppression). Thus the exclusion of these resources from clearing the market will not prevent such investments from taking place.

Another difference between the contexts of manipulative price suppression and policy resources is the scope and scale of the affected resources. In the context of manipulative price suppression, the typical behavior would be that the buyer would endure a small economic loss from developing a small quantity of uneconomic capacity resources, with that small loss more than offset by the gains to the much larger buy-side position. The scope of BSM tend to cover a small volume of supply. In the context of policy resources, there is no expectation that the quantities of excluded resources will remain small. In fact, regardless of BSM, these resources should be expected to become the large majority of the New York capacity market as the state proceeds toward its 100% clean electricity mandate.

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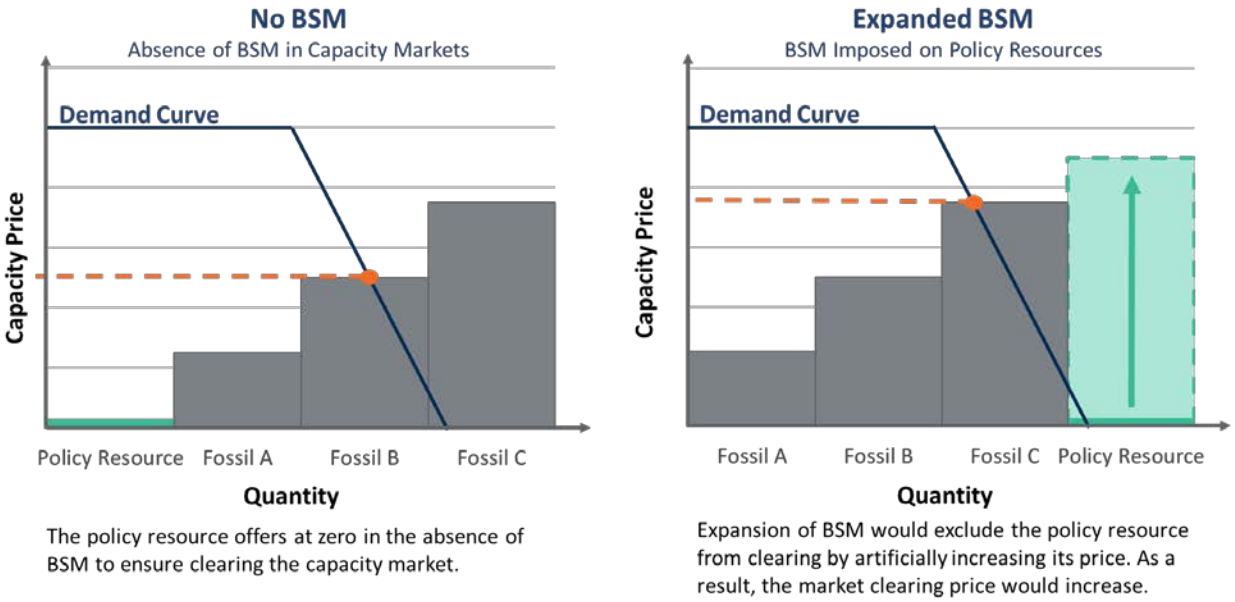
[13] *See* Exhibit B at p. 12, consistent with Complaint, at Attach. A, Shanker Affidavit, at p. 6.

[14] In the non-forward New York market, these other resources may also offer at zero but would tend to enter or exit the market in advance based on whether projected clearing prices would be sufficient to earn a return. The effect on realized prices is the same as in our stylized description here if we assume that market participants have perfect foresight of future market conditions.

FIGURE 2: EXPANSION OF BSM WOULD INCREASE THE CLEARING PRICE



B. The Application of Buyer Side Mitigation Rules to Policy Resources is Based on Flawed Economic Logic

The Complainants present an economic analysis that largely reflects analysis that has previously been presented to the FERC on this same topic. The stated concerns are as follows. States such as New York are attracting large quantities of new resources to meet clean energy goals through a variety of programs and contract solicitations that the Complainants consider to be "subsidies."[15] Because these activities can reduce near-term capacity market prices and/or displace "non-subsidized" resources, BSM advocates argue that it is necessary to protect wholesale capacity markets from the price-suppressive impacts of state policies. They argue that without intervention, market prices will be inappropriately low, merchant capacity suppliers will not earn adequate returns on investment, this would discourage new capacity from entering the market, and thus threaten future reliability. Their proposed remedy is to use BSM on policy resources to restore capacity prices to the "correct" level, *i.e.*, the price that would have prevailed in the absence of the state policies.

The rationale that the Complainants provide for applying BSM to policy resources is based on incomplete and flawed economic logic. A corrected economic analysis reveals a simpler truth: that the "correct" capacity price is the one that accurately reflects underlying fundamentals of supply and demand. This is the accurate price that should signal when and where capacity investments are needed (and when high-cost resources can retire). The logical conclusion under this corrected economic analysis is that BSM should be eliminated from application to policy resources so that capacity prices can be utilized to rationalize supply with demand.

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[15] We do not subscribe to the view that such state programs and/or solicitations should be considered "subsidies" in the traditional sense, nor that subsidies are inappropriate or inherently problematic if they are pursued in light of policy goals. Instead, we see the introduction of clean energy policies as generally providing compensation for environmental externalities not otherwise provided for by the market itself.

B.1. State Policies Address Well-Understood Market Failures Such as Environmental Externality Costs

The complaint quotes Commissioner Danly observing, "these [BSM] exemptions will, regardless of the policy objectives they may seek to achieve, impede a market's ability to set prices that accurately reflect market forces." But prices "reflecting market forces" alone do not ensure economic efficiency where major externalities exist, as in this case. A negative externality is a negative side effect of an economic activity that adversely affects a party not involved in the transaction. The adversely affected third party has no influence over whether the transaction takes place, but is nevertheless harmed. Environmental externalities such as those caused by greenhouse gas and air quality emissions from fossil fuel-fired power plants are the classic textbook example of externalities.[16] Once emitted into the air, greenhouse gases cause a number of adverse effects on residents, businesses, and environment in New York, nationally, and globally in the present day and for hundreds of years.[17] Other pollutants such as NO_X, SO_X, and particulates cause even more immediate detrimental health outcomes such as asthma and early death.[18] Absent policies to address these externalities, neither the purchaser of the power (NYISO in this case) nor the producer of the emissions (the power plant owner) pays the full cost associated with these negative externalities.[19] Such unpriced or underpriced externalities will tend to be produced at a quantity that exceeds the economically efficient level from a societal perspective. The consequence of ignoring these environmental externalities is that market pricing alone would drive resource investments and operations toward an inefficiently large quantity of fossil fuel-fired power plants, imposing inefficiently large externality costs.

Externalities are by definition not "market forces," but rather market failures. Under their existence markets fail to allocate the resources efficiently and the current market price would not be the "correct" one. As a general matter, public policies can address externalities and market failures in one of two ways: one is *command-and-control* policies that regulate behavior directly; the other is to develop market-based policies that align private incentives with social efficiency.[20]

Environmental externalities can be incorporated into electricity markets through policy mechanisms, whether through emissions pricing mechanisms (*e.g.*, carbon pricing) that charge

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[16] N. Gregory Mankiw, *Principles of Microeconomics*, 5th ed. Mason, (OH: South-Western Cengage Learning, 2009), p. 204.

[17] United States Environmental Protection Agency, "Climate Change Indicators: Greenhouse Gases," accessed on November 16, 2020.

[18] Michael Guarnieri, John R Balmes, "Outdoor Pollution and Asthma," The Lancet 383 (9928): 1581–1592. doi:10.1016/s0140-6736(14)60617-6 (2014).

[19] The Regional Greenhouse Gas Initiative (RGGI) has imposed some costs on emitters, but the allowance prices are far below the Social Cost of Carbon adopted by the New York Public Service Commission (NYPSC) for setting zero-emissions credit (ZEC) prices and VDER tariffs, and likely further below the State's willingness to pay for carbon reduction as implied by its aggressive decarbonization goals. In setting ZEC prices, the NYPSC adopted a social cost of carbon of $50.11/short ton (in nominal dollars) for Tranche 3, which runs from April 2021 through March 2023. By comparison, the most recent RGGI auction at the time of this writing cleared at $6.82/short ton on September 2, 2020 (available at https://www.rggi.org/auctions/auction-results/prices-volumes). *See also* NYPSC, Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, "Order Adopting a Clean Energy Standard," at 136, August 1, 2016.

[20] N. Gregory Mankiw, *Principles of Microeconomics*, 5th ed. Mason, (OH: South-Western Cengage Learning, 2009), p. 154–210.

emitters and indirectly reward non-emitters and/or through clean energy attribute payments that reward non-emitters directly. Carbon pricing can take many forms, from a tax or charge approach that sets a price per ton emitted; to a cap-and-trade approach that sets a cap on emissions and lets the market determine the price of allowances; to a hybrid, such as RGGI that is nominally "cap-and-trade" but that includes adjustable caps to serve as price collars. In all of these cases, carbon pricing raises the cost for emitters to produce, making them less competitive and raising market clearing prices for energy; non-emitters earn the higher prices without being charged. Clean energy attribute payments work more directly by paying non-emitters to produce carbon-free energy. They are usually provided through long-term contracts that support clean resources, as in New York's ZEC and REC programs. The mechanisms used to support clean energy resources will continue to evolve as the State, NYISO, and stakeholders continue to assess the most effective and efficient opportunities to support the clean energy transition, as discussed in Section E below.

Many economists (and some pro-BSM) advocates argue that a carbon pricing mechanism would be a better way to address these environmental externalities and enable all resources to compete based on market prices for energy (that account for carbon-related externalities), capacity, and ancillary services. For example, FERC recently held a technical conference on carbon pricing; and the Electric Power Supply Association recently sponsored a study by Energy + Environmental Economics (E3) presenting carbon pricing as the most efficient way for states to achieve their environmental objectives.[21] We agree with many of the arguments in favor of carbon pricing, but caution that electricity sector carbon pricing alone may be an incomplete solution in the context of States' environmental mandates.

We too believe that carbon pricing would help support the state's objectives cost-effectively, through resource-neutral competition that accurately signals where and when clean energy production displaces the most carbon emissions, while also appropriately rewarding storage and higher-efficiency gas-fired generation that partially reduce emissions. The ideal is for a carbon pricing regime to apply uniformly and comprehensively in its geographic scope (across state and national borders) and in its coverage of all economic sectors. However, without this comprehensive scope, carbon pricing could induce unintended effects such as leakage or disincentives to electrify heating and transportation demand. In the case of NYISO's proposal to charge carbon emitting generators in New York for their emissions at a state Commission-determined social cost of carbon, our work showed that proposed border adjustments and allocation of carbon revenues to customers could largely avoid these adverse effects.[22] These results are not necessarily generalizable to other ISO markets or if carbon prices become much higher, but carbon pricing should continue to be pursued, especially at a national and economy-wide level in order to achieve carbon abatement in the most cost-effective fashion.

However carbon pricing should not be presented as the only "legitimate" or "efficient" policy option for incorporating carbon externalities into electricity markets. Even if carbon pricing is pursued, the practical reality is that carbon prices alone may not be set high enough to support sufficient investment to meet mandated clean energy targets in the timeframe required by State

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[21] E3, "Least Cost Carbon Reduction Policies in PJM," at p. 9, March 28, 2020.

[22] Samuel A. Newell, Roger Lueken, Jürgen Weiss, Kathleen Spees, Pearl Donohoo-Vallet, Tony Lee, The Brattle Group, "Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals," August 10, 2017.

laws.[23] Clean energy attribute payments, competitive clean energy solicitations, and customer-backed contracts for clean energy resources are all alternative approaches that can be pursued for addressing environmental externalities, each with advantages and disadvantages relative to carbon pricing in terms of timing, economic efficiency, risk allocation, and implementation feasibility. Further, different communities and customers (within New York) or state governments (in other regions) will place different values on their deemed cost of carbon emissions and so will not be able to establish a single market-wide carbon price. Overall, we anticipate that a combination of carbon pricing and clean energy attribute payments of some form together will be utilized to achieve New York's 100% clean energy mandate. Given the interplay and partial substitutability between RECs and carbon pricing, it is curious that the BSM advocates would view energy revenues incorporating carbon to be legitimate but RECs and ZECs not to be. While they are not the same mechanism, they both serve to address environmental externality costs by affecting the relative revenues of emitting and non-emitting generators, and they have similar effects on capacity market prices. For example, a high enough carbon price would retain high-cost nuclear plants just like a ZEC payment does, so it is difficult to see why the capacity market treatment should be so radically different if using one mechanism or combination of mechanisms versus another.

A more consistent approach is to acknowledge that states, communities, and customers have a legitimate interest in addressing environmental externalities. As the demand side of wholesale electricity markets, customers and their elected representatives have the proper role of establishing how much they are willing to pay to address environmental externalities and what combination of contracts and policies they wish to use to express that value. An efficient marketplace should aim to assist states and customers by providing options for achieving their environmental goals at the lowest possible cost.

B.2. The "Correct" Capacity Price is the One that Aligns Supply with Demand (Not the Price that would Prevail in the Absence of State Policies)

The efficient outcome in a market, or set of interconnected markets, is that which maximizes social welfare: the sum of consumer and producer surplus. Absent environmental externalities and with market participants acting competitively, this outcome would result at the price where the marginal cost of supply (to producers) is equal to the marginal value of additional consumption (to consumers). However, when environmental externalities are introduced, the intersection of (private) supply and demand *will not represent the efficient outcome.* This inefficient outcome is the one that the complainants seek to re-establish with the expanded MOPR. Instead, the correct capacity price is that which aligns supply and demand, given other policies and/or markets that policymakers have identified as necessary to address the externality.

Compensating non-emitting resources for their environmental value lowers their net cost of providing capacity (regardless of whether that compensation is achieved through carbon pricing or clean energy payments). Clean energy resources correctly appear more competitive as capacity providers, just like resources with high energy and ancillary services value, and they should be

[23] Especially as the emissions target tightens toward zero, the carbon price would have to be very high to continue to favor investment in new clean resources over running existing fossil-fired generators in a small number of hours. For example the finding that "carbon taxes alone are unlikely to produce emissions pathways in line with the net-zero emissions targets by 2050," in Larsen, *et al.*, *Expanding the Reach of a Carbon Tax: Emissions Impacts of Pricing Combined with Additional Climate Actions*, October 2020.

allowed to clear the capacity market and be recognized for the resource adequacy value they contribute to the system.

If the capacity market consequently produces low prices, this is correctly signaling an oversupply of capacity, that no more investments are needed for resource adequacy, and that the least valuable resources should retire. Reliability will not be threatened by replacing traditional capacity with clean capacity, as clean resources will be assigned capacity ratings reflecting only the reliability value they actually provide. In fact, NYISO's resource accreditation for intermittent resources is already a fraction of their nameplate capacity and will decline as their market share increases. Thus, as the clean energy transition proceeds it will take greater quantities of wind, solar, and battery supplies to replace a single retiring gas plant. Through this continuously-adjusting displacement rate, reliability can be maintained over the course of the transition. For the same reasons, the market (absent BSM on policy resources) can provide the right price signals and result in efficient outcomes with the least-cost set of economic retirements, entry, and retention of resources needed to maintain resources adequacy.

Forcing policy resource offers upward through BSM rules would generally prevent them from clearing. It would result in an artificially high capacity clearing price and induce inefficient behaviors and uneconomic incentives: it would retain costly existing supply that would otherwise retire, attract costly new supply that is not needed, and dis-incentivize customers from utilizing more electricity given inflated prices that signal a false scarcity of capacity supply. Thus, the application of BSM to policy resources causes the capacity market to depart from supply-demand fundamentals.

The inefficiency of the outcome is especially apparent considering that policy resources will be developed and operate regardless of whether or not they clear the capacity market. Thus the BSM distorts the capacity market by inducing the procurement of additional capacity to meet reliability objectives. The capacity market would simulate a fictional reality as if the policy resources that help meet demand every hour of the year did not exist. Under that fictional scenario, the reliability value of the policy resource in question would be ignored, would not be paid for, and thus would need to be made up for through the purpose of capacity from other suppliers. This scenario becomes perverse when applied to a state such as New York with a 100% clean electricity mandate. All policy-supported resources that physically supply resource adequacy could be excluded from being counted in the capacity market, while the capacity market would remain a multi-billion-dollar-per-year "shadow market" that exists primarily to pay resources that are not actually needed for resource adequacy.

Overall, the Complainants offer a solution to a non-problem. The grievance from the standpoint of incumbent fossil generators is that their resources will eventually become uneconomic in a region with a significant clean energy mandate. Such resources will not enjoy the same revenues they would in a world where emissions do not matter.

However, low prices are not a problem from a more holistic market design, reliability, or economic perspective. Low prices would be produced only when supply is long, new entry is not needed, and retirements can be accommodated. Applying BSM to policy resources creates a fundamental disconnect between market pricing outcomes that deviate from the underlying fundamentals of supply (including that associated with state policy resources) and demand (as expressed through resource adequacy requirements).

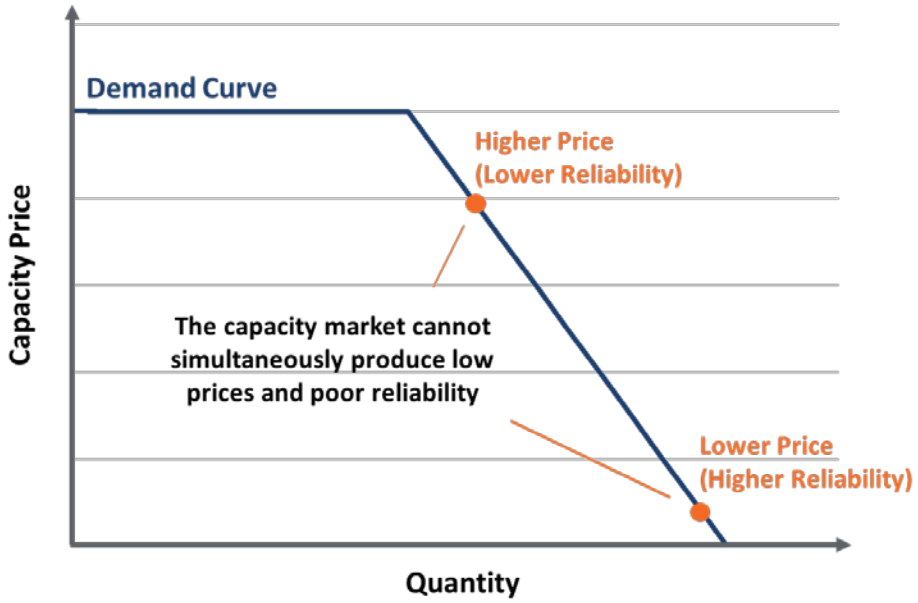
B.3. Capacity Markets with Sloping Demand Curves Cannot Simultaneously Produce Low Prices and Poor Resource Adequacy

The Complainants and other BSM advocates have expressed a misguided concern that the low prices that may prevail due to growth in policy resources will threaten reliability by discouraging investment.

As shown in Figure 3, this concern is illogical in the context of a capacity market with a downward-sloping demand curve that reflects the required reserve margin and the incremental value of additional supply beyond that reserve margin. By its nature, the downward sloping demand curve simply cannot produce market outcomes with low prices and low reliability at the same time. If prices are low due to the entry of policy resources, this means that there is ample supply of capacity on the system. In this long market condition the low capacity prices signal that high-cost resources should retire and new entry is not needed. If the supply-demand balance tightens, prices will rise and signal the need to attract and retain scarce capacity. Thus the Complainants' concern that low prices will produce low reliability is unfounded (and a mathematical impossibility).

This is not to say that reliability is not a concern in the clean energy transition. As noted above, intermittent resources whose unavailability may be correlated across the fleet (*e.g.*, low wind days, or low solar insolation periods such as nighttime) provide less and less incremental resource adequacy value as their penetration increases. Capacity markets must recognize that fact through resource accreditation that accurately reflects resources' contribution to system reliability. Beyond the context of capacity markets discussed in this testimony, other aspects of the wholesale electricity markets including energy, ancillary service, and transmission planning rules may be needed to ensure robust pricing and operations in the context of different resource patterns and capabilities throughout the clean energy transition.

FIGURE 3: CAPACITY MARKETS WITH DOWNWARD-SLOPING DEMAND CURVES CANNOT SIMULTANEOUSLY PRODUCE LOW PRICES AND POOR RESOURCE ADEQUACY



B.4. Broad Application of Buyer-Side Mitigation to Policy Resources will Amplify (Not Mitigate) Regulatory Risks

BSM advocates have argued BSM is necessary to mitigate regulatory risk surrounding capacity investments. We acknowledge that capacity investments do face more regulatory risk in a world with environmental policies than one in which policies never change; and that imposition of increasingly-stringent policies will more usually disadvantage higher-emitting resources. The application of BSM to clean energy policy resources undoes some of that effect, by elevating capacity prices to the level that would prevail absent the policy resources. It would also retain the same capacity as in world without the policy-supported clean energy resources. As long as BSM is maintained, it will benefit incumbent fossil resources and might even attract investment in new gas-fired resources (in both cases, securing more capacity than is needed for reliability).

However, elevated prices should not be conflated with less-risky prices. We do not believe the BSM reduces regulatory risk or provides an efficient basis for attracting new investment. On the contrary, a market whose price is artificially inflated by a rule as controversial and economically inefficient as BSM is unsustainable. Investors will not count on the price premiums produced by such a rule to be sustainable over the long term. They would have to realize that, over time, the pressure to eliminate BSM would only increase as mounting quantities of policy resources are excluded from the market and the BSM-supported price and capacity deviate further from reflecting actual supply and demand conditions. Customers will ask why they are paying so much to support excess capacity, as if it were needed to meet the (already conservative) resource adequacy objectives underlying the capacity market. They will notice that the excess capacity they are supporting is primarily fossil fuel generation that contravenes state clean energy policy goals with wide popular support, and they will demand change. For these reasons, capacity markets that fail to accommodate policies that states are committed to pursuing cannot form the basis for a sustainable market design that supports investment.

Capacity markets can better support merchant investment when needed, with lower regulatory risk, if they do not apply BSM to clean energy policy resources. Such a market reflecting actual supply and demand conditions will send just the right price signals to maintain resource adequacy at least cost. Merchant investors will still face market and regulatory risks, including risks from environmental policies changing in the future. States can mitigate these risks by setting environmental policies on a long-term stable basis, as New York has done through its CLCPA that specifies goals through 2050. Investors can then view these policies as part of the fundamentals against which they can plan their business strategies.[24]

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[24] For example, the Grid Evolution study we performed for NYISO did not incorporate BSM, and it showed how merchant investment in capacity could complement a future with large quantities of policy-supported clean energy resources added. The simulated market retained enough existing capacity and attract enough storage investment to maintain resource adequacy through 2040. It showed that, as vast amounts of wind and solar generation are added to meet clean energy goals, they will continue to contribute capacity value but at a declining marginal rate reflecting their correlated intermittency. Other non-intermittent resources will still needed to support system reliability, and market prices should adjust to signal dispatchable capacity to stay online or enter the market. In our central scenario where policy-driven electrification of transportation and heating sectors increases demand, the simulated market even attracted investment in new dispatchable "gas-fired" generation capacity, assuming it could generate using "renewable natural gas" that counts as non-emitting. *See* R. Lueken, et al., "New York's Evolution to a Zero Emission Power System," prepared for NYISO and presented to the NYISO stakeholders, June 22, 2020.

B.5. Merchant Investors Operate Amidst Wide-Ranging Energy and Environmental Policies from which They Never Should have Expected to be Indemnified

The Complainants express concern that certain merchant investments are not earning the return on investment that they anticipated. They assert that "state subsidy issues" are producing "lower than expected capacity prices caused by uneconomic retention of state subsidized generation facilities."[25]

While poor investment returns are certainly a concern for the particular investors referenced here, this is not a concern from a market design perspective. Merchant generation investors operate in a market and regulatory context that has always included environmental regulations from which they should not expect to be indemnified any more than they should be charged when regulations work in their favor. Favorable policy developments for merchant investors in gas-fired generation such as the Complainants have enjoyed in New York include the finalization of the State's arrangement with Entergy to shut down the Indian Point Energy Center, agreements to retire the state's remaining coal plants, rules to eliminate high-NO_X-emitting peaking plants from Downstate New York, and possible future expansion of electricity demand from policy-driven electrification of the heating and transportation sectors. Natural gas-fired generators also benefit from various tax policies and ratepayer-funded gas transportation infrastructure that have lowered the delivered costs of their fuels.[26]

New York's decarbonization policies underlying the complaint mostly do not help natural gas-fired plants that are major emitters of carbon dioxide. But the state has long discussed its environmental priorities, particularly the need to address climate change. Investors in new power plants should have anticipated policies to effectuate a transition in the generation fleet. It is misleading to suggest, as the Complainants have, that investors in Empire and CVEC could not or should not have foreseen the development of public policies that are unfavorable to the interests of large carbon-emitting power plants. Consider the following record of New York's steady long-term march toward the policies it has now:

- As early as 2002, the New York state government expressed concern in its State Energy Plan regarding the reliance of the state on gas-fired electricity and established a goal to increase renewable energy by 50% as a percentage of total load served by 2020, aiming to move from 10% of demand met by renewable energy to 15% by 2020.[27] In 2004, the New York PSC had adopted the more aggressive RPS goal of 25% renewable energy by the end of 2013.[28] Investment in Empire Energy was made against this backdrop, wherein New York had clearly displayed its commitment to promoting renewable energy.
- In 2010 the RPS goal was amended to 30% by 2015.[29]

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[25] Complaint at p. 33.

[26] For example, s*ee* Doug Koplow, "Testimony on behalf of Sierra Club in Protest on Behalf of Clean Energy Advocates", in FERC Docket No. ER18-1314, May 7, 2018.

[27] New York State, "2002 New York State Energy Plan," at Section 1–3.

[28] NYPSC, Case 03-E-0188, *Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard,* "Order Regarding Retail Renewable Portfolio Standard," September 24, 2004.

[29] NYPSC, Case 03-E-0188, *Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard,* "Order Establishing New RPS Goal and Resolving Main Tier," January 8, 2010.

- In December 2015, Through Reforming the Energy Vision (REV), New York State Government called for 80% GHG emissions reduction by 2050 and 50% of electricity demand to be met by renewables by 2030.[30]
- On January 25, 2016 the NYSDPS staff published a white paper regarding what was to become the Clean Energy Standard, which aimed to meet the goals set forth by Governor Cuomo in 2015. In this white paper they discussed the plan to institute a ZEC in order to support "a smooth emission-free transition from nuclear to non-nuclear resources in the event that energy prices are not able to support the continued financial viability of the plants during their license lives."[31] The ZEC program was established formally on August 1, 2016, when the New York PSC adopted the Clean Energy Standard.[32] It was not until January 24, 2017, nearly one year after NYSDPS staff published the white paper regarding the ZEC program that CVEC closed on financing for developing its generating facility.[33]

But even if the Complainants could not have anticipated the full extent or particulars of the CLCPA, these policies are within the State's mandate to protect public health and are part of the context in which the Complainants chose to invest. They chose to bear the risks and rewards associated with changing market conditions and regulations, and there is no reason to indemnify them through BSM. Doing so would distort the market, as explained above, and impose unnecessary costs on consumers.

B.6. BSM Should Be Applied for Its Narrow Original Purpose of Mitigating Market Power Abuses (Not Repurposed to Undo the Effects of State Policies)

BSM is an appropriate mechanism for its original purpose of preventing manipulative price suppression.[34] In that context BSM has a valid economic rationale: to prevent net-short entities and their representatives from sponsoring uneconomic investments to suppress prices, benefit themselves in the short run (at the expense of other market participants), and induce economic deadweight losses.[35] Applied for that original purpose, BSM rules work together with many other elements of a comprehensive monitoring and mitigation framework that assures market participants that market outcomes will be competitive, reflecting supply-demand fundamentals.[36]

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30 REV, "What You Need to Know," December, 2015.

31 NYSPSC, Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, "Staff White Paper on Clean Energy Standard," at p. 30, January 25, 2016.

32 NYPSC, Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, "Order Adopting a Clean Energy Standard," August 1, 2016.

33 *See* "Advanced Power AG Closes Financing of $1.584 Billion Energy Center in Dover, New York" *Business Wire*, January 24, 2017.

34 *See:* FERC, Docket No. EL07-39-000, "Order Conditionally Approving Proposal" at PP 100–P100106, March 7, 2008.

35 This deadweight loss is the cost of the uneconomic resources in excess of the value they provide. The costs of the resources developed in order to suppress prices exceeds the cost of the resources displaced that would otherwise have cleared the market.

36 *See* Affidavit of Dr. Samuel A. Newell on Behalf of the Competitive Markets Coalition: FERC, (supporting PJM's proposed tariff revisions to change certain terms regarding the Minimum Offer Price Rule in the Reliability Pricing Model).

This valid economic rationale for BSM does not apply in the context of policy-supported clean energy investments:

- Clean energy policy investments are pursued to address climate change, not as a means to suppress capacity prices.
- State-supported investments in clean energy are not uneconomic just because they need payments beyond what they would earn through wholesale electricity markets alone. These policy incentives correct for the market failure to reflect the costs of environmental externalities associated with climate change and public health.
- Applying BSM to clean energy policy resources does not prevent uneconomic behavior (as it does when applied to mitigate manipulative price suppression schemes); rather, it actually *causes* uneconomic behavior by incentivizing the retention of uneconomic, unneeded resources. And as we show later the greatest impact would be to retain exactly those aging fossil plants that the clean energy investments are intended to displace.

Clean energy policies will have a number of effects in the electricity sector and broader economy. Capacity markets, like all other markets, may inevitably be affected by these policies. The overall outcome of an effective policy to mitigate climate change will be to reduce the amount of greenhouse gas emissions produced and to guide the resource mix away from fossil and toward a mix that meets energy and reliability needs with cleaner resources

C. Applying Buyer Side Mitigation to Policy Resources Will Interfere with New York's Statutory Mandate to Transition to a 100% Clean Electricity Grid by 2040

To evaluate the impacts of applying BSM to policy resources, we conducted a simulation analysis of the New York capacity market in a 2030 study year with three scenarios with "No BSM," "Status Quo BSM," and "Expanded BSM" rules.[37] In the No BSM case, we estimated the prices, clearing outcomes, and resulting customer costs under a capacity market design in which BSM is eliminated from application to policy resources. In the Status Quo BSM case, we simulated current BSM rules that are applied only to new policy resources in the downstate G-J region of the NYISO capacity market with an offer floor at the minimum of 0.75 × mitigation Net CONE and a technology-specific value. In the Expanded BSM case, we examined rules consistent with Complainants' proposal to expand BSM to existing and new policy resources throughout New York, and increasing the applicable offer floor to technology-specific MOPR values.

Our analysis shows that the overall effect of applying BSM to state policy resources is to exclude policy resources from clearing the capacity market and induce the uneconomic retention of fossil plants. Both of these outcomes pose barriers to achieving the State's mandate to eliminate carbon emissions from electricity generation by 2040, and interim mandates before then.

[37] We conducted this analysis on behalf the New York State Energy Research and Development Authority, and the New York Department of Public Service. The assumptions and methodology used to develop the analytical results reported here are described in more detail in Exhibit B. *See* Spees, *et al.*, "Quantitative Analysis of Resource Adequacy Structures," Prepared for NYSERDA and NYSDPS, July 1, 2020.

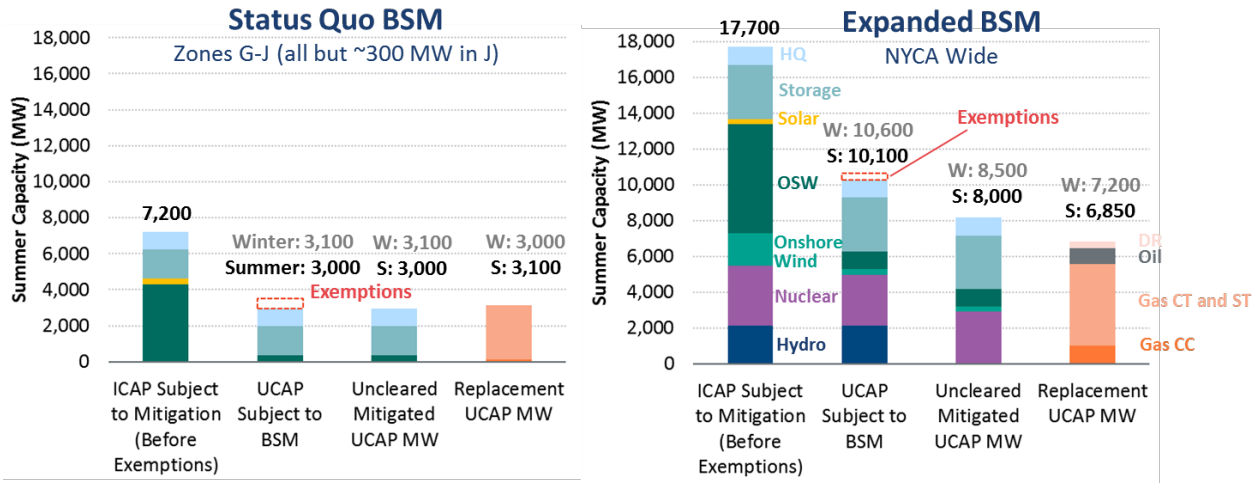
C.1. Approximately 8,250 MW of Clean Resources Would be Excluded from Clearing the Capacity Market by 2030

Figure 4 summarizes our estimates of the quantity of policy resources that could be subject to BSM rules in the New York capacity market by 2030 under Status Quo and Expanded BSM rules. We further report the shares of these resources that we estimate would be likely to clear the capacity market and those that would not. Specifically, we estimate that:

- Under the Status Quo BSM rules, approximately 7,200 ICAP MW (3,050 UCAP MW, reported as the annual average of summer and winter capacity ratings) of policy resources will be subject to BSM by 2030. We project that none of that capacity will clear the capacity market because their BSM offer floors would price them out of the market.
- Under an Expanded BSM rule similar to the one proposed by the Complainants, approximately 17,700 ICAP MW (10,350 UCAP MW annual average) of policy resources would be subject to BSM by 2030. Approximately 8,250 UCAP MW annual average would fail to clear the capacity market.

Failing to clear such a large quantity of existing capacity resources will limit progress in the transition to a clean energy grid by reducing the formal role of policy resources to contribute to resource adequacy and reliability needs.

FIGURE 4: PROJECTED IMPACTS OF BSM ON CAPACITY MARKET CLEARING BY 2030



Sources and Notes: *See* p. 14, Exhibit B.

C.2. Approximately 7,025 MW of Fossil Resources Would be Uneconomically Maintained by an Expanded BSM

As also shown in Figure 4 above, policy resources excluded from clearing the capacity market would likely be replaced primarily by uneconomic fossil plants that would otherwise retire. Under Status Quo BSM assumptions, we estimate that 3,050 UCAP MW annual average of aging, high-emitting gas-fired steam turbine plants would be retained that would otherwise retire. Under Expanded BSM, a full 7,025 UCAP MW annual average of unneeded and uneconomic capacity resources would be retained, including primarily gas- and oil-fired plants, as well as a small amount of demand response.

C.3. In a Region with Significant Clean Electricity Goals, Any Sensible Market Must Recognize Clean Supply While Enabling the Orderly Retirement of Fossil Plants

In a region with significant clean electricity goals, a sensible and sustainable market design would be one that supports and enables the clean energy transition. That means increasing reliance on clean energy resources to provide energy, ancillary, and capacity needs; while enabling the orderly retirement of fossil plants.

Applying BSM to policy resources will impede the State's ability to effectively transition away from carbon-emitting supply and toward a 100% clean electricity grid. It will retain existing fossil plants that would otherwise retire and defer the ability to gain operational experience in relying more heavily on clean energy resources, including non-traditional and intermittent clean energy supply.

D. Applying Buyer Side Mitigation to Policy Resources Imposes Uneconomic Excess Costs on Customers and on Society as a Whole

Applying BSM to policy resources would prevent them from clearing the market and, by removing supply, raise prices in the market. This higher price would induce more non-policy-supported resources to clear and thus support more continued investment in maintaining existing plants (and possibly developing new ones) than needed to maintain reliability. That is, the total amount of capacity available and operating would exceed the amount needed to meet the reliability objectives that the capacity market was designed to meet.

This translates into two types of adverse consequences:

- Higher prices would effectuate a wealth transfer from customers to suppliers on the entire volume of capacity transacted in the market, not just the excess resources; and
- Supporting excess capacity results in excess societal costs or deadweight loss that benefits neither customers nor suppliers (who bear the costs of maintaining the uneconomic excess supply).

The scale of these problems would grow with the scope of BSM application and will grow over time as the State proceeds toward achieving its 100% by 2040 clean electricity mandate.

D.1. Expanded BSM Would Cost Customers Approximately $1,780 Million per Year by 2030

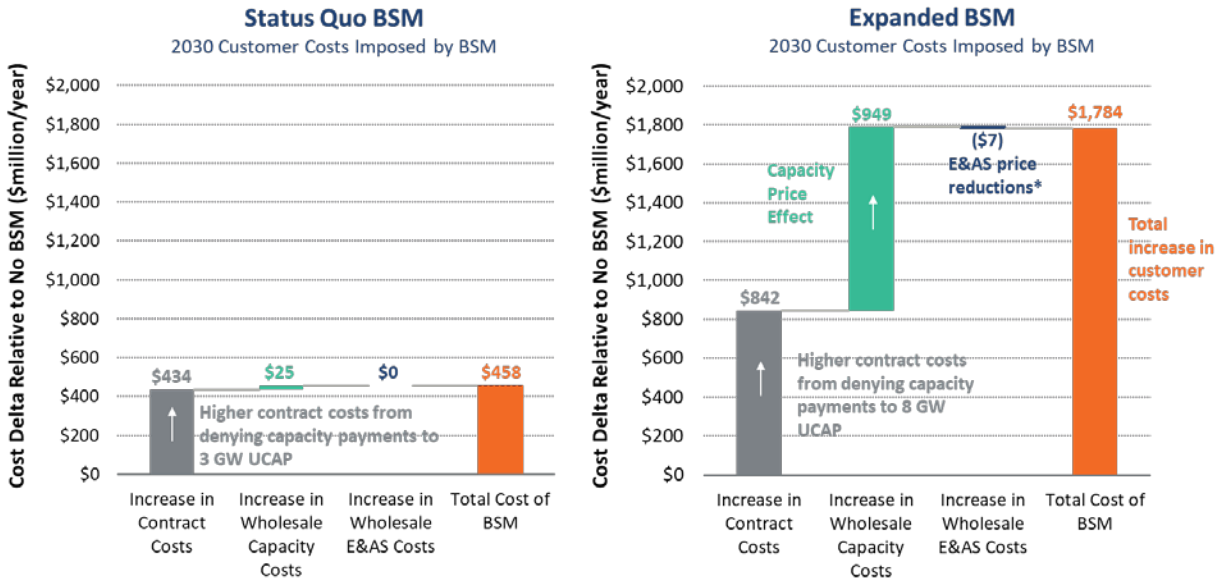
Imposing BSM on policy resources would impose a significant cost on New York customers. We calculated the extent of this cost for several alternative cases with Status Quo and Expanded BSM rules. The detailed assumptions and results from this analysis are included in Exhibit B. These excess costs appear in two ways: (1) as an increase in capacity prices affecting all transactions; and (2) as an increase in contract payments to policy resources because they are deprived of capacity market revenues that go instead to unnecessary substitute resources.

As summarized in Figure 5 below, we estimate costs as an increase in contract payments, plus an increase in capacity market payments, minus a small offset due to reduced energy and ancillary service (E&AS) prices. We estimate that:

- Under the Status Quo BSM rules, costs imposed on customers are currently low but will grow rapidly with the increase in policy resources, with a total cost rising to approximately $460 million per year by 2030. We estimate a relatively modest price impact over the long term, primarily due to the offsetting impact of supply elasticity that could keep prices consistent with the costs of retaining aging fossil plants over the long term.
- An Expanded BSM would have a much more immediate effect due primarily to the application of BSM to approximately 3,100 UCAP MW of nuclear plants that earn ZECs. The customer cost of the Expanded BSM would grow over time to approximately $1,780 million per year by 2030 as the quantity of resources subject to BSM grows. Of this total customer cost, approximately $950 million is caused by higher capacity prices, $840 million is caused by higher contract payments, and approximately $10 million is offset by somewhat lower energy and ancillary service prices.

Our cost estimates account for the offsetting effects of supply elasticity that could reduce price impacts from BSM over the long term. This price mitigation would occur to the extent that excluding policy resources could cause the retention of an almost equivalent amount of replacement capacity and thus results in relatively small net price impact. (Absent supply elasticity, BSM would cause the market to clear at a much higher price along the capacity demand curve and result in much higher customer costs.) We also account for offsetting effects of reductions in the prices of energy and ancillary services due to the excess capacity on the system.

FIGURE 5: CUSTOMER COSTS FROM IMPOSING BSM ON POLICY RESOURCES BY 2030



Sources and Notes: Costs reported in 2030$. *See* p. 7, Exhibit B.

Like any forward-looking estimate of costs, ours are subject to some uncertainty and would differ with alternative assumptions, but we view the overall magnitude to be robust and likely, conservative. Under alternative assumptions, we estimate that Status Quo BSM could cost $400 to $850 million per year by 2030; while expanded BSM could cost $1,300 to $2,750 million per year by 2030.

The robustness of our analysis is further supported by the findings of an entirely independent analysis of the same question that was previously conducted by NorthBridge Group on behalf of

Exelon. In that separate analysis, NorthBridge estimated customer costs of Status Quo BSM would begin at zero in 2021 and rise to $950 million per year by 2025, and that customer costs from an Expanded MOPR would range over $1,200 million to $1,650 million per year over 2021 to 2025.[38] Though the assumptions, methodology, and study years in this Northbridge study differ significantly from our own, the results are relatively consistent. The customer costs of BSM are very high.

D.2. Expanded BSM Would Induce Economic Inefficiencies of Approximately $790 Million per Year by 2030

BSM's costs to customers do not only reflect a wealth transfer to suppliers. The costs also reflect the fact that BSM induces economic waste by inducing capacity owners to make investments to attract or retain capacity resources that are not needed. As we estimated in our analysis, the vast majority of these investments are associated with retaining existing fossil plants that require substantial ongoing investments to stay in operation. For example, the gas-fired steam turbines require significant ongoing reinvestments each year to keep them in operation. In total, keeping an excess 3,050 UCAP MW of these resources online induces excess societal costs on the order of $450 million per year by 2030 under the Status Quo BSM.[39]

With an Expanded BSM, the economic waste is greater, growing to about $790 million per year by 2030.[40] This cost is driven by the same effect of inducing investments to retain resources that are not needed for resource adequacy, though the effect is greater given the larger 7,025 UCAP MW scale of the uneconomic resources.

D.3. Expanded BSM Would Impose Harms to Customers that Significantly Exceed the Benefits to Capacity Sellers

Incumbent capacity sellers are the primary beneficiaries of BSM. However, the approximately $10 million per year in net benefits that these incumbent players would enjoy from Status Quo BSM are far below the $460 million per year increases in costs imposed on customers. In

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[38] Aaron T. Patterson, "Impact of Carbon Pricing on Potential Expanded Buyer-Side Mitigation in the NYISO Markets," The NorthBridge Group, at pp. 6–7, November, 2019.

[39] This calculation of $451 million per year in excess resource costs is based on the observation on p. 14 of Exhibit B that approximately 3,050 UCAP MW of Gas ST is retained under status quo BSM in the summer and winter capacity auctions that would economically retire with no BSM. We assume that the entirety of this retained capacity is in Zone J. The average capacity market price in Zone J is unchanged between the cases with status quo BSM and no BSM, indicating that Gas ST is the marginal resource; hence the clearing price corresponds with the going-forward cost of these resources.

[40] This calculation of $793 million per year in excess resource costs is based on the finding shown on p. 14 of Exhibit B that an average of 7,025 UCAP MW of supply is uneconomically retained between the summer and winter capacity auctions in the case with expanded BSM relative to the case with no BSM. We have assumed that 3,050 UCAP MW of Gas ST is retained in Zone J, as in the case with Status Quo BSM; we have further assumed that all the mitigated capacity that does not clear in the summer in Zone K with expanded BSM is replaced by incumbent supply that is uneconomically retained and that the remaining retained supply is upstate (Zones A-F). Uncleared mitigated capacity in Zone K is estimated as 480 UCAP MW of mitigated storage plus about 186 UCAP MW of mitigated offshore wind, based on the total uncleared quantity of offshore wind in the summer (approximately 900 UCAP MW) times the ratio of mitigated offshore wind in Zone K to total mitigated offshore wind. The average going-forward costs of the retained supply in each zone are estimated as the average of the clearing price with no BSM and the clearing price with Expanded BSM.

Expanded BSM, the benefits to incumbent players are larger at around $1,000 million per year, but still far below the $1,780 million per year in costs to customers.

The reason for this discrepancy is associated with the economic waste induced by BSM as outlined in the following table. As discussed above, customer costs are increased according to the quantity effect (higher contract payments) and price effect (higher capacity market costs). The higher contract payments are earned by policy resources, making up for lost revenues from the capacity market (resulting in overall no net cost or benefit to policy resources that are subject to BSM).

Other incumbent capacity sellers enjoy significant increases in capacity revenue as driven by higher capacity prices and by gaining a greater market share. This causes approximately $460 and $1,790 million per year in increased capacity revenues to incumbent capacity sellers in the Status Quo and Expanded BSM cases, respectively, by 2030. This increase in revenues, however, is offset in large part by a large increase in costs that are incurred to keep uneconomic resources online. Thus, the net benefits to capacity sellers is much lower at approximately $10 or $1,000 million per year in the Status Quo and Expanded BSM cases, respectively.

Overall, the net benefits to incumbent capacity sellers from BSM are significantly lower than the net costs to customers. This is because a portion of the customer costs from BSM fund a wealth transfer from customers to capacity sellers (benefitting fossil generators at the expense of customers), while the remainder of customer cost increases are used to fund uneconomic investments to maintain aging fossil plants that would otherwise retire (benefitting neither customers nor generators).

TABLE 1: APPLYING BSM TO POLICY RESOURCES PRODUCES NET BENEFITS TO INCUMBENT CAPACITY SELLERS AND NET COSTS TO CONSUMERS

		Change from No BSM	
		Status Quo BSM	Expanded BSM
		2030 $ millions Per Year	2030 $ millions Per Year
Customer Costs			
Increased Capacity Market Costs	[1]	$25	$949
Increased Contract Payments	[2]	$434	$842
Total Customer Cost Increase	[3]	**$458**	**$1,784**
Revenues Earned by Policy Resources			
Decrease in Capacity Payments	[4]	$434	$842
Increase in Contract Payments	[5]	$434	$842
Net Benefits to Policy Resources	[6]	**$0**	**$0**
Revenues and Costs Earned by Other Resources			
Increase in Capacity Revenues	[7]	$459	$1,791
Increase in Investment and Fixed Costs	[8]	$451	$793
Net Benefits to Capacity Sellers	[9]	**$8**	**$998**

Sources and Notes:

[1] – [3]: From Exhibit B, p 15. Note that [3] is slightly less than the sum of [1] and [2] due to small offsets in customer costs due to lower energy and ancillary service prices.

[4] – [6]: Increase in policy resources' contract payments is equal to the decrease in capacity revenues earned by policy resources, given that contract payments are structured to capacity market payments thus keeping policy resources whole with or without BSM. Increase in contract costs in [4] can be found on p. 15 of Exhibit B.

[7]: Increase in capacity payments to non-policy resources is equal to the decrease in capacity payments to policy resources that are excluded from the capacity market (item [4]) plus the total increase in capacity market costs (item [1]).

[8]: Estimated based on Exhibit B, at 12, 14-15, as explained in footnotes 39 and 40.

[9]: Calculated as the increase in capacity revenues to non-policy resources (item [7]) minus the increase in investment and fixed costs of non-policy resources (item [8]).

E. To Continue Offering Broad Benefits to Consumers, Competitive Markets Must Align with and Support Environmental Policy Goals

Competitive wholesale electricity markets, including the NYISO capacity market, have a long history of offering significant benefits to consumers by maintaining reliability at low costs. To continue offering these benefits in the future, the markets will increasingly need to adapt to facilitate and accommodate States' clean energy mandates.

E.1. Expansion of BSM Threatens to Undermine the Future of Competitive Wholesale Electricity Markets

Far from "protecting" capacity markets from the threat of price suppression and policy resources, the application of BSM to policy resources threatens to undermine the benefits and eventually the very existence of competitive capacity markets. The application of BSM to state policy resources erodes the benefits that a competitive capacity market can offer. It imposes unnecessary excess costs on customers and society, interferes with the ability to achieve State policy goals, and effects a wealth transfer from customers to incumbent capacity sellers. These adverse economic outcomes are amplified in any region with a significant environmental policy and will rise quickly as New York proceeds toward achieving its 100% clean energy mandate.

Eventually, the scope and scale of an Expanded BSM would become so great that it would exclude the large majority of all resources from participating. At the same time, the capacity market would continue to produce the high prices that would be necessary to retain excess fossil plants consistent with a fictional scenario as though the State's 100% clean electricity policy did not exist. This outcome is nonsensical and unsustainable. Rather than force customers to endure persistent, growing, and unnecessary excess costs, state policymakers would be forced to exit the capacity market entirely. In fact, state policymakers in New York have initiated a proceeding on the future of resource adequacy in the state for this very reason.[41]

The solution to this problem is simple: eliminate the application of BSM on policy resources and allow prices to reflect the intersection of supply with demand.

E.2. Wholesale Electricity Markets Should Offer States and Customers Competitive Solutions for Aligning with and Achieving Environmental Policy Goals

More generally, well-designed competitive markets will greatly aid the cost-effective, reliable transition to a clean electricity grid. To preserve and expand the role of competitive markets in offering broad consumer benefits, they will increasingly need to align with and support states' environmental goals. The FERC has already acknowledged the benefits of supporting state goals through the reflection of enhanced carbon pricing within wholesale electricity markets.[42] States, ISOs, and stakeholders will increasingly identify opportunities to enhance the markets for a decarbonized grid, such as through enhanced carbon pricing, enhanced energy and ancillary service market designs, and solutions for aligning the capacity market with state policy.[43] These reforms may take some time but will ultimately support the evolution of toward a fit-for-purpose wholesale market for the decarbonized grid.

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41 *See*: NYPSC, Case Number 19-E-0530, "Proceeding on Motion of the Commission to Consider Resource Adequacy Matters."

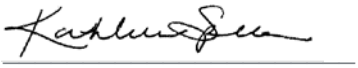
42 FERC, Docket No. AD20-14-000, "Carbon Pricing in Organized Wholesale Electricity Markets," October 15, 2020.

43 *See* Samuel A. Newell, Roger Lueken, Jürgen Weiss, Kathleen Spees, Pearl Donohoo-Vallet, Tony Lee, The Brattle Group, "Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals," August 10, 2017; Kathleen Spees, Samuel A. Newell, Walter Graf, Emily Shorin, "How States, Cities, and Customers Can Harness Competitive Markets to Meet Ambitious Carbon Goals: Through a Forward Market For Clean Energy Attributes Expanded Report Including A Detailed Market design Proposal," September 2019; and New York Independent System Operator (NYISO), "Reliability and Market Considerations For A Grid in Transition," December 20, 2019.

F. Certification

We hereby certify that we have read the filing signed and know its contents are true as stated to the best of our knowledge and belief. We possess full power and authority to sign this filing.

Respectfully Submitted,



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November 18, 2020

Exhibit A.1: Curriculum Vitae of Dr. Kathleen Spees

KATHLEEN SPEES
Principal

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Dr. Kathleen Spees is a Principal at The Brattle Group with expertise in wholesale electricity and environmental policy design and analysis. Her work for market operators, regulators, regulated utilities, and market participants focuses on:

- Wholesale Power Market Reform
- Capacity Market Design
- Wholesale Energy and Ancillary Service Market Design
- Carbon and Environmental Policy
- Generation and Transmission Asset Valuation
- Analysis of Emerging Technologies and Specialized Products

Dr. Spees has worked in more than a dozen international jurisdictions supporting the design and enhancement of environmental policies and wholesale power markets. Her clients include electricity system operators in PJM, Midcontinent ISO, New England, Ontario, New York, Alberta, Texas, Italy, and Australia. Electricity market design assignments involve ensuring adequacy of capacity and energy market investment incentives to achieve reliability objectives at least cost; designing carbon and clean energy policies that effectively interact with wholesale electricity markets; enhancing operational reliability and efficiency through energy market, scarcity pricing, and ancillary service market improvements; effectively integrating intermittent renewables, storage, demand response, and other emerging technologies; evaluating benefits and costs of industry reform initiatives; and enhancing efficiency at market interties.

For system operators and regulators, Dr. Spees provides expert support through stakeholder forums, independent public reports, and testimony in regulatory proceedings. For utilities and market participants, her assignments support business strategy, investment decisions, asset transactions, contract negotiation, regulatory proceedings, and litigation. Dr. Spees has developed and applied a wide range of analytical and modeling tools to inform these policy, market design, and business decisions.

Dr. Spees earned her PhD in Engineering and Public Policy within the Carnegie Mellon Electricity Industry Center in 2008 and her MS in Electrical and Computer Engineering from Carnegie Mellon University in 2007. She earned her BS in Physics and Mechanical Engineering from Iowa State University in 2005.

Publications posted at: http://www.brattle.com/experts/kathleen-spees

I. REPRESENTATIVE EXPERIENCE

A. WHOLESALE POWER MARKET REFORM

- **Ontario Market Renewal Benefits Case.** For the Ontario Independent Electricity System Operator (IESO), developed an analysis evaluating the benefits and implementation costs associated with fundamental reforms to wholesale power markets, including implementing nodal pricing, a day-ahead energy market, enhanced intra-day unit commitment, operability reforms, an enhanced intertie design, and a capacity market. Analysis included: (a) market visioning sessions with IESO staff and stakeholders to identify future market design requirements; (b) identify primary drivers and quantify system efficiency benefits; (c) review lessons learned from other markets' reforms to

identify opportunities and reform risks; (d) conduct a bottom-up analysis of implementation costs for replacing market systems; and (e) evaluate interactions with existing supply contracts.

- **MISO Market Development Vision.** For the Midcontinent Independent System Operator (MISO), worked with staff and stakeholders to codify a Market Vision as the basis for motivating and prioritizing market development initiatives over the next 2-5 years. Authored a foundational report for that Vision, including: describing the core services MISO must continue to provide to support a well-functioning market; establishing a set of principles for enhancing those services; identifying seven Focus Areas offering the greatest opportunities for improving MISO's electricity market; and proposing criteria for prioritizing initiatives within and across Focus Areas.
- **Australia NEM Electricity Market Vision for Enabling Innovation and Clean Energy.** On behalf of the Australian Energy Market Operator reviewed electricity market design options for the future of the NEM. Evaluated opportunities for relying on markets, innovation, and new technologies to address a range of challenges in the context of significant increases in customer costs, high gas prices, large clean energy penetration, coal retirements, uncertain carbon policies, and emerging reliability and security concerns.
- **Thailand Power Market Reform.** Supported market design options and recommendations for potential power market reforms in Thailand, including the introduction of forward, day-ahead, and real-time energy markets, as well as the potential introduction of a bilateral or centralized capacity market. Examined interactions with retail rates, existing contracts, and self-supply arrangements.
- **Power Market Reform to Accommodate Decarbonization and Clean Energy Policies.** For the system operator in a jurisdiction pursuing significant clean energy and decarbonization policies, assisted in evaluating market design alternatives. Estimated energy price, customer cost, and reliability implications under alternative energy, ancillary service, and capacity market design scenarios. Quantified implications of key uncertainties such as intermittent resource penetration levels and impacts of interties with external regions. Provided research and comparative analysis of design alternatives and lessons learned from other jurisdictions.
- **Western Australia Power Market Reform Options.** For EnerNOC, developed a whitepaper describing high-level market reform options in the face of escalating customer costs in Western Australia. Described the drivers of capacity payment costs in comparison to other major cost driver. Identified high-level options for pursuing capacity and energy-only market design reforms, comparing advantages and disadvantages.
- **Russian Capacity and Natural Gas Market Liberalization.** On behalf of a market participant, conducted an assessment of market design, regulatory uncertainty, and

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liberalization success. Focus was on the efficiency of market design rules in the newly introduced system of capacity contracts combined with capacity payments, as well as on the impacts of gas price liberalization delays.

- **PJM Review of International Energy-Only, Capacity Market, and Capacity Payment Mechanisms.** For PJM Interconnection, conducted a review of energy-only markets, capacity payment systems, and capacity markets on behalf of PJM market operator. Reviewed reliability, volatility, and overall investment outcomes related to details of market designs in bilateral, centralized, and forward commitment markets.
- **Options for Reconciling Regulated Planning and Wholesale Power Markets in in MISO.** For NRG, developed a whitepaper assessing reliability and economic implications of current capacity market and integrated planning approaches, and the challenges in accommodating retail access and integrated planning within the same market region. Recommended options for enhancing the MISO capacity market and regulated entities' approaches to planning.
- **Review of California Planning and Market Mechanisms for Resource Adequacy.** For Calpine, evaluated interactions and implications of California's policy, planning, and market mechanisms affecting resource adequacy. Recommended improvements to reconcile inconsistencies and enhance efficiencies in regulated long-term procurements, short term local resource adequacy construct, and CAISO backstop mechanisms.

B. CAPACITY MARKET DESIGN

- **PJM Review of Capacity Market Design and Demand Curve Parameters: 2011, 2014, and 2018.** For PJM Interconnection, conducted independent periodic reviews of PJM's Reliability Pricing Model. Analyzed market functioning for resource adequacy including uncertainty and volatility of prices, net cost of new entry parameters, impacts of administrative parameters and regulatory uncertainties, locational mechanisms, demand curve shape, incremental auction procedures, and other market mechanisms. Developed a probabilistic simulation model evaluating the price volatility and reliability implications of alternative demand curve shapes and recommended a revised demand curve shape. Provided expert support to stakeholder proceedings, testimony submitted before the Federal Energy Regulatory Commission, and before the Maryland Public Service Commission.
- **MISO Resource Adequacy Construct.** For MISO, conducted a review of MISO's resource adequacy construct. Subsequent assistance to MISO in enhancing the market design for resource adequacy related to market redesign, capacity market seams, and accommodation of both regulated and restructured states. Provided background presentations to stakeholders on the capacity market design provisions of NYISO, PJM, CAISO, and ISO-NE.
- **Alberta Energy-Only Market Review for Long-Term Sustainability: 2011 and 2013 Update.** For AESO, conducted a review of the ability of the energy-only market to

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attract and retain sufficient levels of capacity for long-term resource adequacy. Evaluation of the outlook for revenue sufficiency under forecasted carbon, gas, and electric prices, potential impact of environmentally-driven retirements, potential federal coal retirement mandate, and provincial energy policies.

- **Economic Implications of Resource Adequacy Requirements.** For the U.S. Federal Energy Regulatory Commission, reviewed economic and reliability implications of resource adequacy requirements based on traditional reliability criteria as well as alternative standards based on economic criteria. Evaluated total system costs, customer costs, supplier net revenues, and demand response implications under a range of reserve margins as well as under different energy-only and capacity market designs.
- **Winter Resource Adequacy and Reliability.** For an RTO, analyzed the risk of winter reliability and resource adequacy shortages. Examined the drivers of winter reliability concerns including unavailability of specific resource types, winter fuel supply shortages, and weather-driven outages. Developed a range of potential reforms for addressing identified concerns.
- **Alberta Capacity Market Design.** Supported the development of a capacity market design in Alberta. Provided expert support to public working groups and AESO staff to review analytical questions, develop and evaluate design alternatives, and draft design documents. Supported on all aspects of market design including establishing reliability requirements, developing demand curve parameters, evaluating seasonal capacity resources, setting capacity ratings, product definition and obligations, and penalty mechanisms.
- **European Market Flexibility and Capacity Auction Design.** For European client, developed a market-based design for meeting flexible and traditional capacity needs in the context of high levels of intermittent resource penetration, degraded energy and ancillary pricing signals, and ongoing electricity market reforms. Engaged in meetings with industry and European Commission staff to develop and refine design options. Developed a model simulating market clearing results in a two-product auction and projecting prices over time.
- **Italian Capacity Market Design.** For Italy's transmission system operator Terna, supported development of a locational capacity market design and locational capacity demand curves based on simulation modeling on the value of capacity to customers.
- **Capacity Auction Design for Western Australia**. For Western Australia's Public Utility Office, drafted a whitepaper and advised on the design of its new capacity auction mechanism.
- **IESO Capacity Auction Design.** Provided expert support to IESO staff in support of a new capacity auction design. Provided detailed memos describing options, tradeoffs, and lessons learned on every aspect of capacity auction design. Supported stakeholder engagement, conducted analysis of design alternatives, and developed design proposals.

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- **PJM Seasonal Capacity Market Design.** For the Natural Resources Defense Council, provided testimony and economic analysis in support of improving the capacity market design to better accommodate seasonal capacity resources.
- **ISO New England Capacity Demand Curve**. For ISO New England, worked with RTO staff and stakeholders to develop a selection of capacity demand curves and evaluate them for their efficiency and reliability performance. Began with a review of lessons learned from other market and an assessment of different potential design objectives. Developed and implemented a statistical simulation model to evaluate probabilistic reliability, price, and reserve margin outcomes in a locational capacity market context under different candidate demand curve shapes. Submitted Testimony before the Federal Energy Regulatory Commission supporting a proposed system-wide demand curve, with ongoing support to develop locational demand curves for individual capacity zones.
- **MISO-PJM Capacity Market Seams Analysis.** For MISO, evaluated barriers to capacity trade with neighboring capacity markets, including mechanisms for assigning and transferring firm transmission rights and cross-border must-offer requirements. Evaluated economic impacts of addressing the barriers and identified design alternatives for enabling capacity trade.
- **MISO Competitive Retail Choice Solution.** For MISO, evaluated design alternatives for accommodating the differing needs of states relying on competitive retail choice and integrated resource planning. Conducted probabilistic simulations of likely market results under alternative market designs and demand curves. Provided expert support in stakeholder forums and submitted expert testimony before the Federal Energy Regulatory Commission.
- **Capacity Market Manipulation.** For a market participant, supported economic and policy analysis of an alleged instance of capacity market withholding.
- **Demand Curve and Net Cost of New Entry Review.** For an RTO, provided a high-level conceptual review of its approach to establishing demand curve and net cost of new entry parameters. Identified potential reliability and economic efficiency concerns, and recommended enhancements.
- **Western Australia Reserve Capacity Mechanism and Transition Mechanism**. For EnerNOC, authored two public reports related to the energy market reforms in Western Australia. The first report evaluated the characteristics of the Western Australia Reserve Capacity Mechanism in comparison with international best practices and made recommendations for improvements, whether pursuing a capacity market or energy-only market design. The second report evaluated and recommended changes to the regulator's proposed mechanism for transitioning to its long-term capacity market design.

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- **Cost of New Entry Study to Determine PJM Auction Parameters: 2011 and 2014.** For PJM Interconnection, partnered with engineering, procurement, and construction firm to develop bottom-up cost estimates for building new gas combined cycles and combustion turbines. Affidavit before the Federal Energy Regulatory Commission and participation in settlement discussions on the same.

C. WHOLESALE ENERGY AND ANCILLARY SERVICE MARKET DESIGN

- **Greece Energy and Ancillary Service Market Reform.** For the Hellenic Association of Independent Power Producers, provided expert advice and a report on how to reform wholesale power markets to conform with policy mandates and meet system flexibility needs. Analyzed energy and ancillary market pricing and rules to identify opportunities to enhance efficiency, improve participation of emerging resources, achieve market coupling, and better integrate intermittent resources. Proposed high-level design recommendations for implementing forward, day-ahead, intraday, and balancing markets consistent with European Target Model requirements. Developed detailed design recommendations for near-term and long term enhancements to market operations, pricing, dispatch, and settlements. Provided expert support in meetings with European Commission staff.
- **Alberta Energy and Ancillary Service Market Enhancements.** Supported the development of market design enhancements to better support flexibility needs and align with capacity market implementation. Developed design proposals and evaluated alternatives for immediate and long-term reforms including monitoring and mitigation, enhanced administrative scarcity pricing, ancillary service co-optimization, day-ahead markets,
- **SPP Ramp Product Proposal.** For Golden Spread Electric Cooperative, developed recommendations for the design and implementation of a ramping product to most efficiently and cost-effectively manage intermittency needs. Reviewed opportunities to determine the most appropriate quantity of resources, forward product timeframe, price formation, and interactions with existing pricing and commitment procedures.
- **ERCOT Energy Market Design and Investment Incentives Review.** For the Electric Reliability Council of Texas (ERCOT), conducted a study to: (a) characterize the factors influencing generation investment decisions; (b) evaluate the energy market's ability to support investment and resource adequacy at the target level; (c) examine efficiency of pricing and incentives for energy and ancillary services, focusing on scarcity events; and (d) evaluate options to enhance long-term resource adequacy while maintaining market efficiency. Performed forward-looking simulation analyses of prices, investment costs, and reliability. Interviewed a broad spectrum of stakeholders; worked with ERCOT staff to understand the relevant aspects of their planning process, operations, and market data. Supported ongoing proceedings with stakeholders and before the Public Utility Commission of Texas.

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- **Scarcity and Surplus Event Pricing.** For an RTO, examined the efficiency and reliability implications of its pricing mechanisms during scarcity and surplus events, and evaluated potential market reforms. Options reviewed included adjusting the price cap consistent with the value of lost load, adjusting supplier offer caps, imposing administrative scarcity prices at varying levels of emergency events, ancillary service market pricing interactions, and reducing the price floor below zero.
- **MISO Wind Curtailment Interactions with Energy Market Pricing and Transmission Interconnection Processes.** For MISO, evaluated the efficiency and equity implications of wind curtailment prioritization mechanisms and options for addressing stakeholder concerns, including interconnection agreement types, energy and capacity injection rights, ARR/FTR allocation mechanisms, energy market offers, and market participant hedging needs.
- **Survey of Energy Market Seams.** For the Alberta Electric System Operator (AESO), assessed the implications of energy market seams inefficiencies between power markets in Canada, the U.S., and Europe for the Alberta Electric System Operator. Evaluation of options for improving seams based on other markets' experiences with inter-regional transmission upgrades, energy market scheduling and dispatch, transmission rights models, and resource adequacy.
- **New England Fuel Security Market Design.** For NextEra, developed design proposals for using market-based mechanisms to meet regional fuel security needs including through a fuel security reserve product that would enhance pricing and operations for fuel security in the energy and ancillary service markets, and options for a long-term solution through forward auctions for fuel security.
- **Reliability Auctions for the NEM.** For the Australian Electricity Market Operator conducted an international review of the range of approaches to supporting reliability and system security through competitive auctions. Focused on product definition including, various aspects of reliability and system security, auctions focused on enabling non-traditional resource types, options ranging from strategic reserve models to partial needs procurements to capacity markets, and potential for impacts on energy-only market pricing and performance.
- **ERCOT Operating Reserves Demand Curve and Economically Optimal Reserve Margin 2014 and 2018.** For the Public Utility Commission of Texas and ERCOT, co-authored a report estimating the economically-optimal reserve margin. Compared to various reliability-based reserve margins, and evaluated the cost and uncertainty of energy-only and a potential capacity market in ERCOT. Conducted the study in collaboration with Astrape Consulting to construct a series of economic and reliability modeling simulations that account for uncertain weather patterns, generation and transmission outages, and multi-year load forecasting errors. The simulations also incorporate detailed representation of the Texas power market, including intermittent wind and solar generation, operating reserves, different types of demand response, the full range

of emergency procedures (such as operating reserve deletion), scarcity pricing provisions, and load-shed events.

- **Southern Company Independent Auction Monitor.** For Southern Company, developed auction monitoring capability and protocol development for monitoring hourly and daily auctions. Supported functions included daily and annual audits of internal company processes and data inputs related to load forecasting, purchases and sales, and outage declarations. Analyzed company data to develop monitoring protocols and automated tools. Coordinated implementation of data collection and aggregation system required for market oversight and for detailed internal company data audits.

D. CARBON AND ENVIRONMENTAL POLICY

- **Integrating Markets and Public Policy in New England.** For a coalition of stakeholders, engaged in a collaborative effort to develop market-based approaches for accommodating and achieving state decarbonization objectives. Developed and refined design proposals including carbon pricing and market-based clean energy procurements, while identifying options for reducing regulatory uncertainties, avoiding cross subsidies across states, and mitigating customer cost impacts. Evaluated options for improving interactions with existing energy, capacity, renewable energy credit, and carbon markets. Conducted modeling of price, cost, and emissions outcomes under a range of designs. Engaged in an iterative process to develop, present, and refine design proposals based on input from a broad array of stakeholders. Provided expert support in outreach to state policymakers and industry groups.
- **Ontario Market Evolution to Support a 90% Clean Energy System and Increasing Distributed Resources.** For the IESO, supported the activities of the non-emitting stakeholder committee to model market reforms necessary to fully enable the 90% clean energy fleet. Supported stakeholder workshops to identify potential futures with many more distributed resources, a range of technology costs, and a variety of market designs. Conducted modeling analysis to analyze market outcomes including cost, reliability, resource curtailment, and resource revenues.
- **National Carbon Policy Design and Interactions with Power Markets.** For an international regulator, analyzed a range of options for the design of a carbon policy for the electricity sector, considering impacts on the wholesale electricity market and interactions with other sectors. Analyzed a range of alternatives for intensity-based and cap-and-trade based approaches, alternative allocations methods, and interactions with renewables standards. Developed two detailed design alternatives within the specified policy constraints.
- **Review of International Carbon Mechanisms.** For an RTO, conducted a survey of international carbon pricing, cap-and-trade, and rate-based mechanisms, and detailed review of design elements of the mechanisms implemented in Europe, California, Alberta, and the Regional Greenhouse Gas Initiative. Evaluated a range of alternatives

for implementing the Clean Power Plan across states while effectively integrating with wholesale markets.

- **New York ISO Carbon Pricing.** For the New York ISO, examined economic implications of a possible carbon pricing proposal within the wholesale electricity market. Developed a whitepaper evaluating interactions with state environmental policies, wholesale power markets, intertie pricing, capacity market, and transmission planning. Estimated energy price and customer cost impacts.
- **Carbon Allowance Allocations Alternatives.** For the National Resources Defense Council, developed a whitepaper examining the advantages and disadvantages of auction-based, customer-based, and generator-based approaches to allocating carbon allowances. Developed recommendations for avoiding the introduction of inefficient investment, retirement, and operational incentives under each type of design, and for mitigating customer cost impacts.
- **Power Market Impacts of Clean Power Plan Alternatives.** Conducted a modeling assessment of price, cost, and emissions implications of different rate-based, subcategory rate-based, and mass-based implementation of the Clean Power Plan in Texas. Estimated energy, emission reduction credit, and carbon prices under each scenario, and net revenue and operating implications for several types of generating plants.
- **Review of Hydropower Industry Implications under Clean Air Act 111(d).** For the National Hydropower Association, provided members review of the implications for new and existing hydropower resources of proposed EPA Clean Power Plan under Clean Air Act Section 111(d). Analyzed impacts under a variety of potential revisions to the proposed rule, different potential state compliance options, differing plan regulatory statuses, mass-based vs. rate-based compliance, regulated planning vs. market-based compliance, and cooperative vs. stand-alone compliance.
- **Enabling Canadian Imports for U.S. Clean Energy Policies.** For a coalition of Canadian electricity producers and policymakers, reviewed a range of options for U.S. states to pursue clean energy policies and the Clean Power Plan while enabling contributions from clean energy imports.
- **Clean Power Plan Regulatory and Stakeholder Support.** For a cooperative entity, provided support in developing internal and external positioning associated with the Clean Power Plan. Analyzed state-wide emissions targets and compliance alternatives. Supported messaging and stakeholder engagement at the state and federal levels. Submitted testimony before the Environmental Protection Agency.
- **State Compliance Strategy under the Clean Power Plan.** For a regulated utility, evaluated options and feasibility of meeting state standards under 111(d) rate standards under a number of compliance scenarios. Developed an hourly dispatch model covering backcast and forecast years through the interim and final compliance timelines, accounting for impacts of load growth, renewables growth, coal-to-gas redispatch, coal

minimum dispatch constraints, planned retirements, new generation development, and export commitments. Estimated the ability to meet the standard under various compliance strategies.

- **New Gas Combined Cycle Plants Under the Clean Power Plan.** For the National Resources Defense Council, developed a whitepaper evaluating the economic implications of Clean Power Plan implementation plans that do or do not cover gas combined cycle plants on a level basis with other fossil-emitting plants. Conducted simulation analyses comparing the economic and emissions implications of alternative approaches.
- **MISO Coal Retrofit Supply Chain Analysis.** For the MISO, analyzed the fleet-wide requirements for retrofitting plants to upgrade for the Mercury and Air Toxics Standard. Reviewed the upstream engineering services, procurement, and construction supply chain to evaluate the ability to upgrade the fleet within the available time window. Analyzed the potential for operational and reliability concerns from simultaneous planned outages needed to support fleet-wide retrofit requirements in the MISO footprint.
- **Impact of Environmental Policies on Coal Plant Retirement.** For a PJM market participant, conducted a zone-level analysis of PJM market prices and used unit-level data to conduct a virtual dispatch of coal units under a series of long-term capacity, fuel, and carbon price scenarios. Modeled retirement decisions of plants by PJM zone and the effect of the carbon price on the location and aggregate size of these retirement decisions.

E. GENERATION AND TRANSMISSION ASSET VALUATION

- **Generation and Transmission Asset Valuations (Multiple Clients).** For multiple clients, top-line operating cost and revenues estimation for generation and transmission assets in PJM, ISO-NE, MISO, SPP, and ERCOT; experience with a range of asset types including gas CCs, gas CTs, coal, wind, waste-to-energy, cogeneration, and HVDC lines. Evaluation exercises include forecasting market prices and net revenues from energy, capacity, ancillary service, and (if applicable) renewable energy credit markets. Valuations account for the operational impacts and economic value of existing power purchase agreements and other hedges. Clients typically require qualitative and quantitative analysis of regulatory risks under a range of operational and market scenarios. Valuation efforts often conducted in the context of due diligence for transactions, business decisions, and contract negotiations.
- **Executive Education and Investment Opportunities Surveys (Multiple Clients).** For multiple clients, provided executive education and detailed survey material to support investments in new markets and strategic decision-making. Educational efforts provided over a range of levels including high-level executive sessions, all-day workshop sessions, and detailed support for analytical teams. Examples of subject matter include: (a) cross-market surveys comparing investment attractiveness in many dimensions based

on market fundamentals, regulatory structure, and contracting opportunities; and (b) single-market deep-dive educational sessions on capacity, energy, ancillary service, and financial/hedging product functioning and market performance.

- **In-House Fundamentals Capability Development (Multiple Clients).** For multiple clients, supported the development of in-house capability for market fundamentals analysis. Typically needed in the context of new entrants to a market or system operators expanding the scope of their internal analytical capabilities. Scope of support has included: (a) initial education, backup support, and advisory support for fundamentals teams entering a new market; (b) development and transfer of new purpose-built modeling tools such as capacity market models; and (c) external peer review or independent assessment functions.
- **Asset or Fleet Valuation in Support of Litigation and Arbitration Proceedings (Multiple Clients).** In litigation and arbitration contexts, provided estimates of economic damages or asset/fleet value estimates that would have applied at the time of a particular business decision. Supported expert testimony, litigation workpapers, and assessment of opposing experts' analysis.
- **Economic Analysis of Plant Retrofit and Fuel Contracting Decisions (Multiple Clients).** Supported plant operational and investment decisions for enhancing the value of particular assets, including contexts such as: (a) retrofitting plants from oil to gas generation; (b) retrofitting single-cycle to combined cycle with different capacities for duct firing; (c) enhancing ancillary service capability; and (d) and contracting for firm gas capability. Evaluated operational, cost, and revenue impacts of alternatives and compared to present investment costs.
- **Financial Implications of Regulatory, Policy, and Market Design Changes (Multiple Clients).** Conducted analyses of risks and opportunities associated with regulatory, policy, and market design changes. Examples include an analysis of potential Trump administration policies, implications of potential clean energy and carbon policies, and assessing private risks from changes to ancillary service market rules.

F. EMERGING TECHNOLOGIES AND SPECIALIZED PRODUCTS

- **RTO Business Models Analysis for Enabling Customer-Side Disruption and the Clean Energy Future.** For a system operator, engaged in an executive strategy analysis to evaluate a range of electricity sector business models under a future with high penetrations of distributed resources and decarbonization. Developed detailed scenario descriptions of the business models envisioned considering different roles and scope of services provided by the RTO, distribution companies, load serving entities, and third-party aggregators. Created an interactive tool for mapping financial flows and energy flows at all points in the electricity value chain under each business model considered, and drew implications for value proposition of each segment of the market.

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- **Enabling Market Participation from Non-Emitting and Emerging Technologies.** For an Ontario stakeholder group, provided expert support to identify market design enhancements to enable and integrate non-emitting and emerging technologies. Examined participation barriers and design enhancements to unlock full value of resources for supporting energy, flexibility, capacity, and other value streams to the province.
- **International Review of Demand Response Integration into Wholesale Electricity Markets.** For the Australian Energy Market Commission, authored a report describing the range of approaches and market experience integrated demand response into wholesale energy, ancillary service, and capacity markets. Provided detailed discussion of approaches in Singapore, Alberta, ERCOT, PJM, ISO New England, and Ontario. Summarized lessons learned regarding demand response business models, efficient wholesale pricing signals, and interactions with retail markets.
- **Oncor Value of Distributed Storage**. For Oncor Electric Delivery Company, conducted a benefit-cost analysis of adding varying levels of distributed storage into the ERCOT market. Value streams considered including market values such as energy and ancillary services, as well as regulated system values including deferred transmission and distribution costs, and avoiding distribution outages. Evaluated value from the perspectives of customers, a merchant storage developer, and society as a whole, as well as evaluating impacts on incumbent suppliers.
- **Oncor Distributed Storage Business Models to Supply Customer, Distribution System, and Wholesale Value Streams**. For Oncor Electric Delivery Company, conducted a benefit-cost analysis of adding varying levels of distributed storage into the Texas market. Recommended policy changes to enable storage under a range of business models (merchant, utility-owned, customer-owned, and third-party owned), and to allow for the development of resources that could provide multiple value streams. Value streams considered including market values such as energy and ancillary services, distribution-system values including deferred transmission and distribution costs, and customer value streams including avoiding distribution outages. Evaluated value from the perspectives of customers, a merchant storage developer, and society as a whole, as well as evaluating impacts on incumbent suppliers.
- **Risk and Financial Analysis of PJM Capacity Performance Product.** For a market participant, conducted a probabilistic assessment of the expected value, upside, and downside risks (both market-wide and private) associated with PJM's capacity performance product. Evaluated the likely frequency of scarcity events on average and as concentrated in particular years to estimate the expected value of bonus payments if operating as an energy-only asset, and the net potential bonus/penalty if operating as a capacity performance resource. Estimated risk-neutral and risk-averse capacity price offer levels; characterized the magnitude of risk exposure of poor asset performance coincided with system scarcity events.

- **Demand Response Auction Design**. For a system operator, assisted in the high-level and detailed designs of a demand response auction. Supported market rule development, auction clearing optimization specification, and quality control testing of auction clearing engine.
- **Hedging Products for Wind**. For a hedge fund, provided analytical support for the development of a hedging product for wind developers. Evaluated the risk exposure based on day-ahead and real-time participation, locational price differentials, profile and curtailment risks, and discrepancies with exchange-traded hedging products.
- **Tariff Design for Merchant Transmission Upgrades.** For a transmission developer, evaluated tariff design options for capturing market value of wind and transmission for a market participant proposing a large HVDC upgrade to enable wind developments.
- **Magnitude and Potential Impact of "Missing Efficiency" in PJM.** For the Natural Resources Defense Council, analyzed the potential magnitude of energy efficiency programs in PJM that are not accounted for on either demand side (through load forecast adjustments) or on the supply side (in the capacity market). Estimated potential energy and capacity market customer cost impacts in both the short-run and long-run if adjusting the load forecast to account for the missing efficiency.
- **Financial Transmission Right and Virtual Bidding Market Manipulation Litigation for PJM.** For PJM Interconnection, analyzed financial transmission rights, energy market, and virtual trading data for expert testimony regarding market manipulation behavior.
- **Wind and Storage.** For a developer of potential storage assets, simulation analysis modeling combined effects of gas dispatch, wind variability, load variability, and minimum generation conditions to determine the value of electric storage under various levels of wind penetration. Conducted portfolio analysis to determine the optimal level of storage on a systems level to minimize cost as a function of wind penetration levels.
- **Market Reforms to Meet Emerging Flexibility Needs.** For the Natural Resources Defense Council, authored a report on the electricity market reforms needed in the context of declining needs for baseload resources, increasing levels of intermittent supply, and increasing needs for flexible resources.

II. REPRESENTATIVE PUBLICATIONS

A. PAPERS AND REPORTS

Brown, Toby, Neil Lessem, Roger Lueken, Kathleen Spees, and Cathy Wang. *High-Impact, Low-Probability Events and the Framework for Reliability in the National Electricity Market*. Prepared for the Australian Energy Market Commission, February 2019.

Newell, Samuel A., Ariel Kaluzhny, Kathleen Spees, Kevin Carden, Nick Wintermantel, Alex Krasny, and Rebecca Carroll. *Estimation of the Market Equilibrium and Economically Optimal*

Reserve Margins for the ERCOT Region. Prepared for the Electric Reliability Council of Texas, Inc. December 20, 2018.

Spees, Kathleen. *An Economic Perspective on Reliability: Rethinking System Needs and in a Future Dominated by Renewables, New Tech, and Engaged Consumers.* Presented at the Electricity Consumers Resource Council. November 28, 2018.

Spees, Kathleen. *The Cutting Edge in Resource Planning.* Presented to the Solar Energy Industries Association. November 12, 2018.

Spees, Kathleen. *Clean Energy Markets: The "Missing Link" to Market Design 3.0.* Presented to the Harvard Electricity Policy Group. October 4, 2018.

Pfeifenberger, Johannes P., Kathleen Spees, Michael Hagerty, Mike Tolleth, Martha Caulkins, Emily Shorin, Sang H. Gang, Patrick S. Daou, and John Wroble. *AESO Cost of New Entry Analysis: Combustion Turbines and Combined-Cycle Plants with November 1, 2021 Online Date.* Prepared for Alberta Electric System Operator. September 4, 2018.

Pfeifenberger, Johannes P., John Tsoukalis, Judy Chang, and Kathleen Spees. *Initial Comments on SPP's Draft Ramp Product Report.* August 30, 2018.

Spees, Kathleen, Johannes P. Pfeifenberger, Samuel A. Newell, and Judy Chang. *Harmonizing Environmental Policies with Competitive Markets: Using Wholesale Power Markets to Meet State and Customer Demand for a Cleaner Electricity Grid More Cost Effectively.* July 30, 2018.

Newell, Samuel A., David Luke Oates, Johannes P. Pfeifenberger, Kathleen Spees, Michael Hagerty, John Imon Pedtke, Matthew Witkin, and Emily Shorin. *Fourth Review of PJM's Variable Resource Requirement Curve.* April 19, 2018.

Newell, Samuel A., Kathleen Spees, Yingxia Yang, Elliott Metzler, and John Imon-Pedtke. *Opportunities to More Efficiently Meet Seasonal Capacity Needs in PJM.* April 12, 2018.

Spees, Kathleen, Samuel A Newell, David Luke Oates, Toby Brown, Neil Lessem, Daniel Jang, and John Imon Pedtke. *Near Term Reliability Auctions in the NEM: Lessons from International Jurisdictions.* Prepared for the Australian Energy Market Operator, August 23, 2017.

Newell, Samuel A., Roger Lueken, Jürgen Weiss, Kathleen Spees, Pearl Donohoo-Vallett, and Tony Lee. *Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals.* Prepared for the New York Independent System Operator. August 10, 2017.

Newell, Samuel A., Johannes P. Pfeifenberger, Judy Chang, and Kathleen Spees. "How Wholesale Power Markets and State Environmental Policies Can Work Together," *Utility Dive,* July 10, 2017.

Chang, Judy, Mariko Geronimo Aydin, Johannes P. Pfeifenberger, Kathleen Spees, and John Imon Pedtke. *Advancing Past "Baseload" to a Flexible Grid: How Grid Planners and Power Markets*

are Better Defining System Needs to Achieve a Cost-Effective and Reliable Supply Mix. Prepared for the Natural Resources Defense Council. June 26, 2017.

Pfeifenberger, Johannes P., Kathleen Spees, Judy Chang, Walter Graf, and Mariko Geronimo Aydin. "Reforming Ontario's Wholesale Electricity Market: The Costs and Benefits," *Energy Regulation Quarterly,* Volume 5, Issue 2. June 2017.

Spees, Kathleen, Yingxia Yang, and Yeray Perez. *Energy and Ancillary Services Market Reforms in Greece: A Path to Enhancing Flexibility and Adopting the European Target Model.* Prepared for the Hellenic Association of Independent Power Producers (HAIPP). May 2017.

Pfeifenberger, Johannes, Kathleen Spees, Judy Chang, Mariko Geronimo Aydin, Walter Graf Peter Cahill, James Mashal, John Imon Pedtke. *The Future of Ontario's Electricity Market: A Benefits Case Assessment of the Market Renewal Project.* Prepared on behalf of the Independent Electricity System Operator. Draft Report March 3, 2017.

Chang, Judy, Kathleen Spees, and Tony Lee. *CO_2 Allowance Allocation Options: Considerations for Policymakers when Developing Mass-Based Compliance Strategies Under the Clean Power Plan.* Prepared on behalf of the National Resources Defense Council. November 2016.

Chang, Judy, Kathleen Spees, Metin Celebi, and Tony Lee. *Covering New Gas-Fired Combined Cycle Plants under the Clean Power Plan: Implications for Economic Efficiency and Wholesale Electricity Markets.* Prepared on behalf of the Natural Resources Defense Council. November 2016.

Chang, Judy, Kathleen Spees, and Pearl Donohoo-Vallett. *Enabling Canadian Electricity Imports for Clean Power Plan Compliance: Technical Guidance for U.S. State Policymakers.* Prepared on behalf of the Canadian Electricity Association, Canadian Hydropower Association, Canadian Wind Energy Association, Emera Incorporated, Government of Canada, Government of Québec, Manitoba Hydro, Nalcor Energy, and Powerex Corporation. June 2016.

Pfeifenberger, Johannes P., Samuel A. Newell, Kathleen Spees, and Roger Lueken. "Open Letter to GAO: Response to U.S. Senators' Capacity Market Questions." Submitted to the U.S. Government Accountability Office. May 5, 2016.

Spees, Kathleen, Samuel A. Newell, and Colin A. McIntyre. *Western Australia's Transition to Competitive Capacity Auction*. Prepared on behalf of EnerNOC. January 29, 2016.

Chupka, Metin Celebi, Judy Chang, Ira H. Shavel, Kathleen Spees, Jürgen Weiss, Pearl Donohoo-Vallett, Michael Hagerty, and Michael A. Kline. *The Clean Power Plan: Focus on Implementation and Compliance*. Published by The Brattle Group, Inc. January 2016.

Newell, Samuel A., Kathleen Spees, and Roger Lueken. *Enhancing the Efficiency of Resource Adequacy Planning and Procurements in the Midcontinent ISO Footprint: Options for MISO, Utilities and States.* Prepared on behalf of NRG. November 2015.

Brown, Toby, Samuel A. Newell, David Luke Oates, and Kathleen Spees. *International Review of*

Demand Response Mechanisms. Prepared for the Australian Energy Market Commission. October 2015.

Spees, Kathleen, Judy Chang, Johannes P. Pfeifenberger, Matthew K. Davis, Ioanna Karkatsouli, James Mashal, and Lauren Regan. *The Value of Distributed Electricity Storage in Texas – Proposed Policy for Enabling Grid-Integrated Storage Investments*. Prepared on behalf of Oncor. March 2015.

Spees, Kathleen and Samuel A. Newell. *Resource Adequacy in Western Australia: Alternatives to the Reserve Capacity Mechanism.* Prepared on behalf of EnerNOC. August 2014.

Faruqui, Ahmad, Sanem Sergici, and Kathleen Spees. *Quantifying the Amount and Economic Impacts of Missing Energy Efficiency in PJM's Load Forecast.* Prepared on behalf of the Sustainable FERC Project. September 2014.

Graves, Frank, and Kathleen Spees. "How will the EPA's Clean Power Plan Impact Renewables?" *North American Windpower.* July 2014.

Celebi, Metin, Kathleen Spees, J. Michael Hagerty, Samuel A. Newell, Dean Murphy, Marc Chupka, Jürgen Weiss, Judy Chang, and Ira Shavel. "EPA's Proposed Clean Power Plan: Implications for States and the Electricity Industry," Policy Brief. June 2014.

Pfeifenberger, Johannes P., Samuel A. Newell, Kathleen Spees, Ann Murray, and Ioanna Karkatsouli. *Third Triennial Review of PJM's Variable Resource Requirement Curve.* May 15, 2014.

Newell, Samuel A., Michael Hagerty, Kathleen Spees, Johannes P. Pfeifenberger, Quincy Liao, Christopher D. Ungate, and John Wroble. *Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM.* May 15, 2014.

Newell, Samuel A., Johannes P. Pfeifenberger, and Kathleen Spees. *Estimating the Economically Optimal Reserve Margin in ERCOT.* Prepared for the Public Utility Commission of Texas and the Electric Reliability Council of Texas. January 31, 2014.

Newell, Samuel A., and Kathleen Spees. *Developing a Market Vision for MISO: Supporting a Reliable and Efficient Electricity System in the Midcontinent.* January 27, 2014.

Spees, Kathleen, Samuel A. Newell, and Johannes Pfeifenberger. "Capacity Markets: Lessons Learned from the First Decade," published in *Economics of Energy & Environmental Policy.* Vol. 2, No. 2. September 2013.

Pfeifenberger, Johannes, Kathleen Spees, Kevin Carden, and Nick Wintermantel. *Resource Adequacy Requirements: Reliability and Economic Implications.* Prepared for the Federal Energy Regulatory Commission. September 2013.

Pfeifenberger, Johannes P., Kathleen Spees, and Michael DeLucia. *Evaluation of Market Fundamentals and Challenges to Long-Term System Adequacy in Alberta's Electricity Market: 2013 Update*, prepared for the Alberta Electric System Operator. March 2013.

Pfeifenberger, Johannes P., Kathleen Spees, and Samuel A. Newell. *Resource Adequacy in*

California: Options for Improving Efficiency and Effectiveness. Prepared for Calpine. October 2012.

Newell, Samuel A., Kathleen Spees, Johannes P. Pfeifenberger, Robert S. Mudge, Michael DeLucia, and Robert Carlton. *ERCOT Investment Incentives and Resource Adequacy*. Prepared for the Electric Reliability Council of Texas. June 1, 2012.

Celebi, Metin, Kathleen Spees, Quincy Liao, and Steve Eisenhart. *Supply Chain and Outage Analysis of MISO Coal Retrofits for MATS*. Prepared for the Midcontinent Independent System Operator.

Pfeifenberger, Johannes, Kathleen Spees, Attila Hajos, Delphine Hou, and Dan Harris. *Alberta's Intertie Challenges: A Survey of Market Design Options for Seams Between Power Markets*. Prepared for the Alberta Electric System Operator.

Pfeifenberger, Johannes P., Samuel A. Newell, Kathleen Spees, Attila Hajos, and Kamen Madjarov. *Second Performance Assessment of PJM's Reliability Pricing Model*. Prepared for PJM Interconnection. August 26, 2011.

Spees, Kathleen, Samuel A. Newell, Johannes P. Pfeifenberger, Robert Carlton, and Bin Zhou. *Cost of New Entry Estimates for Combustion Turbine and Combined-Cycle Plants in PJM.* Prepared for PJM Interconnection. August 24, 2011.

Pfeifenberger, Johannes P., and Kathleen Spees. *Evaluation of Market Fundamentals and Challenges to Long-Term System Adequacy in Alberta's Electricity Market*. Prepared for the Alberta Electric System Operator. April 2011.

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Pfeifenberger, Johannes P., Kathleen Spees, and Adam C. Schumacher. *A Comparison of PJM's RPM with Alternative Energy and Capacity Market Designs*. Prepared for PJM Interconnection. September 2009.

Spees, Kathleen. "Meeting Electric Peak on the Demand Side: Wholesale and Retail Market Impacts of Real-Time Pricing and Peak Load Management Policy," PhD Thesis, Carnegie Mellon University.

Spees, Kathleen with Lester Lave, Jay Apt, and M. Granger Morgan. "Policy Brief on the Smart Metering, Peak Load Reduction, and Efficiency Provisions of House Bills 2200 and 2201," June 13, 2008.

Technology: Enabling the Transformation of Power Distribution. Prepared by the Center for the Study of Science, Technology, & Policy (Contributions from Kathleen Spees), and Infosys for the Ministry of Power of India.

Spees, Kathleen. "Real-Time Pricing as an Effective Substitute for Electric Generation Capacity: How Innovative Retail Electric Services Can Benefit the Grid," *Network Industries Quarterly*. Spring 2007.

Spees, Kathleen, and Lester Lave. "Do RTOs Promote Renewables? A Study of State-Level Data over Time." Working Paper CEIC-07-14.

Spees, Kathleen, and Lester Lave. "Impacts of Responsive Load in PJM: Load Shifting and Real Time Pricing." 2007. *The Energy Journal*. Vol. 29, No. 2. 2008.

Spees, Kathleen, and Lester Lave. "Demand Response and Electricity Market Efficiency." *The Electricity Journal*. Volume 20, Issue 3, April 2007.

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Fowler, Kimberly, Amy Solana, and Kathleen Spees. *Building Cost and Performance Metrics: Data Collection Protocol, Revision 1.1*. Prepared by Pacific Northwest National Laboratory for the Federal Energy Management Program, September 2005.

B. TESTIMONY

Newell, Samuel A., Kathleen Spees, and David Luke Oates. Response on Behalf of Midcontinent Independent System Operator (MISO) regarding the Competitive Retail Solution. Docket No. ER17-284-000. January 13, 2017.

Newell, Samuel A., Kathleen Spees, and David Luke Oates. Testimony on Behalf of Midcontinent Independent System Operator (MISO) regarding the Competitive Retail Solution. Docket No. ER17-284-000. November 1, 2016.

Chang, Judy, Kathleen Spees, and David Luke Oates, Comments on the Clean Power Plan Federal Implementation Plan Proposal Sponsored by Wolverine Power Supply Cooperative, Inc. Before the Environmental Protection Agency, Docket No. EPA-HQ-OAR-2015-0199. January 21, 2016.

Newell, Samuel A. and Kathleen Spees. Affidavit on Behalf of PJM Interconnection, LLC Regarding Variable Resource Requirement Curve, for Use in PJM's Capacity Market, Before the Federal Energy Regulatory Commission, Docket ER14-2940-000. November 5, 2014.

Newell, Samuel A. and Kathleen Spees. Affidavit on Behalf of PJM Interconnection, LLC Regarding Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters, Before the Federal Energy Regulatory Commission, Docket ER14-2940-000. September 25, 2014.

Newell, Samuel A. and Kathleen Spees. Testimony on Behalf of ISO New England Inc. Regarding a Forward Capacity Market Demand Curve. Before the Federal Energy Regulatory Commission, Docket No. ER14-1639-000. April 1, 2014.

Newell, Samuel A. and Kathleen Spees. Response on Behalf of PJM Interconnection, LLC, Regarding the Cost of New Entry Estimates for Delivery Year 2015/16 in PJM's Reliability Pricing Model. Before the Federal Energy Regulatory Commission. Docket No. ER12-13-000. January 13, 2012.

Newell, Samuel, Kathleen Spees, and Philip Q. Hanser. Supplemental Comments, Re: Notice of

Proposed Rulemaking regarding Demand Response Compensation in Organized Wholesale Energy Markets. Before the Federal Energy Regulatory Commission. October 4, 2010. Docket Nos. RM10-17-000 and EL09-68-00.

Pfeifenberger, Johannes P. and Kathleen Spees. Comments In the Matter of the Reliability Pricing Model and the 2013/2014 Delivery Year Base Residual Auction Results. Before the State of Maryland Public Service Commission. Administrative Docket PC22. Filed October 1, 2010.

Newell, Samuel, Kathleen Spees, and Philip Q. Hanser. Comments, Re: Notice of Proposed Rulemaking regarding Demand Response Compensation in Organized Wholesale Energy Markets. Before the Federal Energy Regulatory Commission. May 13, 2010. Docket Nos. RM10-17-000 and EL09-68-00.

C. PRESENTATIONS

Spees, Kathleen and Matthew Witkin. "Market Design for a Clean Grid: Unlocking the Potential for Non-Emitting and Emerging Technologies," Presented to IESO Non-Emitting Resource Subcommittee. January 22, 2018.

Spees, Kathleen, Judy Chang, and David Luke Oates. "A Dynamic Clean Energy Market in New England," November 2017. Prepared for Conservation Law Foundation, Brookfield Renewable, NextEra Energy Resources, and National Grid.

Judy Chang, Kathleen Spees, and Johannes P. Pfeifenberger. "Hello World: Alberta's Capacity Market." Presented at the 2018 IPPSA Conference. November 2017.

Spees, Kathleen. "Decarbonisation and Tomorrow's Electricity Market," Presented at the 2017 IESO Stakeholder Summit. June 12, 2017.

Spees, Kathleen, Johannes P. Pfeifenberger, Judy Chang, Yingxia Yang, Rebecca Carroll, Roger Lueken, and Colin McIntyre. "Flexibility Enhancements: Alberta Needs and Experience from Other Jurisdictions," Prepared for the Alberta Electricity System Operator," August 10, 2017.

Spees, Kathleen. "Rethinking Capacity Mechanisms in the Context of Emerging Flexibility Challenges," Presented at the European Capacity Mechanisms Forum. February 3, 2017.

Spees, Kathleen. "CO_2e Cap-and-Trade: Interactions with Electricity Markets," Presented to the Associated of Power Producers of Ontario. November 15, 2016.

Spees, Kathleen, Samuel A. Newell, and Judy Chang. "Using Competitive Markets to Achieve Policy Objectives: How the Systems Built for Fossil Plants Can Evolve to Support the Clean, Distributed Grid of the Future." Presented at the Energy Bar Association 2017 Annual Meeting & Conference. March 29, 2017.

Chang, Judy, Kathleen Spees, and Pearl Donohoo-Vallett. "Enabling Canadian Imports for Advancing Clean Energy Strategies for the U.S.: Considerations for Policymakers," Presented at the Embassy of Canada and Canadian Electricity Association's Half-day Conference. October 24, 2016.

Spees, Kathleen, Samuel A. Newell, David Luke Oates and James Mashal. "Clean Power Plan in

Texas: Implications for Renewables and the Electricity Market," Presented at the 2016 Renewable Energy Law Conference. February 9, 2016.

Pfeifenberger, Johannes P., Judy Chang, Kathleen Spees, and Matthew K. Davis. "Impacts of Distributed Storage on Electricity Markets, Utility Operations, and Customers," 2015 MIT Energy Initiative Associate Member Symposium. May 1, 2015.

Chang, Judy, Johannes P. Pfeifenberger, Kathleen Spees, and Matthew K. Davis. "The Value of Distributed Electrical Energy Storage in Texas: Proposed Policy for Enabling Grid-Integrated Storage Investments," Energy Storage Policy Forum 2015, Washington, D.C. January 29, 2015.

Spees, Kathleen. "EPA's Clean Power Plan: Potential Impacts on Asset Values," Infocast 7th Annual Projects & Money Summit 2015. January 13, 2015.

Chang, Judy, Johannes P. Pfeifenberger, Kathleen Spees, and Matthew K. Davis. "The Value of Distributed Electrical Energy Storage in Texas: Proposed Policy for Enabling Grid-Integrated Storage Investments," UBS Investment Research Webinar. December 5, 2014.

Spees, Kathleen and Judy Chang. "Evaluating Cooperation Opportunities under CAA 111(d)," Presented to the Eastern Interconnection States' Planning Council. October 2, 2015.

Spees, Kathleen. "Implications of EPA's Clean Power Plan under Clean Air Act Section 111(d)," Presented to the Department of Engineering and Public Policy at Carnegie Mellon University. September 18, 2015.

Spees, Kathleen, Samuel A. Newell, and Johannes P. Pfeifenberger. "ERCOT's Optimal Reserve Margin: As Estimated for the Public Utility Commission of Texas and the Electric Reliability Council of Texas," presented to the 2014 Texas Industrial Energy Consumers Annual Meeting. July 15, 2014.

Pfeifenberger, Johannes P., Samuel A. Newell, and Kathleen Spees. "Energy and Capacity Markets: Tradeoffs in Reliability, Costs, and Risks," presented at the Harvard Electricity Policy Group Seventy-Fourth Plenary Session. February 27, 2014.

Spees, Kathleen, Johannes P. Pfeifenberger, and Samuel A. Newell. "ERCOT's Optimal Reserve Margin," presented to UBS Investment Research investor conference call. February 19, 2014.

Spees, Kathleen. "Capacity Markets: Lessons Learned from the First Decade," presented to EUCI 10th Annual Capacity Markets Conference. November 7, 2013.

Pfeifenberger, Johannes P, and Kathleen Spees. "Characteristics of Successful Capacity Markets," presented at the APEx Conference 2013, New York. NY. October 31, 2013.

Spees, Kathleen and Johannes Pfeifenberger. "Outlook on Fundamentals in PJM's Energy and Capacity Markets," presented at the 12th Annual Power and Utility Conference, Hosted by Goldman Sachs. August 8, 2013.

Newell, Samuel A., and Kathleen Spees. "Get Ready for Much Spikier Energy Prices: The Under-Appreciated Market Impacts of Displacing Generation with Demand Response," presented at the Cadwalader Energy Investor Conference. February 7, 2013.

Washington, DC +1.202.419.3390 Kathleen.Spees@brattle.com

Spees, Kathleen and Johannes P. Pfeifenberger. "PJM Reliability Pricing Model: 2016/17 Planning Period Parameters Update," presented to Barclays North American Utilities Investor Call. February 4, 2013.

Spees, Kathleen and Johannes P. Pfeifenberger. "Seams Inefficiencies: Problems and Solutions at Energy Market Borders," presented at the EUCI Canadian Transmission Summit. July 17, 2012.

Spees, Kathleen. "New U.S. Emission Regulations: Electric Industry Impacts," presented at the U.S. Energy 24th Annual Energy Conference. May 11, 2012.

Spees, Kathleen. "Market Design from a Practitioner's Viewpoint: Wholesale Electric Market Design for Resource Adequacy," presented at Lawrence University Economics Colloquium. April 23, 2012.

Spees, Kathleen. "Options for Extending Forward certainty in Capacity Markets." Presented at the EUCI Conference on Capacity Markets: Achieving Market Price Equilibrium. November 9, 2011.

Spees, Kathleen, and Pfeifenberger, Johannes P. "Resource Adequacy: Current Issues in North American Power Markets." Presented at the Alberta Power Summit. November 19, 2011.

Spees, Kathleen and Samuel Newell. "Capacity Market Designs: Focus on CAISO, NYISO, PJM, and ISO-NE," Presented to the Midwest ISO Supply Adequacy Working Group. July 19, 2010.

Pfeifenberger, Johannes P., and Kathleen Spees. "Best Practices in Resource Adequacy," presented at the PJM Long Term Capacity Issues Symposium. January 27, 2010.

Chang, Judy, Kathleen Spees, and Jurgen Weiss. "Using Storage to Capture Renewables: Does Size Matter?" working paper presented at the 15th Annual POWER Research Conference. University of California Energy Institute's Center for the Study of Energy Markets. March 18, 2010.

Exhibit A.2: Curriculum Vitae of Dr. Samuel A. Newell

SAMUEL A. NEWELL

Principal

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Dr. Samuel Newell leads The Brattle Group's Electricity Practice. He has 22 years of experience supporting clients in wholesale market design, generation asset valuation, resource planning, and transmission planning. Much of his work addresses the industry's transition to clean energy. He frequently provides testimony and expert reports to Independent System Operators (ISOs), the Federal Energy Regulatory Commission (FERC), state regulatory commissions, and the American Arbitration Association.

Dr. Newell earned a Ph.D. in Technology Management & Policy from the Massachusetts Institute of Technology, an M.S. in Materials Science & Engineering from Stanford University, and a B.A. in Chemistry & Physics from Harvard College.

Prior to joining The Brattle Group in 2004, Dr. Newell was the Director of the Transmission Service at Cambridge Energy Research Associates. Before that, he was a Manager at A.T. Kearney.

AREAS OF EXPERTISE

- Transmission Planning and Modeling
- Electricity Market Design and Analysis
- Generation and Storage Asset Valuation, and Procurements
- Integrated Resource Planning
- Demand Response (DR) Resource Potential and Market Impact
- Gas-Electric Coordination
- RTO Participation and Configuration
- Energy Litigation
- Tariff and Rate Design
- Business Strategy

EXPERIENCE

Transmission Planning and Modeling

- Economic and Environmental Evaluation of New Transmission to Quebec. For the New Hampshire Attorney General's Office in a proceeding before the state Site Evaluation Committee, co-sponsored testimony on the benefits of the proposed Northern Pass Transmission line. Responded to the applicant's analysis and developed our own, focusing on wholesale market participation, price impacts, and net emissions savings.
- Benefit-Cost Analysis of New York AC Transmission Upgrades. For the New York Department of Public Service (DPS) and NYISO, led a team to evaluate 21 alternative projects to increase transfer capability between Upstate and Southeast NY. Quantified a broad scope of benefits: traditional production cost savings from reduced congestion, using GE-MAPS; additional production cost savings considering non-normal conditions; resource cost savings from being able to retire Downstate capacity, delay new entry, and

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shift the location of future entry Upstate; avoided costs from replacing aging transmission that would have to be refurbished soon; reduced costs of integrating renewable resources Upstate; and tax receipts. Identified projects with greatest and most robust net value. DPS used our analysis to inform its recommendation to the NY Public Service Commission to declare a "Public Policy Need" to build a project such as the best ones identified.

- Evaluation of New York Transmission Projects. For the New York Department of Public Service (DPS), provided a cost-benefit analysis for the "TOTS" transmission projects. Showed net production cost and capacity resource cost savings exceeding the project costs, and the lines were approved. The work involved running GE-MAPS and a capacity market model, and providing insights to DPS staff.
- Benefits of New 765kV Transmission Line. For a utility joint venture between AEP and ComEd, analyzed renewable integration and congestion relief benefits of their proposed $1.2 billion RITELine project in western PJM. Guided client staff to conduct simulations using PROMOD. Submitted testimony to FERC.
- Benefit-Cost Analysis of a Transmission Project for Offshore Wind. Submitted testimony on the economic benefits of the Atlantic Wind Connection Project, a proposed 2,000 MW DC offshore backbone from New Jersey to Virginia with 7 onshore landing points. Described and quantified the effects on congestion, capacity markets, CO2 emissions, system reliability and operations, jobs and economic stimulus, and the installed cost of offshore wind generation. Directed Ventyx staff to simulate the energy market impacts using the PROMOD model.
- Analysis of Transmission Congestion and Benefits. Analyzed the impacts on transmission congestion, and customer benefits in California and Arizona of a proposed inter-state transmission line. Used the DAYZER model to simulate congestion and power market conditions in the Western Electricity Coordination Council region in 2013 and 2020 considering increased renewable generation requirements and likely changes to market fundamentals.
- Benefit-Cost Analysis of New Transmission. For a transmission developer's application before the California Public Utility Commission (CPUC) to build a new 500 kV line, analyzed the benefits to ratepayers. Analysis included benefits beyond those captured in a production cost model, including the benefits of integrating a pumped storage facility that would allow the system to accommodate a larger amount of intermittent renewable resources at a reduced cost.
- Benefit-Cost Analysis of New Transmission in the Midwest. For the American Transmission Company (ATC), supported Brattle witness evaluating the benefits of a proposed new 345 kV line (Paddock-Rockdale). Advised client on its use of PROMOD IV simulations to quantify energy benefits, and developed metrics to properly account for the effects of changes in congestion, losses, FTR revenues, and LMPs on customer

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costs. Developed and applied new methodologies for analyzing benefits not quantified in PROMOD IV, including competitiveness, long-run resource cost advantages, reliability, and emissions. Testimony was submitted to the Public Service Commission of Wisconsin, which approved the line.

- Transmission Investments and Congestion. Worked with executives and board of an independent transmission company to develop a metric indicating congestion-related benefits provided by its transmission investments and operations.
- Analysis of Transmission Constraints and Solutions. For a large, geographically diverse group of clients, performed an in-depth study identifying the major transmission bottlenecks in the Western and Eastern Interconnections, and evaluating potential solutions to the bottlenecks. Worked with transmission engineers from multiple organizations to refine the data in a load flow model and a security-constrained, unit commitment and dispatch model for each interconnection. Ran 12-year, LMP-based market simulations using GE-MAPS across multiple scenarios and quantified congestion costs on major constraints. Collaborated with engineers to design potential transmission (and generation) solutions. Evaluated the benefits and costs of candidate solutions and identified several highly economic major transmission projects.
- Merchant Transmission Impacts. For a merchant transmission company, used GE-MAPS to analyze the effects of the Cross Sound Cable on energy prices in Connecticut and Long Island.
- Security-Constrained Unit Commitment and Dispatch Model Calibration. For a Midwestern utility, calibrated their PROMOD IV model, focusing on LMPs, unit commitment, flows, and transmission constraints. Helped client to understand their model's shortcomings and identify improvement opportunities. Also assisted with initial assessments of FTRs in preparation for its submission of nominations in MISO's first allocation of FTRs.
- Model Evaluation. Led an internal Brattle evaluation of commercially available transmission and market simulation models. Interviewed vendors and users of PROMOD IV, Gridview, DAYZER, and other models. Intensively tested each model. Evaluated accuracy of model algorithms (e.g., LMP, losses, unit commitment) and ability to calibrate models with backcasts using actual RTO data.

Electricity Market Design and Analysis

- MISO Resource Adequacy Framework for a Transforming Fleet. Currently advising MISO in its Resource Availability and Need initiative to reform its resource adequacy framework to address year-round shortage risks as the fleet transforms. Presenting to stakeholders on resource accreditation, determination of LSE requirements, modifications to the Planning Reserve Auction, and interactions with outage scheduling and with energy and ancillary services markets.

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- Singapore Capacity Market Development. For the Energy Market Authority (EMA) in Singapore, developing a complete forward capacity market design. Worked with EMA in collaboration with other government entities and stakeholders. Published high-level design documents and presented to stakeholders. Currently assisting with detailed design and implementation.
- Electricity Market Transformation Study. For NYISO, led a team to conduct simulation analyses of how prices for energy, ancillary services, capacity, and RECs may have to evolve to support adequate generation/storage investment to maintain reliability and meet the state's mandates for 70% renewable electricity by 2030 and 100% carbon-free electricity by 2040. Used an advanced Brattle-developed capacity expansion model, GridSIM, to model investment and chronological operation with large amounts of intermittent and storage resources, subject to reliability and environmental constraints, under a range of assumptions regarding market design and carbon pricing. Results and insights informed NYISO's 2019 Grid in Transition whitepaper, and subsequent scenario analyses are providing a foundation for NYISO's examination of reliability and market design enhancements.
- New York State Resource Adequacy Constructs. For NYSERDA, evaluating the customer cost impacts of several alternative constructs that differ in whether FERC or the state sets the rules and how buyer-side mitigationf is implemented.
- IESO's Market Renewal Program / Energy Market Settlements. For the Ontario Independent Electricity System Operator (IESO), helped develop settlement equations for the new day-ahead and real-time nodal market, including make-whole payments for natural gas-fired combined-cycle plants participating as "pseudo-units" and for cascading hydro systems.
- PJM's Capacity Market Reviews and Parameters. For PJM, conducted all four official reviews of its Reliability Pricing Model (2008, 2011, 2014, and 2018). Analyzed capacity auctions and interviewed stakeholders. Evaluated the demand curve shape, the Cost of New Entry (CONE) parameter, and the methodology for estimating net energy and ancillary services revenues. Recommended improvements to support participation and competition, to avoid excessive price volatility, and to safeguard future reliability performance. In 2020, provided Avoidable Cost Rates for existing resources and Net CONE for new energy efficiency resources, for use in the Minimum Offer Price Rule. Submitted testimonies before FERC.
- Seasonal Capacity in PJM. On behalf of the Natural Resources Defense Council, analyzed the ability of PJM's capacity market to efficiently accommodate seasonal capacity resources and meet seasonal resource adequacy needs. Co-authored a whitepaper proposing a co-optimized two-season auction and estimating the efficiency benefits. Filed and presented report at FERC.

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- Energy Price Formation in PJM. For NextEra Energy, analyzed PJM's integer relaxation proposal and evaluated implications for day-ahead and real-time market prices. Reviewed PJM's Fast-Start pricing proposal and authored report recommending improvements, which NextEra and other parties filed with FERC, and which FERC largely accepted and cited in its April 2019 Order.
- Carbon Pricing to Harmonize NY's Wholesale Market and Environmental Goals. Led a Brattle team to help NYISO: (1) develop and evaluate market design options, including mechanisms for charging emitters and allocating revenues to customers, border adjustments to prevent leakage, and interactions with other market design and policy elements; and (2) develop a model to evaluate how carbon pricing would affect market outcomes, emissions, system costs, and customer costs under a range of assumptions. Whitepaper initiated discussions with NY DPS and stakeholders. Supported NYISO in detailed market design and stakeholder engagement.
- Market Design for Energy Security in ISO-NE. For NextEra Energy, evaluated and developed proposals for meeting winter energy security needs in New England when pipeline gas becomes scarce. Evaluated ISO-NE's proposed multi-day energy market with new day-ahead operating reserves. Developed competing proposal for new operating reserves in both day-ahead and real-time to incent preparedness for fuel shortages; also developed criteria and high-level approach for potentially incorporating energy security into the forward capacity market. Presented evaluations and proposals to the NEPOOL Markets Committee.
- ERCOT's Proposed Future Ancillary Services Design. For the Electric Reliability Council of Texas (ERCOT), evaluated the benefits of its proposal to unbundle ancillary services, enable broader participation by load resources and new technologies, and tune its procurement amounts to system conditions. Worked with ERCOT staff to assess each ancillary service and how generation, load resources, and new technologies could participate. Directed their simulation of the market using PLEXOS, and evaluated other benefits outside of the model.
- Investment Incentives and Resource Adequacy in ERCOT. For ERCOT, led a Brattle team to: (1) interview stakeholders and characterize the factors influencing generation investment decisions; (2) analyze the energy market's ability to support investment and resource adequacy at the target level; and (3) evaluate options to enhance long-term resource adequacy while maintaining market efficiency. Worked with ERCOT staff to understand the relevant aspects of their operations and market data. Performed probabilistic simulation analyses of prices, investment costs, and reliability. Conclusions informed a PUCT proceeding in which I filed comments and presented at several workshops.
- Operating Reserve Demand Curve (ORDC) in ERCOT. For ERCOT, evaluated several alternative ORDCs' effects on real-time price formation and investment incentives. Conducted backcast analyses using interval-level data provided by ERCOT and assuming

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generators rationally modify their commitment and dispatch in response to higher prices under the ORDC. Analysis was used by ERCOT and the PUCT to inform selection of final ORDC parameters.

- Economically Optimal Reserve Margins in ERCOT. For ERCOT, co-led studies (2014 and 2018) estimating the economically-optimal reserve margin, and the market equilibrium reserve margins in its energy-only market. Collaborated with ERCOT staff and Astrape Consulting to construct Monte Carlo economic and reliability simulations. Accounted for uncertainty and correlations in weather-driven load, renewable energy production, generator outages, and load forecasting errors. Incorporated intermittent wind and solar generation profiles, fossil generators' variable costs, operating reserve requirements, various types of demand response, emergency procedures, administrative shortage pricing under ERCOT's ORDC, and criteria for load-shedding. Reported economic and reliability metrics across a range of renewable penetration and other scenarios. Results informed the PUCT's adjustments to the ORDC to support desired reliability outcomes.
- Australian Electricity Market Operator (AEMO) Redesign. Advised AEMO on market design reforms for the National Electricity Market (NEM) to address concerns about operational reliability and resource adequacy as renewable generation displaces traditional resources. Also provided a report on potential auctions to ensure sufficient capabilities in the near-term.
- Response to DOE's "Grid Reliability and Resiliency Pricing" Proposal. For a broad group of stakeholders opposing the rule in a filing before FERC, evaluated DOE's proposed rule: the need (or lack thereof) for bolstering reliability and resilience by supporting resources with a 90-day fuel supply; the likely cost of the rule; and the incompatibility of DOE's proposed solution with the principles and function of competitive wholesale electricity markets.
- Energy Market Power Mitigation in Western Australia. Led a Brattle team to help Western Australia's Public Utilities Office design market power mitigation measures for its newly reformed energy market. Established objectives; interviewed stakeholders; assessed local market characteristics affecting the design; synthesized lessons learned from the existing energy market and from several international markets. Recommended criteria, screens, and mitigation measures for day-ahead and real-time energy and ancillary services markets. The Public Utilities Office posted our whitepaper in support of its conclusions.
- MISO Competitive Retail Choice Solution. For MISO, evaluated design alternatives for accommodating the differing needs of states relying on competitive retail choice and integrated resource planning. Conducted probabilistic simulations of likely market results under alternative market designs and demand curves. Provided expert support in stakeholder forums and submitted expert testimony before FERC.

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- Buyer Market Power Mitigation. On Behalf of the "Competitive Markets Coalition" group of generating companies, helped develop and evaluate proposals for improving PJM's Minimum Offer Price Rule so that it more effectively protects the capacity market from manipulation by buyers while reducing interference with non-manipulative activity. Participated in discussions with other stakeholders. Submitted testimony to FERC supporting tariff revisions that PJM filed.
- Market Development Vision for MISO. For the Midcontinent Independent System Operator (MISO), worked with MISO staff and stakeholders to codify a Market Vision as the basis for motivating and prioritizing market development initiatives over the next 2–5 years. Authored a foundational report for that Vision, including: describing the core services MISO must continue to provide to support a well-functioning market; establishing a set of principles for enhancing those services; identifying seven Focus Areas offering the greatest opportunities; and proposing criteria for prioritizing initiatives within and across Focus Areas.
- ISO-NE Capacity Demand Curve Design. For ISO New England (ISO-NE), developed a demand curve for its Forward Capacity Market. Solicited staff and stakeholder input, then established market design objectives. Provided a range of candidate curves and evaluated them against objectives, showing tradeoffs between reliability uncertainty and price volatility (using a probabilistic locational capacity market simulation model we developed). Worked with Sargent & Lundy to estimate the Net Cost of New Entry to which the demand curve prices are indexed. Submitted testimonies before FERC, which accepted the proposed curve.
- Offer Review Trigger Prices in ISO-NE. For the Internal Market Monitor in ISO-NE, developed benchmark prices for screening for uncompetitively low offers in the Forward Capacity Market. Worked with Sargent & Lundy to conduct bottom-up analyses of the costs of constructing and operating gas-fired generation technologies and onshore wind; also estimated the costs of energy efficiency and demand response. For each technology, estimated capacity payments needed to make the resource economically viable, given their costs and expected non-capacity revenues. Recommendations were filed with and accepted by the FERC.
- Western Australia Capacity Market Design. For the Public Utilities Office (PUO) of Western Australia, led a Brattle team to advise on the design and implementation of a new forward capacity market. Reviewed the high-level forward capacity market design proposed by the PUO; evaluated options for auction parameters such as the demand curve; recommended supplier-side and buyer-side market power mitigation measures; helped define administrative processes needed to conduct the auction and the governance of such processes.
- Western Australia Reserve Capacity Mechanism. For EnerNOC, evaluated Western Australia's administrative Reserve Capacity Mechanism in comparison with international capacity markets, and made recommendations for improvements to meet

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reliability objectives more cost effectively. Evaluated whether to develop an auction-based capacity market compared or an energy-only market design. Submitted report and presented recommendations to the Electricity Market Review Steering Committee and other senior government officials.

- Evaluation of Moving to a Forward Capacity Market in NYISO. For NYISO, conducted a benefit-cost analysis of replacing its prompt capacity market with a 4-year forward capacity market. Evaluated options based on stakeholder interviews and the experience of PJM and ISO-NE. Addressed risks to buyers and suppliers, market power mitigation, implementation costs, and long-run costs. Recommendations were used by NYISO and stakeholders to help decide whether to pursue a forward capacity market.
- MISO's Resource Adequacy Construct and Market Design Elements. For MISO, conducted the first major assessment of its resource adequacy construct. Identified several successes and recommended improvements in load forecasting, locational resource adequacy, and the determination of reliability targets. Incorporated extensive stakeholder input and review. Continued to consult with MISO in its work with the Supply Adequacy Working Group on design improvements, including market design elements for its annual locational capacity auctions.
- Demand Response (DR) Integration in MISO. Through a series of assignments, helped MISO incorporate DR into its energy market and resource adequacy construct, including: (1) conducted an independent assessment of MISO's progress in integrating DR into its resource adequacy, energy, and ancillary services markets. Analyzed market participation barriers; (2) wrote a whitepaper evaluating various approaches to incorporating economic DR in energy markets. Identified implementation barriers and recommended improvements to efficiently accommodate curtailment service providers; (3) helped modify MISO's tariff and business practices to accommodate DR in its resource adequacy construct by defining appropriate participation rules. Informed design by surveying the practices of other RTOs and by characterizing the DR resources within the MISO footprint.
- Survey of Demand Response Provision of Energy, Ancillary Services, and Capacity. For the Australian Energy Market Commission (AEMC), co-authored a report on market designs and participation patterns in several international markets. AEMC used the findings to inform its integration of DR into its National Energy Market.
- Integration of DR into ISO-NE's Energy Markets. For ISO-NE, provided analysis and assisted with a stakeholder process to develop economic DR programs to replace the ISO's initial economic DR programs when they expired.
- Compensation Options for DR in ISO-NE's Energy Market. For ISO-NE, analyzed the implications of various DR compensation options on consumption patterns, LMPs, capacity prices, consumer surplus, producer surplus, and economic efficiency. Presented findings in a whitepaper that ISO-NE submitted to FERC.

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- ISO-NE Forward Capacity Market (FCM) Performance. With ISO-NE's internal market monitor, reviewed the performance of the first two forward auctions. Evaluated key design elements regarding demand response participation, capacity zone definition and price formation, an alternative pricing rule for mitigating the effects of buyer market power, the use of the Cost of New Entry in auction parameters, and whether to have an auction price ceiling and floor.
- Evaluation of Tie-Benefits. For ISO-NE, analyzed the implications of different levels of tie-benefits (i.e., assistance from neighbors, reducing installed capacity requirements) for capacity costs and prices, emergency procurement costs, and energy prices. Whitepaper submitted by ISO-NE to the FERC.
- Evaluation of Major Initiatives. With ISO-NE and its stakeholders, developed criteria for identifying "major" market and planning initiatives that trigger the need for the ISO to provide qualitative and quantitative information to help stakeholders evaluate the initiative, as required in ISO-NE's tariff. Developed guidelines on the kinds of information ISO-NE should provide for major initiatives.
- Energy Market Monitoring & Market Power Mitigation. For PJM, co-authored a whitepaper, "Review of PJM's Market Power Mitigation Practices in Comparison to Other Organized Electricity Markets."
- Vertical Market Power. Before the NYPSC, examined whether the merger between National Grid and KeySpan could create incentives to exercise vertical market power. Employed a simulation-based approach using the DAYZER model of the NYISO wholesale power market and examined whether outages of National Grid's transmission assets significantly affected KeySpan's generation profits.
- LMP Impacts on Contracts. For a West Coast client, reviewed the California ISO's proposed implementation of locational marginal pricing (LMP) in 2007 and analyzed implications for "seller's choice" supply contracts. Estimated congestion costs ratepayers would face if suppliers financially delivered power to the lowest priced nodes; estimated incremental contract costs using a third party's GE-MAPS market simulations (and helped to improve their model inputs to more accurately reflect the transmission system in California). Applied findings to support the ISO in design modifications of the California market under LMP.
- RTO Accommodation of Retail Access. For MISO, identified business practice improvements to facilitate retail access. Analyzed retail access programs in IL, MI, and OH. Studied retail accommodation practices in other RTOs, focusing on how they modified their procedures surrounding transmission access, qualification of capacity resources, capacity markets, FTR allocations, and settlement.

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Generation and Storage Asset Valuation, and Procurements

- Evaluation of Hydropower Procurement Options. For a potential buyer of new transmission and hydropower from Quebec, evaluated the costs and emissions benefits under a range of contracting approaches. Accounted for the possibility of resource shuffling and backfill of emissions. Considered the value of storage services.
- Valuation of a Gas-Fired Combined-Cycle Plant in New England. For a party to litigation, submitted testimony on the fair market value of the plant. Simulated energy and capacity markets to forecast net revenues, and estimated exposure to capacity performance penalties. Compared the valuation to the transaction prices of similar plants and analyzed the differences. Collaborated with a co-testifying export on project finance to assess whether the estimated value would suffice to cover the plant's debt and certain other obligations.
- Valuation of a Portfolio of Combined-Cycle Plants across the U.S. For a debt holder in a portfolio of plants, estimated the fair market value of each plant in 2018 and the plausible range of values five years hence. Reviewed comparables. Analyzed electricity markets in New England, New York, Texas, Arizona, and California using our own models and reference points from futures markets and publicly available studies. Performed probability-weighted discounted cash flow valuation analyses across a range of scenarios. Provided insights into market and regulatory drivers and how they may evolve.
- Wholesale Market Value of Storage in PJM. For a potential investor in battery storage, estimated the energy, ancillary services, and capacity market revenues their technology could earn in PJM. Reviewed PJM's market participation rules for storage. Forecast capacity market revenues and the risk of performance penalties. Developed a real-time energy and ancillary service bidding algorithm that the asset owner could employ to nearly optimize its operations, given expected prices and operating constraints. Identified changes in real-time bid/offer rules that PJM could implement to improve the efficiency of market participation by storage resources.
- Valuation of a Generation Portfolio in ERCOT. For the owners of a portfolios of gas-fired assets (including a cogen plant), estimated the market value of their assets by modeling future cash flows from energy and ancillary services markets over a range of plausible scenarios. Analyzed the effects load growth, entry, retirements, environmental regulations, and gas prices could have on energy prices, including scarcity prices under ERCOT's Operating Reserve Demand Curve. Evaluated how future changes in these drivers could cause the value to shift over time.
- Valuation Methodology for a Coal Plant Transaction in PJM. For a part owner of a very large coal plant being transferred at an assessed value that was yet to be determined by a third party, wrote a manual describing how to conduct a market valuation of the plant. Addressed drivers of energy and capacity value; worked with an engineering

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subcontractor to describe how to determine the remaining life of the plant and CapEx needs going forward. Our manual was used to inform their pre-assessment negotiation strategy.

- Valuation of a Coal Plant in PJM. For the lender to a bidder on a coal plant being auctioned, estimated the market value of the plant. Valuation analysis focused especially on the effects of coal and gas prices on cash flows, and the ongoing fixed O&M costs and CapEx needs of the plant.
- Valuation of a Coal Plant in New England. For a utility, evaluated a coal plant's economic viability and market value. Projected market revenues, operating costs, and capital investments needed to comply with future environmental mandates.
- Valuation of Generation Assets in New England. To inform several potential buyers' valuations of various assets being sold in ISO-NE, provided energy and capacity price forecasts and cash flows under multiple scenarios. Explained the market rules and fundamentals to assess key risks to cash flows.
- Valuation of Generation Asset Bundle in New England. For the lender to the potential buyer of generation assets, provided long-term energy and capacity price forecasts, with multiple scenarios to test whether the plant could be worth less than the debt. Reviewed a broad scope of documents available in the "data room" to identify market, operational, and fuel supply risks.
- Valuation of Generation Asset Bundle in PJM. For a potential buyer, provided energy and capacity price forecasts and reviewed their valuation analysis. Analyzed supply and demand fundamentals of the PJM capacity market. Performed locational market simulations using the DAYZER model to project nodal prices as market fundamentals evolve. Reviewed the client's spark spread options model.
- Wind Power Development. For a developer proposing to build a several hundred megawatt wind farm in Michigan, provided a revenue forecast for energy and capacity. Evaluated the implications of several scenarios around key uncertainties.
- Wind Power Financial Modeling. For an offshore wind developer proposing to build a 350 MW project in PJM off the coast of New Jersey, analyzed market prices for energy, renewable energy certificates, and capacity. Provided a detailed financial model of project funding and cash distributions to various types of investors (including production tax credit). Resulting financial statements were used in an application to the state of New Jersey for project grants.
- Contract Review for Cogeneration Plant. For the owner of a large cogen plant in PJM, analyzed revenues under the terms of a long-term PPA (in renegotiation) vs. potential merchant revenues. Accounted for multiple operating modes of the plant and its sales of energy, capacity, ancillary services, and steam over time.

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- Generation Strategy/Valuation. For an independent power producer, acted for over two years as a key advisor on the implementation of the client's growth strategy. Led a large analytical team to assess the profitability of proposed new power plants and acquisitions of portfolios of plants throughout the U.S. Used the GE-MAPS market simulation model to forecast power prices, transmission congestion, generator dispatch, emissions costs, energy margins for candidate plants; used an ancillary model to forecast capacity value.
- Generation Asset Valuation. For multiple banks and energy companies, provided valuations of financially distressed generating assets. Used GE-MAPS to simulate net energy revenues; a capacity model to estimate capacity revenues; and a financial valuation model to value several natural gas, coal, and nuclear power plants across a range of scenarios. Identified key uncertainties and risks.

Integrated Resource Planning (IRP)

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- Resource Planning in Hawaii. Assisted the Hawaiian Electric Companies in developing its Power Supply Improvement Plan, filed April 2016. Our work addressed how to maintain system security as renewable penetration increases toward 100% and displaces traditional synchronous generation. Solutions involved defining technology-neutral requirements that may be met by demand response, distributed resources, and new technologies as well as traditional resources.
- IRP in Connecticut (for the 2008, 2009, 2010, 2012, and 2014 Plans). For the two major utilities in CT and the CT Dept. of Energy and Environmental Protection (DEEP), led the analysis for five successive integrated resource plans. Plans involved projecting 10-year Base Case outlooks for resource adequacy, customer costs, emissions, and RPS compliance; developing alternative market scenarios; and evaluating resource procurement strategies focused on energy efficiency, renewables, and traditional sources. Used an integrated modeling system that simulated the New England locational energy market (with the DAYZER model), the Forward Capacity Market, REC markets, and suppliers' likely investment/retirement decisions. Addressed electricity supply risks, natural gas supply into New England, RPS standards, environmental regulations, transmission planning, emerging technologies, and energy security. Solicited input from stakeholders. Provided oral testimony before the DEEP.
- Contingency Plan for Indian Point Nuclear Retirement. For the New York Department of Public Service (DPS), assisted in developing contingency plans for maintaining reliability if the Indian Point nuclear plant were to retire. Evaluated generation and transmission proposals along three dimensions: their reliability contribution, viability for completion by 2016, and the net present value of costs. The work involved partnering with engineering sub-contractors, running GE-MAPS and a capacity market model, and providing insights to DPS staff.

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- Analysis of Potential Retirements to Inform Transmission Planning. For a large utility in Eastern PJM, analyzed the potential economic retirement of each coal unit in PJM under a range of scenarios regarding climate legislation, legislation requiring mercury controls, and various capacity price trajectories.
- Resource Planning in Wisconsin. For a utility considering constructing new capacity, demonstrated the need to consider locational marginal pricing, gas price uncertainty, and potential CO2 liabilities. Guided client to look beyond building a large coal plant. Led them to mitigate exposures, preserve options, and achieve nearly the lowest expected cost by pursuing a series of smaller projects, including a promising cogeneration application at a location with persistently high LMPs. Conducted interviews and facilitated discussions with senior executives to help the client gain support internally and begin to prepare for regulatory communications.

Demand Response (DR) Resource Potential and Market Impact

- ERCOT DR Potential Study. For ERCOT, estimated the market size for DR by end-user segment based on interviews with curtailment service providers and utilities and informed by penetration levels achieved in other regions. Presented findings to the Public Utility Commission of Texas at a workshop on resource adequacy.
- DR Potential Study. For an Eastern ISO, analyzed the biggest, most cost-effective opportunities for DR and price responsive demand in the footprint, and what the ISO could do to facilitate them. For each segment of the market, identified the ISO and/or state and utility initiatives that would be needed to develop various levels of capacity and energy market response. Also estimated the potential and cost characteristics for each segment. Interviewed numerous curtailment service providers and ISO personnel.
- Wholesale Market Impacts of Price-Responsive Demand (PRD). For NYISO, evaluated the potential effects of widespread implementation of dynamic retail rates. Utilized the PRISM model to estimate effects on consumption by customer class, applied empirically-based elasticities to hourly differences between flat retail rates and projected dynamic retail rates. Utilized the DAYZER model to estimate the effects of load changes on energy costs and prices.
- Energy Market Impacts of DR. For PJM and the Mid-Atlantic Distributed Resources Initiative (sponsored by five state commissions), quantified the market impacts and customer benefits of DR programs. Used a simulation-based approach to quantify the impact that a three percent reduction of peak loads during the top 20 five-hour blocks would have had in 2005 and under a variety of alternative market conditions. Utilized the DAYZER market simulation model, which we calibrated to represent the PJM market using data provided by PJM and public sources. Results were presented in multiple forums and cited widely, including by several utilities in their filings with state

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commissions regarding investment in advanced metering infrastructure and implementation of DR programs.

- Value of DR Investments. For Pepco Holdings, Inc., evaluated its proposed DR-enabling investments in advanced metering infrastructure and its efficiency programs. Estimated reductions in peak load that would be realized from dynamic pricing, direct load control, and efficiency. Built on the Brattle-PJM-MADRI study to estimate short-term energy market price impacts and addressed long-run equilibrium offsetting effects through supplier response scenarios. Estimated capacity price impacts and resource cost savings over time. Submitted a whitepaper to DE, NJ, MD, and DC commissions. Presented findings to DE Commission.

Gas-Electric Coordination

- Gas Pipeline Investment for Electricity. For the Maine Office of Public Advocate, co-sponsored testimony regarding the reliability and economic impacts if the Maine PUC signed long-term contracts for electricity customers to pay for new gas pipeline capacity into New England. Analyzed other experts' reports and provided a framework for evaluating whether such procurements would be in the public interest, considering their costs and benefits vs. alternatives.
- Gas Pipeline Investment for Electricity. For the Massachusetts Attorney General's office, provided input for their comments in the Massachusetts Department of Public Utilities' docket investigating whether and how new natural gas delivery capacity should be added to the New England market.
- Fuel Adequacy and Other Winter Reliability Challenges. For an ISO, co-authored a report assessing the risks of winter reliability events due to inadequate fuel, inadequate weatherization, and other factors affecting resource availability in the winter. Evaluated solutions being pursued by other ISOs. Proposed changes to resource adequacy requirements and energy market design to mitigate the risks.
- Gas-Electric Reliability Challenges in the Midcontinent. For MISO, provided a PowerPoint report assessing future gas-electric challenges as gas reliance increases. Characterized solutions from other ISOs. Provided inputs on the cost of firm pipeline gas vs. the cost and operational characteristics of dual-fuel capability.

RTO Participation and Configuration

- Market Impacts of RTO Seams. For a consortium of utilities, submitted written testimony to the FERC analyzing the financial and operational impact of the MISO-PJM seam on Michigan and Wisconsin. Evaluated economic hurdles across RTO seams and assessed the effectiveness of inter-RTO coordination efforts underway. Collaborated

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with MISO staff to leverage their PROMOD IV model to simulate electricity markets under alternative RTO configurations.

- Analysis of RTO Seams. For a Wisconsin utility in a proceeding before the FERC, assisted expert witness on (1) MISO and PJM's real-time inter-RTO coordination process, and (2) the economic benefit of implementing a full joint-and-common market. Analyzed lack of convergence between MISO's and PJM's energy prices and shadow prices on reciprocal coordinated flow gates.
- RTO Participation. For an integrated Midwest utility, advised client on alternative RTO choices. Used GE-MAPS to model the transmission system and wholesale markets under various scenarios. Presented findings to senior management. Subsequently, in support of testimonies submitted to two state commissions, quantified the benefits and costs of RTO membership on customers, considering energy costs, FTR revenues, and wheeling revenues.

Energy Litigation

- Demand Response Arbitration. Provided expert testimony on behalf of a client that had acquired a demand response company and alleged that the company had overstated its demand response capacity and technical capabilities. Analyzed discovery materials including detailed demand response data to assess the magnitude of alleged overstatements. Calculated damages primarily based on a fair market valuation of the company with and without alleged overstatements. Provided deposition, expert report, and oral testimony before the American Arbitration Association (non-public).
- Contract Damages. For the California Department of Water Resources and the California Attorney General's office, supported expert providing testimony on damages resulting from an electricity supplier's alleged breaches of a power purchase agreement. Analyzed two years of hourly data on energy deliveries, market prices, ISO charges, and invoice charges to identify and evaluate performance violations and invoice overcharges. Assisted counsel in developing the theory of the case and provided general litigation support in preparation for and during arbitration. Resulted in successful award for client.
- Contract Damages. For the same client described above, supported expert providing testimony in arbitration regarding the supplier's alleged breaches in which its scheduled deliveries were not deliverable due to transmission congestion. Quantified damages and demonstrated the predictability of congestion, which the supplier was allegedly supposed to avoid in its choice of delivery points.
- Contract Termination Payment. For an independent power producer, supported expert testimony on damages from the termination of a long-term tolling contract for a gas-fired power plant in PJM, involving power market forecasting, financial valuation techniques, and a detailed assessment of the plant's costs and operating characteristics. Prepared witness for arbitration and assisted counsel in deposing and cross-examining opposing experts. Resulted in resounding victory for client.

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Tariff and Rate Design

- Wholesale Rates. On behalf of a G&T co-op in the Western U.S., provided testimony regarding its wholesale rates, which are contested by member co-ops. Analyzed the G&T co-op's cost of service and its marginal cost of meeting customers' energy and peak demand requirements.
- Transmission Tariffs. For a merchant generating company participating in FERC hearings on developing a Long Term Transmission Pricing Structure, helped lead a coalition of stakeholders to develop a position on how to eliminate pancaked transmission rates while allowing transmission owners to continue to earn their allowed rate of return. Analyzed and presented the implications of various transmission pricing proposals on system efficiency, incentives for new investment, and customer rates throughout the MISO-PJM footprint.
- Retail Rate Riders. For a traditionally regulated Midwest utility, helped general counsel to evaluate and support legislation, and propose commission rules addressing rate riders for fuel and purchased power and the costs of complying with environmental regulations. Performed research on rate riders in other states; drafted proposed rules and tariff riders for client.
- Rate Filings. For a traditionally regulated Midwest utility, assisted counsel in preparing for a rate case. Helped draft testimonies regarding off-system sales margins and the cost of fuel.

Business Strategy

- Preparing a Gentailer for a Transformed Wholesale Market Design. Supported a gentailer in Alberta to prepare its generation and retail businesses for the implementation of a capacity market.
- Evaluation of Cogeneration Venture. For an unregulated division of a utility, evaluated a venture to build and operate cogeneration facilities. Estimated the market size and potential pricing, and assessed the client's capabilities for delivering such services. Analyzed the target customer base in detail; performed technical cost analysis for building and operating cogeneration plants; analyzed retail/default rate structures against which new cogeneration would have to compete. Senior management followed our recommendations to shut down the venture.
- Strategic Sourcing. For a large, diversified manufacturer, coordinated a cross-business unit client team to reengineer processes for procuring electricity, natural gas, and demand-side management services. Worked with executives to establish goals. Gathered data on energy usage patterns, costs, and contracts across hundreds of facilities. Interviewed energy managers, plant managers, and executives. Analyzed potential

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suppliers. Helped draft RFPs and develop negotiating strategy. Designed internal organizational structure (incorporating outsourced service providers) for managing energy procurement on an ongoing basis.

- M&A Advisory. For a European utility aiming to enter the U.S. markets and enhance its trading capability, evaluated acquisition targets. Assessed potential targets' capabilities and their value versus stock price. Reviewed experiences of acquirers in other M&A transactions. Advised client against an acquisition, just when the market was peaking (just prior to collapse).
- Marketing Strategy. For a power equipment manufacturer, identified the most attractive target customers and joint-venture candidates for plant maintenance services. Evaluated the cost structure and equipment mix of candidates using FERC data and proprietary data. Estimated the value client could bring to each customer. Worked with company president to translate findings into a marketing strategy.
- Distributed Generation (DG) Market Assessment. For the unregulated division of a major utility, performed a market assessment of DG technologies. Projected future market sizes by market segments in the U.S.
- Fuel Cells. For a European fuel cell component manufacturer, acted as a technology and electricity market advisor for a larger consulting team developing a market entry strategy in the U.S.

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TESTIMONY and REGULATORY FILINGS

Before the FERC, Docket Nos. EL19-58 and ER19-1486, "Supplemental Affidavit of Samuel A. Newell and James A. Read Jr. on Behalf of PJM Interconnection, L.L.C.," regarding the use of forward-looking data to estimate energy and ancillary services revenues for the purposes of determining capacity market parameters, September 17, 2020.

Before the FERC, Docket Nos. EL19-58 and ER19-1486, "Affidavit of Samuel A. Newell, James A. Read Jr., and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.," regarding the use of forward-looking data to estimate energy and ancillary services revenues for the purposes of determining capacity market parameters, August 5, 2020.

Before the FERC, Docket Nos. EL16-49, ER18-1314-000, ER18-1314-001, EL18-178-000 (Consolidated), "Supplemental Affidavit of Samuel A. Newell, John M. Hagerty and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.," regarding the expansion of the Minimum Offer Price Rule in its forward capacity market, March 23, 2020.

Before the FERC, Docket Nos. EL16-49, ER18-1314-000, ER18-1314-001, EL18-178-000 (Consolidated), "Affidavit of Samuel A. Newell, John M. Hagerty and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.," regarding the expansion of the Minimum Offer Price Rule in its forward capacity market, March 17, 2020.

Before the Indiana General Assembly 21st Century Energy Policy Development Task Force, "Electricity Transmission Basics," on behalf of the Indiana Energy Association, October 17, 2019.

Before the FERC, Docket No. ER19-105-000, Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters, "Affidavit of Samuel A. Newell, John M. Hagerty, and Sang H. Gang on Behalf of PJM Interconnection, L.L.C.," regarding the Cost of New Entry, accompanied by report, *PJM Cost of New Entry Combustion Turbines and Combined-Cycle Plants with June 1, 2022 Online Date*, October 12, 2018.

Before the FERC, Docket No. ER19-105-000, Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters, "Affidavit of Dr. Samuel A. Newell and David Luke Oates on behalf of PJM Interconnection, L.L.C," regarding the Variable Resource Requirement Curve Shape, accompanied by report, *Fourth Review of PJM's Variable Resource Requirement Curve*, October 12, 2018.

Before the FERC, Docket Nos. EL16-49-000, ER18-1314-000, ER18-1314-001, EL18-178-000 (Consolidated), Affidavit of Kathleen Spees and Samuel A. Newell Regarding the Need for a Self-Supply Exemption from Minimum Offer Price and Other Policy Supported Resource Rules on behalf of Dominion Energy Services, Inc. and Virginia Electric and Power Company, October 2, 2018.

Before the FERC, Docket Nos. EL17-32-000 and EL17-36-000, Prefiled Comments of Samuel A. Newell, Kathleen Spees, and Yingxia Yang on behalf on behalf of the Natural Resources Defense Council: "Opportunities to More Efficiently Meet Seasonal Capacity Needs in PJM," April 15,

2018; presented oral testimony on the Seasonality Panel at FERC's Seasonal Capacity Technical Conference on April 24, 2018.

Before the FERC, Docket No. EL18-34-000, Samuel A. Newell, Pablo A. Ruiz, and Rebecca C. Carroll, "Evaluation of PJM's Fast-Start Pricing Proposal," report prepared for NextEra Energy Resources and attached to *Reply Brief of Joint Commenters*, March 14, 2018.

Before the New Hampshire Site Evaluation Committee, Docket No. 2015-06, oral testimony and cross examination on the electricity market impacts of the proposed Northern Pass Transmission Project, October 26-27, 2017.

Before the FERC, Docket No. AD17-11-000, Prefiled Comments of Samuel A. Newell re "Reconciling Wholesale Competitive Markets with State Polices," April 25, 2017; and oral testimony on Industry Expert Panel at the Technical Conference on May 2, 2017.

Before the New Hampshire Site Evaluation Committee, Docket No. 2015-06, Prefiled Supplemental Testimony of Samuel Newell and Jurgen Weiss on behalf of the New Hampshire Counsel for the Public, with attached report, "Electricity Market Impacts of the Proposed Northern Pass Transmission Project--Supplemental Report," April 17, 2017.

Before the FERC, Docket No. ER17-284-000, filed "Response of Dr. Samuel A. Newell, Dr. Kathleen Spees, and Dr. David Luke Oates on behalf of Midcontinent Independent System Operator Regarding the Competitive Retail Solution," January 13, 2017.

Before the New Hampshire Site Evaluation Committee, Docket No. 2015-06, Prefiled Direct Testimony of Samuel Newell and Jurgen Weiss on behalf of the New Hampshire Counsel for the Public, with attached report, "Electricity Market Impacts of the Proposed Northern Pass Transmission Project," December 30, 2016.

Before the FERC, Docket No. ER17-284-000, filed "Testimony of Dr. Samuel A. Newell, Dr. Kathleen Spees, and Dr. David Luke Oates on behalf of Midcontinent Independent System Operator Regarding the Competitive Retail Solution," November 1, 2016.

"Benefit-Cost Analysis of Proposed New York AC Transmission Upgrades," Appendix 1 to Comparative Evaluation of Alternating Current Transmission Upgrade Alternatives, Trial Staff Final Report, *Proceeding on Motion of the Commission to Examine Alternating Current Transmission Upgrades*, New York State Department of Public Service, Matter No. 12-02457, Case No. 12-T-0502, September 22, 2015. Presented to NYISO and DPS Staff at the Technical Conference, Albany, NY, October 8, 2015.

Before the Maine Public Utilities Commission, Docket No. 2014-00071, filed "Testimony of Dr. Samuel A. Newell and Matthew P. O'Loughlin on Behalf of the Maine Office of the Public Advocate, Comments on LEI's June 2015 Report and Recommendations for a Regional Analysis," November 18, 2015.

Before the FERC, Docket No. ER14-2940-000, filed "Response of Dr. Samuel A. Newell and Dr. Kathleen Spees on Behalf of PJM Interconnection, LLC Regarding Variable Resource Requirement Curve," for use in PJM's capacity market, November 5, 2014.

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Before the FERC, Docket No. ER15-68-000, filed "Affidavit of Dr. Samuel A. Newell on behalf of PJM Interconnection, LLC," regarding the Cost of New Entry for use in PJM's Minimum Offer Price Rule, October 9, 2014.

Before the Texas House of Representatives Environmental Regulation Committee, Hearing on the Environmental Protection Agency's Newly Proposed Clean Power Plan and Potential Impact on Texas, invited by Committee Chair to present, "EPA's Clean Power Plan: Basics of the Rule, and Implications for Texas," Austin, TX, September 29, 2014.

Before the FERC, Docket No. ER14-2940-000, filed "Affidavit of Dr. Samuel A. Newell and Mr. Christopher D. Ungate on Behalf of PJM Interconnection, LLC," regarding the Cost of New Entry for use in PJM's capacity market, September 25, 2014.

Before the FERC, Docket No. ER14-2940-000, filed "Affidavit of Dr. Samuel A. Newell and Dr. Kathleen Spees on Behalf of PJM Interconnection, LLC Regarding Periodic Review of Variable Resource Requirement Curve Shape and Key Parameters," September 25, 2014.

Before the Public Utilities Commission of the State of Colorado, Proceeding No. 13F-0145E, "Answer Testimony and Exhibits of Samuel A. Newell on Behalf of Tri-State Generation and Transmission Association, Inc.," regarding an analysis of complaining parties' responses to Tri-State Generation and Transmission Association, Inc.'s Third Set of Data Requests, Interrogatory, September 10, 2014.

Before the Maine Public Utilities Commission, Docket No. 2014-00071, "Testimony of Dr. Samuel A. Newell and Matthew P. O'Loughlin on Behalf of the Maine Office of the Public Advocate, Analysis of the Maine Energy Cost Reduction Act in New England Gas and Electricity Markets," July 11, 2014.

Before the FERC, Docket No. ER14-1639-000, filed "Testimony of Dr. Samuel A. Newell and Dr. Kathleen Spees on behalf of ISO New England Inc. Regarding a Forward Capacity Market Demand Curve," April 1, 2014.

Before the FERC, Docket No. ER14-1639-000, filed "Testimony of Dr. Samuel A. Newell and Mr. Christopher D. Ungate on Behalf of ISO New England Inc. Regarding the Net Cost of New Entry for The Forward Capacity Market Demand Curve," April 1, 2014.

Before the FERC, Docket No. ER14-616-000, filed "Affidavit of Dr. Samuel A. Newell on Behalf of ISO New England Inc.," and accompanying "2013 Offer Review Trigger Prices Study," regarding the Minimum Offer Price Rule new capacity resources in capacity auctions, December 13, 2013.

Before the American Arbitration Association, provided expert testimony (deposition, written report, and oral testimony at hearing) in a dispute involving the acquisition of a demand response company, July-November, 2013. (Non-public).

Before the Public Utility Commission of Texas, at a workshop on Project No. 40000, presented "Report On ORDC B+ Economic Equilibrium Planning Reserve Margin Estimates Prepared By The Brattle Group," on behalf of The Electric Reliability Council of Texas (ERCOT), June 25,

2013. Subsequently filed additional comments, "Additional ORDC B+ Economic Equilibrium Planning Reserve Margin Estimates," July 29, 2013.

Before the FERC, Docket No. ER13-535-000, filed "Affidavit of Dr. Samuel A. Newell on Behalf of the 'Competitive Markets Coalition' Group Of Generating Companies," supporting PJM's proposed tariff revisions to change certain terms regarding the Minimum Offer Price Rule in the Reliability Pricing Model, December 28, 2012.

Before the FERC, Docket No. ER12-513-000, filed "Affidavit of Dr. Samuel A. Newell on Behalf of PJM Interconnection, LLC," in support of PJM's Settlement Agreement regarding the Cost of New Entry for use in PJM's capacity market, November 21, 2012.

Before the Texas House of Representatives State Affairs Committee, Hearing on the issue of resource adequacy in the Texas electricity market, presented "The Resource Adequacy Challenge in ERCOT," on behalf of The Electric Reliability Council of Texas, October 24, 2012.

Before The Public Utility Commission of Texas, at a workshop on Project No. 40480, presented "Resource Adequacy in ERCOT: 'Composite' Policy Options," and "Estimate of DR Potential in ERCOT" on behalf of The Electric Reliability Council of Texas (ERCOT), October 25, 2012.

Before The Public Utility Commission of Texas, at a workshop on Project No. 40480, presented "ERCOT Investment Incentives and Resource Adequacy," September 6, 2012.

Before The Public Utility Commission of Texas, at a workshop on Project No. 40480, presented "Summary of Brattle's Study on ERCOT Investment Incentives and Resource Adequacy," July 27, 2012.

Before the FERC, Docket No. ER12-___-000, Affidavit of Dr. Samuel A. Newell on Behalf of SIG Energy, LLLP, March 29, 2012, Confidential Exhibit A in Complaint of Sig Energy, LLLP, SIG Energy, LLLP v. California Independent System Operator Corporation, Docket No. EL 12-___-000, filed April 4, 2012 (Public version, confidential information removed).

Before the FERC, Docket No. ER12-13-000, filed "Response of Dr. Samuel A. Newell and Dr. Kathleen Spees on Behalf of PJM Interconnection, LLC," regarding the Cost of New Entry for use in PJM's capacity market, January 13, 2012.

Before the FERC, Docket No. ER12-13-000, Affidavit of Dr. Samuel A. Newell on Behalf of PJM Interconnection, LLC, re: the Cost of New Entry Estimates for Delivery Year 2015/16 in PJM's Reliability Pricing Model, filed December 1, 2011.

Before the FERC, Docket Nos. ER11-4069 and ER11-4070, Direct testimony of Johannes Pfeifenberger and Samuel Newell on behalf of the RITELine Companies, re: the public policy, congestion relief, and economic benefits of the RITELine Transmission Project, filed July 18, 2011.

Before the FERC, Docket No. No. EL11-13-000, Direct testimony of Johannes Pfeifenberger and Samuel Newell on behalf of The AWC Companies re: the public policy, reliability, congestion relief, and economic benefits of the Atlantic Wind Connection Project, filed December 20, 2010.

"Economic Evaluation of Alternative Demand Response Compensation Options," whitepaper filed by ISO-NE in its comments on FERC's Supplemental Notice of Proposed Rulemaking in Docket No. RM10-17-000, October 13, 2010 (with K. Madjarov).

Before the FERC, Docket No. RM10-17-000, Filed Comments re: Supplemental Notice of Proposed Rulemaking and September 13, 2010 Technical Conference, October 5, 2010 (with K. Spees and P. Hanser).

Before the FERC, Docket No. RM10-17-000, Filed Comments re: Notice of Proposed Rulemaking regarding wholesale compensation of demand response, May 13, 2010 (with K. Spees and P. Hanser).

Before the Connecticut Department of Public Utility Control, provided oral testimony to support the 2010 "Integrated Resource Plan for Connecticut" (see below), June 2010.

2010 "Integrated Resource Plan for Connecticut," report co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Energy Advisory Board, January 4, 2010. Presented to the Connecticut Energy Advisory Board January 8, 2010.

"Dynamic Pricing: Potential Wholesale Market Benefits in New York State," lead authors: Samuel Newell and Ahmad Faruqui at The Brattle Group, with contributors Michael Swider, Christopher Brown, Donna Pratt, Arvind Jaggi and Randy Bowers at the New York Independent System Operator, submitted as "Supplemental Comments of the NYISO Inc. on the Proposed Framework for the Benefit-Cost Analysis of Advanced Metering Infrastructure," in State of New York Public Service Commission Case 09-M-0074, December 17, 2009.

Before the Connecticut Department of Public Utility Control, provided oral testimony to support the 2009 "Integrated Resource Plan for Connecticut" (see below), June 30, 2009.

2009 "Integrated Resource Plan for Connecticut," report co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Energy Advisory Board, January 1, 2009.

"Informational Filing of the Internal Market Monitoring Unit's Report Analyzing the Operations and Effectiveness of the Forward Capacity Market," prepared by Dave LaPlante and Hung-po Chao of ISO-NE with Sam Newell, Metin Celebi, and Attila Hajos of The Brattle Group, filed with FERC on June 5, 2009 under Docket No. ER09-1282-000.

Before the Connecticut Department of Public Utility Control, provided oral testimony to support the 2008 "Integrated Resource Plan for Connecticut" and "Supplemental Reports" (see below), September 22, 2008.

"Integrated Resource Plan for Connecticut," co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Energy Advisory Board; co-authored with M. Chupka, A. Faruqui, and D. Murphy, January 2, 2008. Supplemental Report co-submitted with The Connecticut Light & Power Company and The United Illuminating Company to the Connecticut Department of Utility Control; co-authored with M. Chupka, August 1, 2008.

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"Quantifying Customer Benefits from Reductions in Critical Peak Loads from PHI's Proposed Demand-Side Management Programs," whitepaper by Samuel A. Newell and Ahmad Faruqui filed by Pepco Holdings, Inc. with the Public Utility Commissions of Delaware (Docket No. 07-28, 9/27/2007), Maryland (Case No. 9111, filed 12/21/07), New Jersey (BPU Docket No. EO07110881, filed 11/19/07), and Washington, DC (Formal Case No. 1056, filed 10/1/07). Presented orally to the Public Utility Commission of Delaware, September 5, 2007.

Before the Public Service Commission of Wisconsin, Docket 137-CE-149, "Planning Analysis of the Paddock-Rockdale Project," report by American Transmission Company re: transmission cost-benefit analysis, April 5, 2007 (with J.P. Pfeifenberger and others).

Prepared Supplemental Testimony on Behalf of the Michigan Utilities before the FERC, Docket No. ER04-718-000 et al., re: Financial Impact of ComEd's and AEP's RTO Choices, December 21, 2004 (with J. P. Pfeifenberger).

Prepared Direct and Answering Testimony on Behalf of the Michigan-Wisconsin Utilities before the FERC, Docket No. ER04-375-002 et al., re: Financial Impact of ComEd's and AEP's RTO Choices on Michigan and Wisconsin, September 15, 2004 (with J.P. Pfeifenberger).

Declaration on Behalf of the Michigan-Wisconsin Utilities before the FERC, Docket No. ER04-375-002 et al., re: Financial Impact of ComEd's and AEP's RTO Choices on Michigan and Wisconsin, August 13, 2004 (with J.P. Pfeifenberger).

PUBLICATIONS

Offshore Wind Transmission: An Analysis of Options for New York, report prepared for Anbaric, August 2020 (with J. Pfeifenberger, W. Graf, and K. Spokas).

Singapore Foreward Capacity Market—FCM Design Proposal (third Consultation Paper), prepared for the Singapore Energy Market Authority, May 2020 (with J. Chang and W. Graf). Followed draft proposals in first and second Consultation papers in May 2019 and Dec 2019.

Quantitative Analysis of Resource Adequacy Structures, report prepared for NYSERDA and NYSDPS, July 1, 2020 (with K. Spees, J. Imon Pedtke, and M. Tracy). Update to version from May 29, 2020.

New York's Evolution to a Zero Emission Power System: Modeling Operations and Investment Through 2040 Including Alternative Scenarios, report prepared for NYISO Stakeholders, June 22, 2020 (with R. Lueken, J. Weiss, S. Crocker Ross, and J. Moraski). Update to version from May 18, 2020.

Qualitative Analysis of Resource Adequacy Structures for New York, report prepared for NYSERDA and NYSDPS, May 19, 2020 (with K. Spees and J. Imon Pedtke).

Offshore Transmission in New England: The Benefits of a Better-Planned Grid, report prepared for Anbaric, May 2020 (with J. Pfeifenberger and W. Graf).

Implementing Recommended Improvements to Market Power Mitigation in the WEM, report prepared for Energy Policy WA in Western Australia, April 2020 (with T. Brown).

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Gross Avoidable Cost Rates for Existing Generation and Net Cost of New Entry for New Energy Efficiency, report prepared for PJM, March 17, 2020 (with M. Hagerty, S. Sergici, E. Cohen, S. Gang, J. Wroble, and P. Daou).

"Forward Clean Energy Markets: A New Solution to State-RTO Conflicts," *Utility Dive*, January 27, 2020 (with K. Spees and J. Pfeifenberger.)

How States, Cities, and Customers Can Harness Competitive Markets to Meet Ambitious Carbon Goals: Through a Forward Market for Clean Energy Attributes: Expanded Report Including a Detailed Market Design Proposal, report prepared for NRG, September 2019 (with K. Spees, W. Graf, and E. Shorin).

International Review of Demand Response Mechanisms in Wholesale Markets, report for the Australian Energy Market Commission, June 2019 (with T. Brown, K. Spees, and C. Wang).

How States, Cities, and Customers Can Harness Competitive Markets to Meet Ambitious Carbon Goals: Through a Forward Market for Clean Energy Attributes, report prepared for NRG, April 2019 (with K. Spees, W. Graf, and E. Shorin).

Estimation of the Market Equilibrium and Economically Optimal Reserve Margins for the ERCOT Region, 2018 Update, Final Draft, prepared for the Electric Reliability Council of Texas, December 20, 2018 (with R. Carroll, A. Kaluzhny, K. Spees, K. Carden, N. Wintermantel, and A. Krasny).

Harmonizing Environmental Policies with Competitive Markets: Using Wholesale Power Markets to Meet State and Customer Demand for a Cleaner Electricity Grid More Cost Effectively, discussion paper, July 2018 (with K. Spees, J. Pfeifenberger, and J. Chang).

Fourth Review of PJM's Variable Resource Requirement Curve, report prepared for PJM Interconnection LLC for submission to FERC and PJM stakeholders, April 16, 2018 (with J. Pfeifenberger, K. Spees, and others).

PJM Cost of New Entry Combustion Turbines and Combined-Cycle Plants with June 1, 2022 Online Date, report prepared for PJM Interconnection LLC for submission to FERC and PJM stakeholders, April 19, 2018 (with J. Michael Hagerty, J. Pfeifenberger, S. Gang of Sargent & Lundy, and others).

Evaluation of the DOE's Proposed Grid Resiliency Pricing Rule, whitepaper prepared for NextEra Energy Resources, October 23, 2017 (with M. Celebi, J. Chang, M. Chupka, and I. Shavel).

Near Term Reliability Auctions in the NEM: Lessons from International Jurisdictions, report prepared for the Australian Energy Market Operator, August 23, 2017 (with K. Spees, D.L. Oates, T. Brown, N. Lessem, D. Jang, and J. Imon Pedtke).

Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals, whitepaper prepared for the New York Independent System Operator, August 11, 2017 (with R. Lueken, J. Weiss, K. Spees, P. Donohoo-Vallett, and T. Lee).

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"How wholesale power markets and state environmental Policies can work together," *Utility Dive*, July 10, 2017 (with J. Pfeifenberger, J. Chang, and K. Spees).

Market Power Mitigation Mechanisms for the Wholesale Electricity Market in Western Australia, whitepaper prepared for the Public Utilities Office in the Government of W. Australia's Department of Finance, September 1, 2016 (with T. Brown, W. Graf, J. Reitzes, H. Trewn, and K. Van Horn).

Western Australia's Transition to a Competitive Capacity Auction, report prepared for Enernoc, January 29, 2016 (with K. Spees and C. McIntyre).

Enhancing the Efficiency of Resource Adequacy Planning and Procurements in the Midcontinent ISO Footprint—Options for MISO, Utilities, and States, report prepared for NRG, November 9, 2015 (with K. Spees and R. Lueken).

International Review of Demand Response Mechanisms, report prepared for Australian Energy Market Commission, October 2015 (with T. Brown, K. Spees, and D.L. Oates).

Resource Adequacy in Western Australia — Alternatives to the Reserves Capacity Mechanism, report prepared for EnerNOC, Inc., August 2014 (with K. Spees).

Third Triennial Review of PJM's Variable Resource Requirement Curve, report prepared for PJM Interconnection, LLC, May 15, 2014 (with J. Pfeifenberger, K. Spees, A. Murray, and I. Karkatsouli).

Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM, report prepared for PJM Interconnection, LLC, May 15, 2014 (with M. Hagerty, K. Spees, J. Pfeifenberger, Q. Liao, and with C. Ungate and J. Wroble at Sargent & Lundy).

Developing a Market Vision for MISO: Supporting a Reliable and Efficient Electricity System in the Midcontinent, foundational report prepared for Midcontinent Independent System Operator, Inc., January 27, 2014 (with K. Spees and N. Powers).

Estimating the Economically Optimal Reserve Margin in ERCOT, report prepared for the Public Utilities Commission of Texas, January 2014 (with J. Pfeifenberger, K. Spees, and I. Karkatsouli).

"Capacity Markets: Lessons Learned from the First Decade," *Economics of Energy & Environmental Policy*. Vol. 2, No. 2, Fall 2013 (with J. Pfeifenberger and K. Spees).

ERCOT Investment Incentives and Resource Adequacy, report prepared for the Electric Reliability Council of Texas, June 1, 2012 (with K. Spees, J. Pfeifenberger, R. Mudge, M. DeLucia, and R. Carlton).

"Trusting Capacity Markets: does the lack of long-term pricing undermine the financing of new power plants?" *Public Utilities Fortnightly*, December 2011 (with J. Pfeifenberger).

Second Performance Assessment of PJM's Reliability Pricing Model: Market Results 2007/08 through 2014/15, prepared for PJM Interconnection LLC, August 26, 2011 (with J. Pfeifenberger, K. Spees).

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Cost of New Entry Estimates for Combustion-Turbine and Combined-Cycle Plants in PJM, report prepared for PJM Interconnection LLC, August 24, 2011 (with J. Pfeifenberger, K. Spees, and others).

"Fostering economic demand response in the Midwest ISO," *Energy* 35 (2010) 1544–1552 (with A. Faruqui, A. Hajos, and R.M. Hledik).

"DR Distortion: Are Subsidies the Best Way to Achieve Smart Grid Goals?" *Public Utilities Fortnightly*, November 2010.

Midwest ISO's Resource Adequacy Construct: An Evaluation of Market Design Elements, report prepared for MISO, January 2010 (with K. Spees and A. Hajos).

Demand Response in the Midwest ISO: An Evaluation of Wholesale Market Design, report prepared for MISO, January 2010 (with A. Hajos).

Cost-Benefit Analysis of Replacing the NYISO's Existing ICAP Market with a Forward Capacity Market, whitepaper for the NYISO and stakeholders, June 15, 2009 (with A. Bhattacharyya and K. Madjarov).

Fostering Economic Demand Response in the Midwest ISO, whitepaper written for MISO, December 30, 2008 (with R. Earle and A. Faruqui).

Review of PJM's Reliability Pricing Model (RPM), report prepared for PJM Interconnection LLC for submission to FERC and PJM stakeholders, June 30, 2008 (with J. Pfeifenberger and others).

"Reviving Integrated Resource Planning for Electric Utilities: New Challenges and Innovative Approaches," *Energy*, Vol. 1, 2008, The Brattle Group (with M. Chupka and D. Murphy).

Enhancing Midwest ISO's Market Rules to Advance Demand Response, report written for MISO, March 12, 2008 (with R. Earle).

"The Power of Five Percent," *The Electricity Journal*, October 2007 (with A. Faruqui, R. Hledik, and J. Pfeifenberger).

Quantifying Customer Benefits from Reductions in Critical Peak Loads from PHI's Proposed Demand-Side Management Programs, prepared for Pepco Holdings, Inc., September 21, 2007 (with A. Faruqui).

Review of PJM's Market Power Mitigation Practices in Comparison to Other Organized Electricity Markets, Report prepared for PJM Interconnection LLC, September 14, 2007 (with P. Fox-Penner, J. Pfeifenberger, J. Reitzes, and others).

"Valuing Demand-Response Benefits in Eastern PJM," *Public Utilities Fortnightly*, March 2007 (with J. Pfeifenberger and F. Felder).

Quantifying Demand Response Benefits in PJM, study report prepared for PJM Interconnection, LLC and the Mid-Atlantic Distributed Resources Initiative, January 29, 2007 (with F. Felder).

"Modeling Power Markets: Uses and Abuses of Locational Market Simulation Models," *Energy*, Vol. 2, 2006, The Brattle Group (with J. Pfeifenberger).

"Innovative Regulatory Models to Address Environmental Compliance Costs in the Utility Industry," October 2005 Newsletter, American Bar Association, Section on Environment, Energy, and Resources; Vol. 3 No. 1 (with J. Pfeifenberger).

PRESENTATIONS

"Offshore Wind Transmission: An Analysis of Options for New York," presented at LCV Virtual Policy Forum, August 6, 2020 (with J. Pfeifenberger, W. Graf, and K. Spokas).

"Possible Paths Forward from MOPR," presented to Power Markets Today webinar on "Capacity Market Alternatives for States," July 15, 2020.

"Considerations for Meeting Sub-Annual Needs, and Resource Accreditation across RTOs," presented to MISO Resource Adequacy Subcommittee, July 8, 2020 (with J. Pfeifenberger, M. Hagerty, and W. Graf).

"New York's Evolution to a Zero Emission Power System—Modeling Operations and Investment Through 2040 Including Alternative Scenarios," presented to NYISO Stakeholders, June 22, 2020 (with R. Lueken, J. Weiss, S. Ross, and J. Moraski).

"Singapore Foreward Capacity Market Design—Industry Briefing Sessions," presented via video to Singapore electricity market stakeholders, June 5&9, 2020 (with W. Graf).

"Industry Changes in Resource Adequacy Requirements," presented to MISO Resource Adequacy Subcommittee, May 6, 2020 (with J. Pfeifenberger, M. Hagerty, and W. Graf).

"NYISO Grid in Transition Study: Detailed Assumptions and Modeling Description," presented to NYISO Stakeholders, March 30, 2020 (with R. Lueken, J. Weiss, J. Moraski, and S. Ross).

"Electricity Market Designs to Achieve and Accommodate Deep Decarbonization," presented to Advanced Energy Economy (AEE) video conference, "ISO-NE in 2050: Getting To An Advanced Energy Future In New England," March 18, 2020.

"U.S. Offshore Wind Generation, Grid Constraints, and Transmission Needs," presented at Offshore Wind Transmission, USA Conference, September 18, 2019 (with J. Pfeifenberger and K. Spokas).

"Pollution Pricing in the Power Sector: Market-Friendly Tools for Incorporating Public Policy," presented to GCPA Spring Conference, Houston, TX, April 16, 2019.

"The Transformation of the Power Sector to Clean Energy: Economic and Reliability Challenges," keynote address to the Power Engineers 4th Annual Power Symposium, Weehawken, NJ, April 4, 2019.

"Market Design for Winter Energy Security in New England: Further Discussion of Options," presented to The New England Power Pool Markets Committee on behalf of NextEra Energy Resources, Westborough, MA, February 6, 2019 (with D.L. Oates and P. Ruiz).

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"Market Design for Winter Energy Security in New England: Discussion of Options," presented to The New England Power Pool Markets Committee on behalf of NextEra Energy Resources, Westborough, MA, January 9, 2019 (with D.L. Oates).

"Market Equilibrium Reserve Margin in ERCOT," presented to Power Markets Today webinar, "A Post Summer Check-in of ERCOT's Market," October 31, 2018.

"Carbon Pricing in NYISO's Wholesale Energy Market, and Applicability to Multi-State RTO markets," presented to Raab Policy Roundtable, May 23, 2018; presented to the Energy Bar Association, 2018 EBA Energizer: Pricing Carbon in Energy Markets, June 5, 2018; presented to Bank of America Merrill Lynch, June 25, 2018.

"Reconciling Resilience Services with Current Market Design," presented to RFF/R-Street Conference on "Economic Approaches to Understanding and Addressing Resilience in the Bulk Power System," Washington, D.C., May 30, 2018.

"System Flexibility and Renewable Energy Integration: Overview of Market Design Approaches," presented to Texas-Germany Bilateral Dialogue on Challenges and Opportunities in the Electricity Market, Austin, TX, February 26, 2018.

"Natural Gas Reliability: Understanding Fact from Fiction," panelist at the NARUC Winter Policy Summit presented to The Committee on Gas, Washington, D.C., February 13, 2018 (with A. Thapa, M. Witkin, and R. Wong).

"Carbon Pricing in Wholesale Markets: Takeaways from NYISO Carbon Charge Study," presented to Harvard Electric Policy Group, October 12, 2017.

"Pricing Carbon into NYISO's Wholesale Energy Market: Study Overview and Summary of Findings," presented to NYISO Business Issues Committee, September 12, 2017.

"Carbon Adders in Wholesale Power Markets—Preventing Leakage," panelist at Resources for the Future's workshop on carbon pricing in wholesale markets, Washington, D.C., August 2, 2017.

"Market-Based Approaches to Support States' Decarbonization Objectives," panelist at Independent Power Producers of New York (IPPNY) 2017 Spring Conference, Albany, NY, May 10, 2017.

"ERCOT's Future: A Look at the Market Using Recent History as a Guide," panelist at the Gulf Coast Power Association's Fall Conference, Austin, TX, October 4, 2016.

"The Future of Wholesale Electricity Market Design," presented to Energy Bar Association 2016 Annual Meeting & Conference, Washington, DC, June 8, 2016.

"Performance Initiatives and Fuel Assurance—What Price Mitigation?" presented to Northeast Energy Summit 2015 Panel Discussion, Boston, MA, October 27, 2015.

"PJM Capacity Auction Results and Market Fundamentals," presented to Bloomberg Analyst Briefing Webinar, September 18, 2015 (with J. Pfeifenberger and D.L. Oates).

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"Energy and Capacity Market Designs: Incentives to Invest and Perform," presented to EUCI Conference, Cambridge, MA, September 1, 2015.

"Electric Infrastructure Needs to Support Bulk Power Reliability," presented to GEMI Symposium: Reliability and Security across the Energy Value Chain, The University of Houston, Houston, TX, March 11, 2015.

Before the Arizona Corporation Commission, Commission Workshop on Integrated Resource Planning, Docket No. E-00000V-13-0070, presented "Perspectives on the IRP Process: How to get the most out of IRP through a collaborative process, broad consideration of resource strategies and uncertainties, and validation or improvement through market solicitations," Phoenix, AZ, February 26, 2015.

"Resource Adequacy in Western Australia—Alternatives to the Reserve Capacity Mechanism (RCM)," presented to The Australian Institute of Energy, Perth, WA, October 9, 2014.

"Customer Participation in the Market," panelist on demand response at Gulf Coast Power Association Fall Conference, Austin, TX, September 30, 2014.

"Market Changes to Promote Fuel Adequacy—Capacity Market to Promote Fuel Adequacy," presented to INFOCAST- Northeast Energy Summit 2014 Panel Discussion, Boston, MA, September 17, 2014.

"EPA's Clean Power Plan: Basics and Implications of the Proposed CO_2 Emissions Standard on Existing Fossil Units under CAA Section 111(d)," presented to Goldman Sachs Power, Utilities, MLP and Pipeline Conference, New York, NY, August 12, 2014.

"Capacity Markets: Lessons for New England from the First Decade," presented to Restructuring Roundtable Capacity (and Energy) Market Design in New England, Boston, MA, February 28, 2014.

"The State of Things: Resource Adequacy in ERCOT," presented to INFOCAST – ERCOT Market Summit 2014 Panel Discussion, Austin, TX, February 24-26, 2014.

"Resource Adequacy in ERCOT," presented to FERC/NARUC Collaborative Winter Meeting in Washington, D.C., February 9, 2014.

"Electricity Supply Risks and Opportunities by Region," presentation and panel discussion at Power-Gen International 2013 Conference, Orlando, FL, November 13, 2013.

"Get Ready for Much Spikier Energy Prices—The Under-Appreciated Market Impacts of Displacing Generation with Demand Response," presented to the Cadwalader Energy Investor Conference, New York, NY, February 7, 2013 (with K. Spees).

"The Resource Adequacy Challenge in ERCOT," presented to The Texas Public Policy Foundation's 11th Annual Policy Orientation for legislators, Austin, TX, January 11, 2013.

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"Resource Adequacy in ERCOT: the Best Market Design Depends on Reliability Objectives," presented to the Harvard Electricity Policy Group conference, Washington, D.C., December 6, 2012.

"Resource Adequacy in ERCOT," presented to the Gulf Coast Power Association Fall Conference, Austin, TX, October 2, 2012.

"Texas Resource Adequacy," presented to Power Across Texas, Austin, TX, September 21, 2012.

"Resource Adequacy and Demand Response in ERCOT," presented to the Center for the Commercialization of Electric Technologies (CCET) Summer Board Meeting, Austin, TX, August 8, 2012.

"Summary of Brattle's Study on 'ERCOT Investment Incentives and Resource Adequacy'," presented to the Texas Industrial Energy Consumers annual meeting, Austin, TX, July 18, 2012.

"Market-Based Approaches to Achieving Resource Adequacy," presentation to Energy Bar Association Northeast Chapter Annual Meeting, Philadelphia, PA, June 6, 2012.

"Fundamentals of Western Markets: Panel Discussion," WSPP's Joint EC/OC Meeting, La Costa Resort, Carlsbad, CA, February 26, 2012 (with J. Weiss).

"Integrated Resource Planning in Restructured States," presentation at EUCI conference on "Supply and Demand-Side Resource Planning in ISO/RTO Market Regimes," White Plains, NY, October 17, 2011.

"Demand Response Gets Market Prices: Now What?" NRRI teleseminar panelist, June 9, 2011.

Before the PJM Board of Directors and senior level representatives at PJM's General Session, panel member serving as an expert in demand response on behalf of Pepco Holdings, Inc., December 22, 2007.

"Resource Adequacy in New England: Interactions with RPS and RGGI," Energy in the Northeast Law Seminars International Conference, Boston, MA, October 18, 2007.

"Corporate Responsibility to Stakeholders and Criteria for Assessing Resource Options in Light of Environmental Concerns," Bonbright Electric & Natural Gas 2007 Conference, Atlanta, GA, October 3, 2007.

"Evaluating the Economic Benefits of Transmission Investments," EUCI's Cost-Effective Transmission Technology Conference, Nashville, TN, May 3, 2007 (with J. Pfeifenberger, presenter).

"Quantifying Demand Response Benefits in PJM," PowerPoint presentation to the Mid-Atlantic Distributed Resources Initiative (MADRI) Executive Committee on January 13, 2007, to the MADRI Working Group on February 6, 2007, as Webinar to the U.S. Demand Response Coordinating Council, and to the Pennsylvania Public Utility Commission staff April 27, 2007.

"Who Will Pay for Transmission," CERA Expert Interview, Cambridge, MA, January 15, 2004.

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"Reliability Lessons from the Blackout; Transmission Needs in the Southwest," presented at the Transmission Management, Reliability, and Siting Workshop sponsored by Salt River Project and the University of Arizona, Phoenix, AZ, December 4, 2003.

"Application of the 'Beneficiary Pays' Concept," presented at the CERA Executive Retreat, Montreal, Canada, September 17, 2003.

EXHIBIT B

Spees, *et al.*, "Quantitative Analysis of Resource Adequacy Structures," Prepared for NYSERDA and NYSDPS, July 1, 2020

Quantitative Analysis of Resource Adequacy Structures

PREPARED FOR
NYSERDA and NYSDPS

PREPARED BY
Kathleen Spees
Sam Newell
John Imon Pedtke
Mark Tracy

July 1, 2020

THE Brattle GROUP

Study Scope

NYSERDA and NYDPS retained Brattle to evaluate several alternative resource adequacy constructs that differ primarily in who administers them and how Buyer-Side Mitigation (BSM) is applied; this deck presents estimates of the differences in customer costs.

Summary of RA Structures Corresponding to Brattle Qualitative Analysis Memo

Structure		Description	Cost Evaluation
1	**ICAP Market with Status Quo BSM**	Current ICAP market with current rules	Compared to #3 to indicate costs of Status Quo BSM
2	**ICAP Market with Expanded BSM**	Same as above but with potential expansion to BSM rules corresponding to FERC's December 2019 order for PJM	Compared to #3 to indicate costs of potential Expanded BSM
3	**Centralized Market for Resource Adequacy Credits (RACs), without BSM**	Functionally similar to current ICAP market, but with rule-setting by State No BSM, except as applied by PSC to prevent the intentional introduction of uneconomic capacity to profitably suppress capacity prices	Evaluated as "No BSM"
4	**LSE Contracting for RACs**	Same as #3, but with no centralized market LSEs must procure sufficient RACs bilaterally	Similar to #3 but difficult to quantify
5	**Co-optimized Capacity and Clean Energy Procurement**	Same as #3, but a State entity would procure RACs and RECs for LSEs in a joint, co-optimized auction	Not evaluated (out of scope)

Approach and Key Assumptions

To estimate customer cost impacts, we simulated future wholesale markets (including the application of BSM) in 2030, using Brattle's GridSIM model. Key Assumptions:

- Modeled fleet reflects the **Climate Leadership and Community Protection Act** (CLCPA) and **NYISO CARIS study**:
  - 70% of load is met by renewable resources by 2030 (does not include Nuclear generation)
  - Annual gross load, 6,100 MW of offshore wind (OSW), 3,000 MW of storage, and 7,500 MW of behind-the-meter (BTM) solar assumptions consistent with CLCPA targets and 2019 CARIS study assumptions
- Assumptions on BSM applicability were updated to align with NYISO's proposed exemption rule:
  - 1. "Status Quo" applies BSM to new renewables and storage in Zones G-J, except approximately 550 UCAP MW of policy exemptions
  - 2. "Expanded BSM" extends BSM to all zones, incl. nuclear and half of the existing hydro resources (assuming CapEx projects), with exemptions for 160 UCAP MW of OSW in Zone J, 173 UCAP MW of OSW in Zone K, and 41 UCAP MW of PV in Zones G-I
  - 3. Centralized RAC Market w/ "No BSM" does not exclude any resources from the capacity market
- Assumptions on UCAP ratings of intermittent resources affect the magnitude of BSM
  - UCAP value declines with penetration; analyzed output vs. net load to estimate effective load-carrying capability (ELCC)
  - Available output data had low CF% and output diversity, making impact estimates conservative; on the other hand, analysis does not recognize that transmission constraints could make the local J/K value fall faster with penetration
- Other key assumptions: resources' fixed and variable costs contributing to capacity prices via supply elasticity
- Sensitivity analyses: explored effects of nuclear retirements; higher load; quantity of BSM policy exemptions

The 2030 system examined here leveraged CARIS 70*30 and otherwise made necessary simplifying assumptions. While the system examined in 2030 does not represent a prediction of the future system, it is a reasonable expectation for the purpose of examining alternative RA structures

Cost estimates are thus indicative; impact will ultimately depend on the year, load, supply mix, UCAP ratings, and capacity supply elasticity, and the details of any changes to BSM rules

Updates to this Quantitative Analysis

We have updated this quantitative analysis based on stakeholder input received and to better reflect NYISO's proposed BSM rules and recent developments

- The most important changes provide a more accurate representation of likely outcomes under the "Status Quo" buyer-side mitigation approach, including:
  - Higher renewables exemption (assuming that NYISO's April 20 filing is accepted)
  - Sensitivity analysis on the quantity of public policy resource exemptions
  - Offer floor at the minimum of 0.75x mitigation Net CONE or resource offer floor
  - Updated representation of resource retirements and winter only status as per the NY DEC "Peaker Rule" Part 227-3 and 2020 Gold Book
  - Updated going-forward cost assumptions for fossil resources that are at risk of retirement (identified as a key study sensitivity)
- **Overall Impact of Updates:** Estimated customer costs imposed by Status Quo BSM are somewhat lower, but the uncertainty range remains similar at approximately $0.4-$0.9 billion per year; Expanded BSM scenario costs remain similar at approximately $1.3-$2.8 billion per year

Summary of Conclusions

- By 2030 relative to a No-BSM scenario, estimated customer costs increase by:
  - **$0.4-0.9 billion/year** under Status Quo BSM (~12%-20% of statewide capacity costs or ~24%-34% of Zones G-J capacity costs), range depending on load growth and exemptions
  - **$1.3-2.8 billion/year** under Expanded BSM (~35%-63% of statewide capacity costs), range depending on load growth and nuclear resource retention
- This reflects costs of over-procuring capacity because mitigated policy resources would not be accounted for in the capacity market, including:
  - Contract costs increase for policy resources, since they are denied capacity payments
  - Capacity market clearing prices rise
- These estimates account for moderating long-term factors:
  - Long-term supply elasticity mitigates capacity price impacts so it is smaller than the "double-payment" quantity effect (showing up as higher contract costs)
  - Lower resource UCAP values at higher penetration of mitigated renewable resources limit the impact of BSM
  - Offsetting E&AS impacts, but these are relatively small
  - Policy resource exemptions can somewhat mitigate costs

Analytical Results

Estimated Customer Costs of BSM in 2030

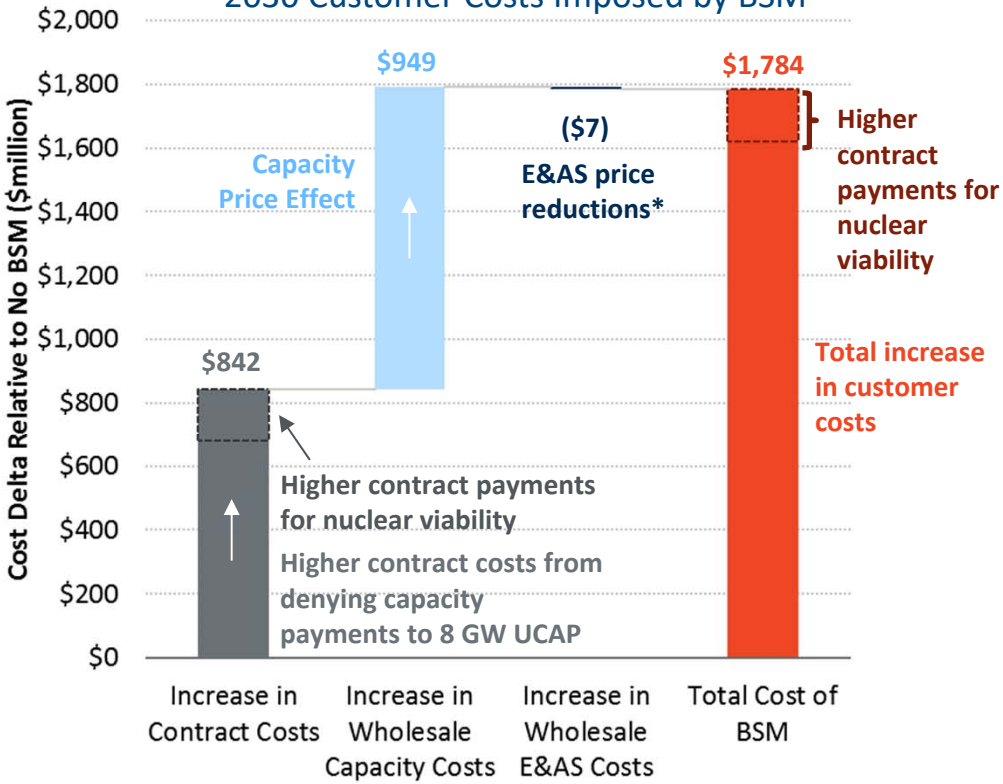
Net impact of BSM on customers is $0.5 billion/yr under Status Quo; $1.8 billion/yr under Expanded BSM.

Status Quo BSM (#1 vs. #3)

2030 Customer Costs Imposed by BSM

Expanded BSM (#2 vs. #3)

2030 Customer Costs Imposed by BSM

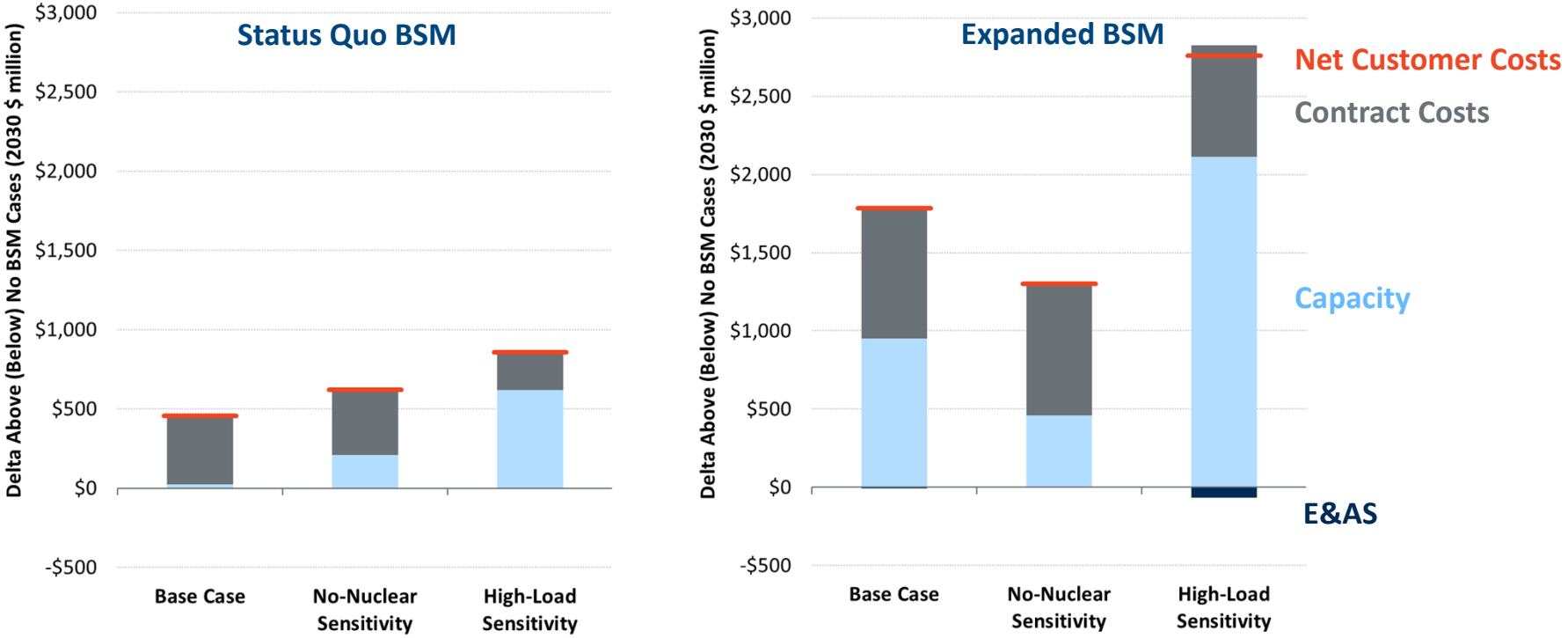


* Energy and AS prices decrease in some cases because excess capacity depresses prices in tight hours; and because higher contract payments (due to lack of capacity payments) cause energy prices to be more negative in over-generation hours.

Sensitivity of BSM Costs to Supply-Demand Balance

Customer costs of BSM are sensitive to peak load (higher load driving higher costs)

Increased Annual Customer Costs Relative to No-BSM Structure



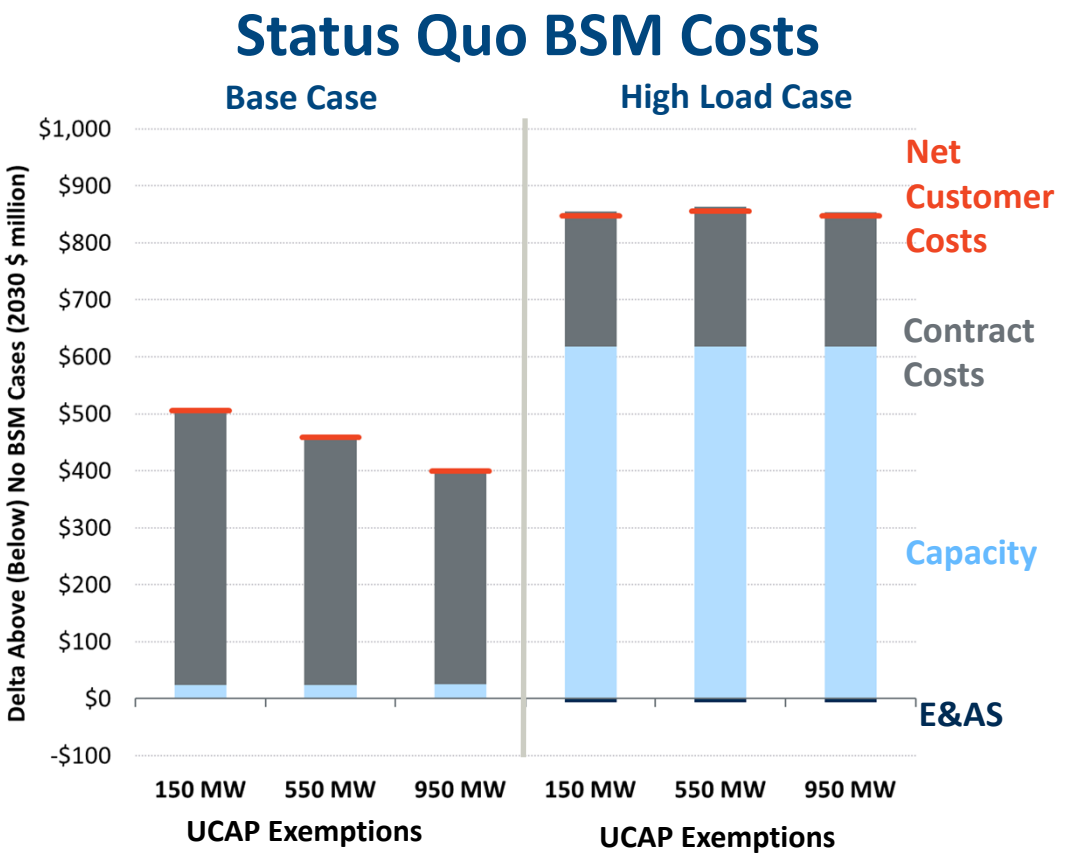
Notes: "**No-Nuclear Sensitivity**" loses all >3 GW of upstate nuclear, largely replaced by retaining gas CCs, so fewer resources to mitigate.
"**High-Load Sensitivity**" results in additions of onshore wind to meet 70% target.

Sensitivity of Status Quo BSM Costs to Policy Resource Exemptions

We evaluated the sensitivity of Status Quo costs to +/- 400 MW of policy resource exemptions

Costs remain similar because:

- **Base Case:** Gas ST is marginal, so 400 MW policy exemptions displaces 400 MW of gas ST retention
- **High Load Case:** Generic offer floor is marginal in all cases, so 400 MW exemptions results in +400 MW generic offer floor resources (and vice versa)

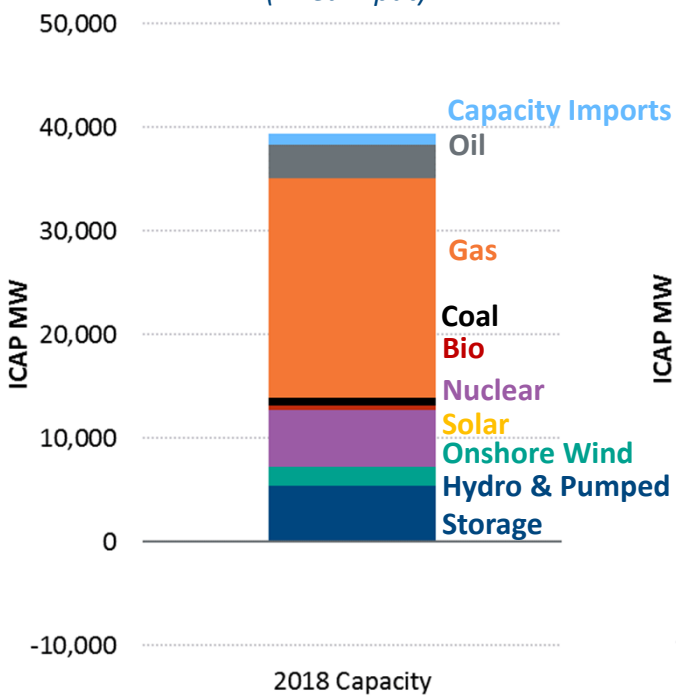


Base Case Detailed Results

Base Case Supply Mix

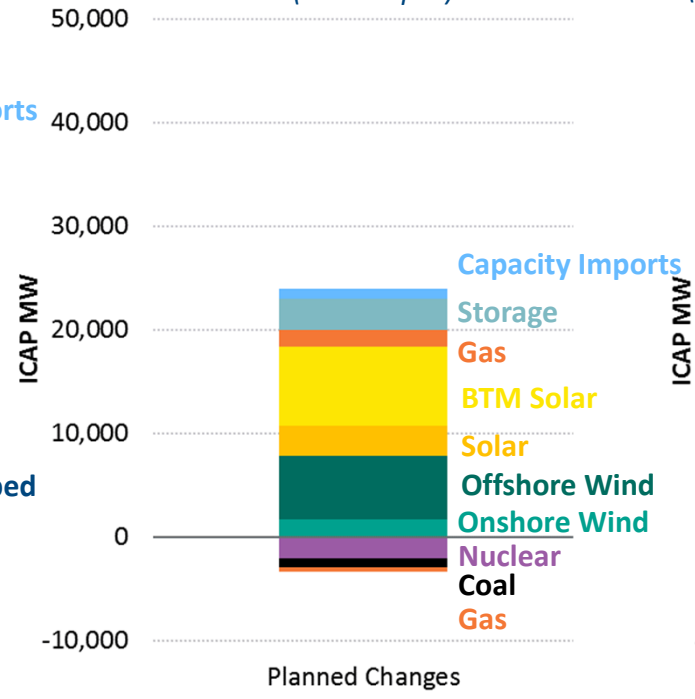
Existing generation is consistent with the 2019 Gold Book, and planned capacity changes are based on signed CES contracts and CARIS study assumptions. The model economically retires old plants and builds new clean ones to meet any remaining gap to reach CLCPA 70% target

2018 Installed Capacity
(Fixed Input)

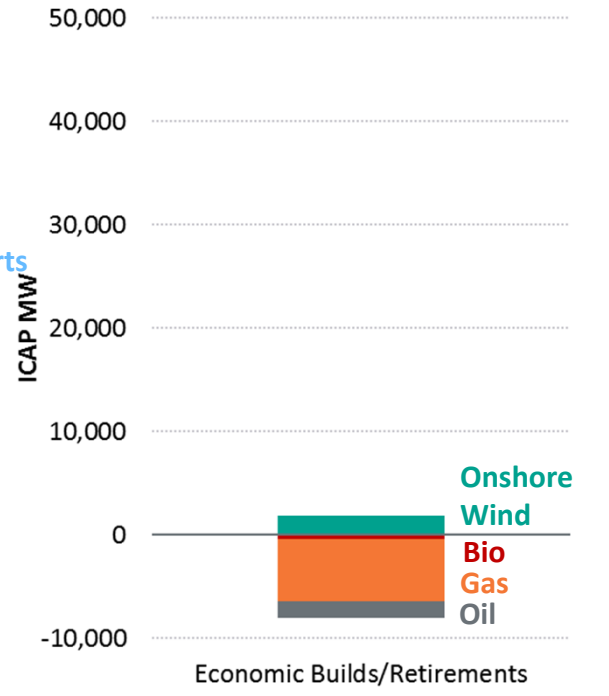


Note: Model determines if 2018 existing supply resources will retire by 2030.

Planned Changes by 2030
(Fixed Input)



Economic Builds/Retirements
(Determined by Model – No BSM Base Case)



Note: Model determines economic resource builds needed to reach CLCPA targets (incremental to planned changes).

Capacity Subject to Mitigation
before considering exemptions or clearing

Mitigated Non-Emitting Capacity by Zone (ICAP MW)

Blue shading subject to Status Quo BSM

Expanded BSM applies to blue and teal

	2018 Capacity	Planned/Assumed 2019-2030 Additions/Retirements (Fixed Input)					Economic Additions (Determined by Model)		Total Capacity by 2030
		Zone A-E	Zone F	Zone G-I	Zone J	Zone K	Zone A-E	Zone F-K	
Hydro & PS	5,436	0	0	0	0	0	0	0	5,436 **
Onshore Wind	1,739	1,710	0	0	0	0	1,814	0	5,263
Offshore Wind	0	0	0	0	4,320 *	1,778	0	0	6,098
Solar	77	2,677	0	284 *	0	0	0	0	3,038
Storage	0	660	240	270	1,350	480	0	0	3,000
Nuclear	5,399	0	0	(2,054)	0	0	0	0	3,345
Capacity Import	1,100	0	0	0	1,000	0	0	0	2,100
Total	**13,751**	**5,047**	**240**	**(1,500)**	**6,670**	**2,258**	**1,814**	**0**	**28,280**

Notes: 2018 installed capacity informed by 2019 Gold Book. Planned/assumed builds are informed by 2019 CARIS study assumptions and signed CES contracts based on 2018-2019 CES contract summary document and recent 2019 Tier 1 solicitation.

* 816 ICAP MW OSW in Zone J and 880 ICAP MW OSW in Zone K procured in 2018 solicitation and 284 MW solar in Zone GHI exempt in both Status Quo and Expanded BSM. See the following slide for assumptions regarding status quo renewable exemptions as assumed consistent with the April 20 NYISO filing.

** Half of existing hydro fleet assumed to be mitigated under Expanded BSM.

Status Quo Exemptions

The quantity of possible public policy resource exemptions under the NYISO's April 20 proposed approach is subject to considerable uncertainty. Our updated analysis assumes ~550 UCAP MW of exemptions (with a sensitivity analysis of +/-400 UCAP MW)

- Given the large uncertainties, our assumed quantity of exemptions is intentionally abstracted from specific predictions such as which resources may be deemed "policy-driven" retirements
- Overall quantity is consistent with outlook for load growth, retirements, and demand curve width
- In "high exemptions" scenario, we further assume that some storage becomes exempt through other means (such as via Part A or Part B tests)

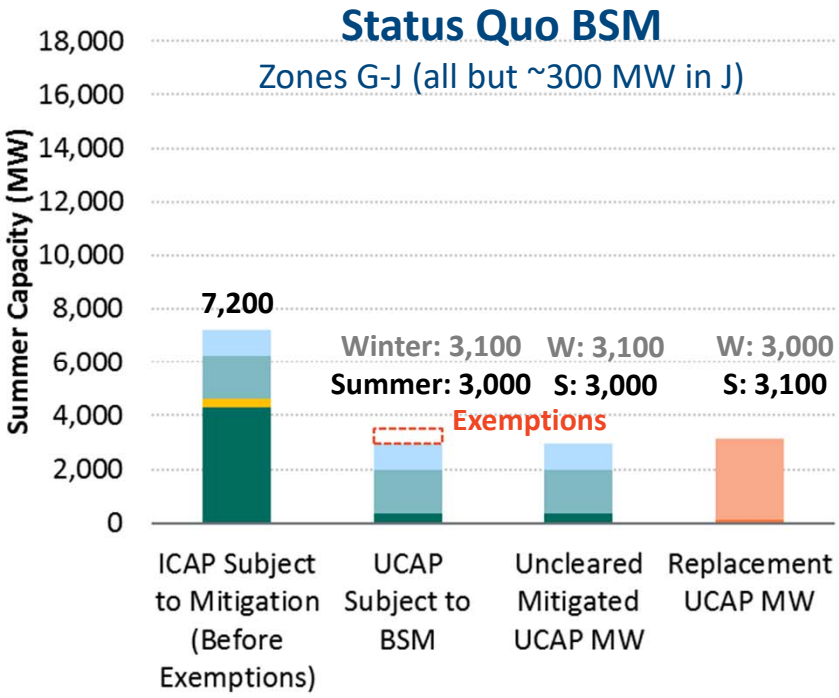
Status Quo Exemptions by Zone

	Zones G-I	Zone J	Zones G-J
Summer UCAP Supply (UCAP MW)			
Offshore Wind	0	848	848
Storage	270	1,350	1,620
Solar	41	0	41
Capacity Imports	0	1,000	1,000
Exemptions (UCAP MW)			
Public Policy Resources	41	507	548
Remaining Mitigated Resources (UCAP MW)			
Offshore Wind	0	341	341
Storage	270	1,350	1,620
Solar	0	0	0
Capacity Imports	0	1,000	1,000

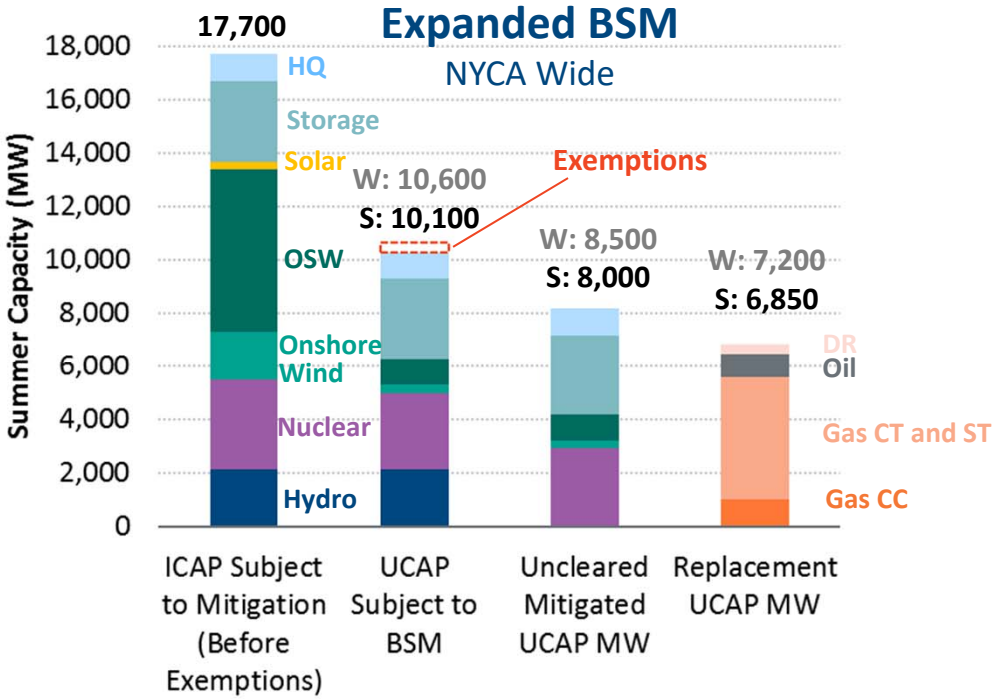
Summary of Mitigation and Market Response Quantities (NYCA-Wide)

In Status Quo BSM, essentially all of the ~3,000 summer UCAP MW uncleared mitigated capacity is replaced by retained gas ST

In Expanded BSM, ~1,150 summer UCAP MW of the 8,000 summer UCAP MW uncleared mitigated capacity is *not* replaced (mostly Upstate), resulting in a higher capacity prices and costs



Mitigated capacity in Zones G-J only under Status Quo, mostly OSW and storage in Zone J that is replaced by retained gas ST plants. UCAP values reflect average ELCC. Capacity numbers are approximate.



Mitigated capacity in all zones. Mitigated OSW and storage in Zones J and K largely offset by retained gas resources. All UCAP values shown reflect average ELCC. Capacity numbers are approximate.

Prices and Customer Costs

Zone J Capacity prices remain similar across all structures as retiring gas ST resources are marginal. Capacity prices in A-F increase significantly in Expanded BSM as more renewables and nuclear resources are mitigated, thus retaining more thermal plants that would otherwise retire

Wholesale Market Prices

	Capacity Market Prices (2030 $/kW-month)			Delta Above (Below) No BSM (2030 $/kW-month)	
Zone	1. Status Quo	2. Expanded BSM	3. No BSM	1. Status Quo	2. Expanded BSM
A-E	$3.65	$8.13	$3.69	($0.04)	$4.44
F	$3.65	$8.13	$3.69	($0.04)	$4.44
G-I	$6.05	$8.13	$6.05	($0.00)	$2.08
J (NYC)	$12.33	$12.32	$12.34	($0.01)	($0.02)
K (LI)	$13.05	$13.88	$13.05	$0.00	$0.83

	Energy Market Prices (2030 $/MWh)			Delta Above (Below) No BSM (2030 $/MWh)	
A-E	$28.02	$27.99	$28.02	$0.00	($0.03)
F	$30.28	$30.23	$30.28	$0.00	($0.05)
G-I	$30.36	$30.33	$30.36	$0.00	($0.03)
J (NYC)	$30.36	$30.33	$30.36	$0.00	($0.03)
K (LI)	$32.19	$32.19	$32.19	$0.00	($0.00)

Cost of BSM

	Customer Costs Delta Above (Below) No BSM (2030 $ million)	
Category	1. Status Quo	2. Expanded BSM
Wholesale Market Cost	**$25**	**$941**
Energy	$0	($7)
Ancillary Services	$0	($0)
Capacity	$25	$949
Contract Costs	**$434**	**$842**
Total Customer Cost	**$458**	**$1,784**
Excluding Nuclear Make-Whole	$457	$1,622

Modeling Approach and Assumptions

Brattle GridSIM Model

Inputs

Supply

Existing resources
Fuel prices
Investment/fixed costs
Variable costs

Demand

Representative day hourly demand
Capacity needs

Transmission

Zonal limits
Intertie limits

Regulations, Policies, Market Design

Capacity market
Carbon pricing
Procurement mandates

GridSIM Optimization Engine

Objective Function

Minimize NPV of Investment & Operational Costs

Constraints

- Market Design and Co-Optimized Operations
  - *Capacity*
  - *Energy*
  - *Ancillary Services*
- Regulatory & Policy Constraints
- Resource Operational Constraints
- Transmission Constraints

Outputs

Annual Investments and Retirements

Hourly Operations

System and Customer Costs

Supplier Revenues

Emissions and Clean Energy Additions

Market Prices

Demand Assumptions

- "Base Load" load assumptions align with 2019 CARIS study input assumptions for 2030
- "Base Load" assumes lower demand than 2019 (156 TWh gross load)
- Modeled "High Load" based on State Team input that assumes greater load than 2019

2030 Demand Assumptions

	Base Load	High Load
Scenarios	Base Case No-Nuclear	High-Load
Annual Gross Load	145 TWh	169 TWh
Gross Peak Load	30 GW	35 GW
Net Peak Load	28 GW	33 GW

Sources and Notes:

"Base Load" annual gross load assumptions are based on 2019 CARIS study. Used ratio of 2019 annual gross load and CARIS annual gross load to convert 2019 gross peak loads to 2030 gross peak loads on zonal level.

"High Load" annual gross load assumptions based on State Team's input. Calculated peak loads based on annual gross load ratio as described above. Netted out assumed 7,542 MW of solar BTM (based on 2019 CARIS study) valued at ~27% summer capacity value from gross peak load to calculate net peak load (similar to Gold Book assumptions).

2019 load data taken from NYISO OASIS data.

Supply Cost Characteristics

- **Resources' fixed O&M costs** affect supply elasticity and BSM price impacts. Sources:
  - *New Gas CCs, CTs*: 2020 costs from Demand Curve Reset (DCR); 2.2% cost inflation rate
  - *New Gas STs*: 2019 costs and cost decline rate from 2019 NREL ATB (0% to -1%/year real)
  - *New wind, solar, storage*: 2019 costs and cost decline rate from 2019 NREL ATB (0% to -7% /year real)
  - *Existing Nuclear*: 2019 costs from NEI (constant real), plus assumed $280/kW-year refurbishment cost adder in 2030
  - *Existing CTs, STs*: FOM from NYISO 2018 SOM Report
  - *Other existing thermal:* FOM assumed 2x new units
  - *All other existing:* Same FOM as new resources
  - *Zone J and K*: FOM assumed 1.3 – 2.7x higher than upstate based on DCR zonal cost ratios
- **Offshore wind** tied to either zone J or K
- **Utility-scale PV and onshore wind** cannot be built in zones J or K

2030 Resource Cost Assumptions

	Upstate New Resource Capital Cost *2030$/kW*	Upstate New Resource FOM *2030$/kW-yr*	Upstate Existing Resource FOM + Refurb Costs *2030$/kW-yr*	Variable O&M *2030$/MWh*
Natural Gas				
Combined cycle	$2,300	$27	$54	$2
Combustion turbine	$1,200	$14	$25	$7
Steam turbine	$5,000	$43	$72	$11
Battery Storage				
4-hour duration	$1,100	$26	$26	$6
Solar PV				
Utility scale	$1,100	$13	$13	$0
Wind				
Offshore (downstate)	$4,600	$107	$107	$0
Onshore	$1,600	$50	$50	$0
Nuclear				
Single-unit	N/A	N/A	$602	$3
Multi-unit	N/A	N/A	$491	$3

Sources and Notes:

Includes interconnection and network upgrade costs. NREL 2019 ATB, NYISO DCR Model 2019-2020 and 2020-2021 , and NEI Nuclear Costs in Context.

VOM for storage resources reflect efficiency losses. Existing FOM for nuclear includes refurbishment costs.

FOM costs for existing STs and CTs were based on average GFC shown in Figure 16 of the 2018 State of the Market Report; FOM costs for existing Gas CTs upstate assumed to be half of those for existing Gas CTs in Zone K.

FOM costs for other existing thermal resources were assumed to be 2x that of comparable new ones, informed by EPA Integrated Planning Model document.

Nuclear refurbishment costs informed by refurbishment costs for nuclear plants in Ontario.

ELCC Modeling Approach

Supply Resource	Concept	Methodology
Wind and Solar Resources	Generation of new wind and solar additions is correlated with previously deployed resources. New resources therefore provide less marginal capacity value than previously added resources.	1. Across 8760 hours, identify 100 top NYCA net load hours 2. Calculate wind UCAP value as avg. output in those hours 3. Repeatedly change the MW of wind installed, all else equal 4. Each time, find top 100 net load hours and the avg. output 5. Repeat process for offshore wind and solar; for each one, hold other variable technologies at likely 2030 levels
Storage Resources	Energy storage can change the "shape" of peak net load periods, flattening and elongating peak periods. As more storage is deployed, longer discharge durations are therefore required to provide the same capacity value.	1. Across 8760 hours, analyze MW of storage required to reduce NYCA net peak load by 1 MW 2. Calculate UCAP value as 1 MW peak reduction / MW storage required 3. Increase amount of storage assumed, holding all else equal. Simulate effect of increased storage on net peak load 4. Repeat steps 1 – 3 across many storage deployment levels 5. Repeat process for storage of different durations

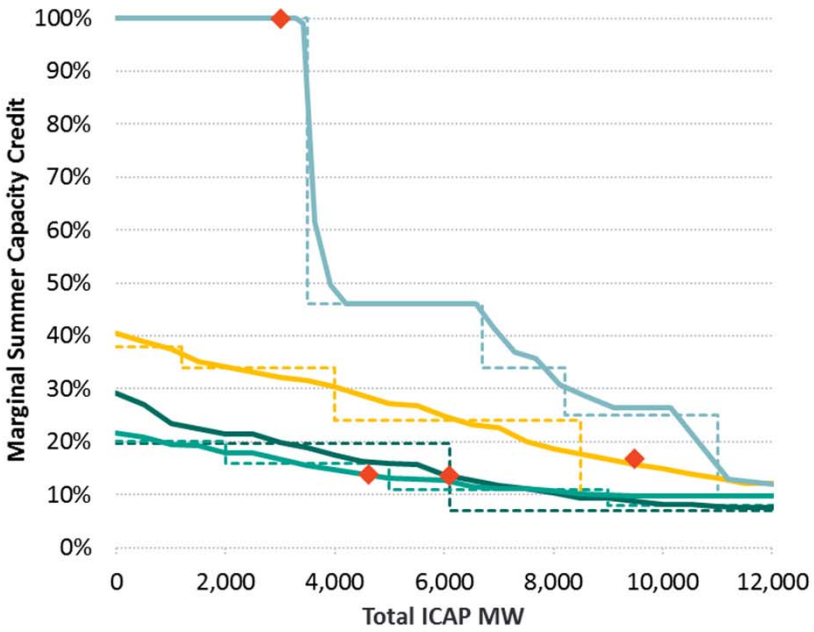
Base Case UCAP Value Curves

modeled based on NYCA-wide net load

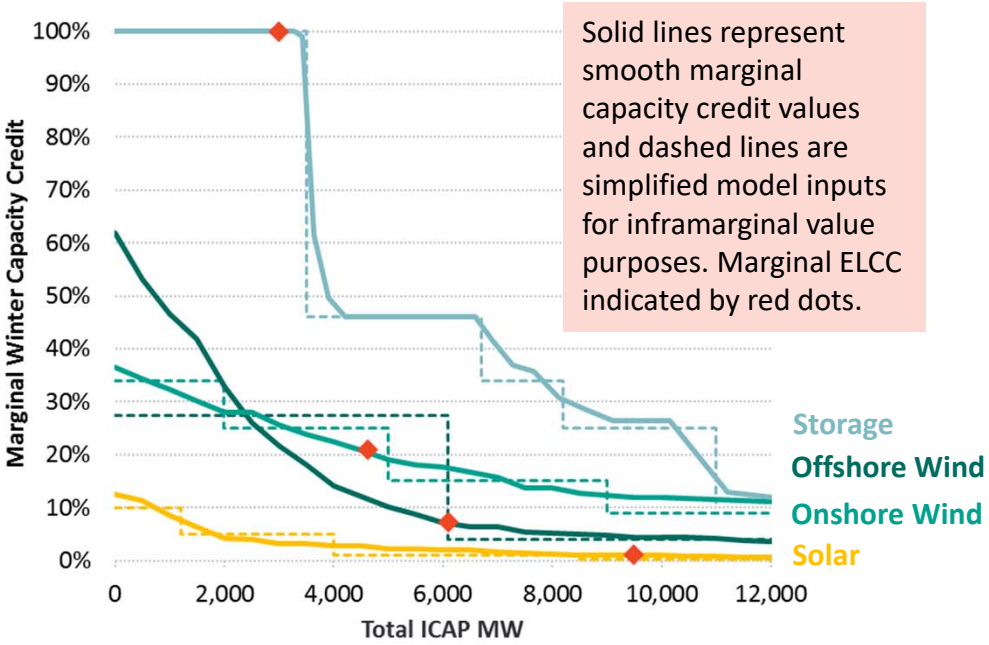
As the penetration increases, marginal effective load-carrying capability (ELCC) decreases.

Note: this analysis may have conservatively low ELCCs for renewables, based on hourly data with lower output than future installations are likely to achieve (and that does not capture diversity across sites for OSW); on the other hand, this analysis uses NYCA-wide net load without considering how transmission constraints could reduce value more quickly.

Summer UCAP Value



Winter Capacity Value



Note: solar capacity credit curves include assumed 7,542 MW of solar BTM already on the grid (based on CARIS study assumption).

Assumptions on BSM Applicability

Resource Type	BSM in Structure 1. Status Quo		BSM in Structure 2. Expanded BSM	
	Zones G-J	Rest of System	Zones G-J	Rest of System
Nuclear	N/A	N/A	N/A	3,345 ICAP MW
OSW	1,740 ICAP MW (assumed 507 UCAP MW exemption in Zone J applies to OSW)		3,504 ICAP MW (assume 816 ICAP MW of already signed contracts exempt)	898 ICAP MW (assume 880 ICAP MW of already signed contracts exempt)
Existing Solar and Onshore Wind	No		No	No
New Utility Scale Solar and Wind	Any new utility scale solar or onshore wind in Zones G-J		All new utility scale solar and onshore wind	
Bulk Storage	1,620 ICAP MW		1,620 ICAP MW	1,380 ICAP MW
Existing Hydro	No		50 ICAP MW	2,085 ICAP MW
Tier 2 Renewables	No		No	No
New HQ Imports	1,000 MW in Zone J		1,000 MW in Zone J	N/A
Demand Response	No		No	No
Fossil Resources	No		No	No

Source: Assumptions on applicability provided by NYSERDA/DPS staff.

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