Institute *for*
Policy Integrity
NEW YORK UNIVERSITY SCHOOL OF LAW

November 8, 2019

Hon. Michelle L. Phillips
Acting Secretary
Public Service Commission
Three Empire State Plaza
Albany, NY 12223-1350

VIA ELECTRONIC SUBMISSION

Attn.: Case 19-E-0530 – Proceeding on Motion of the Commission to Consider Resource Adequacy Matters

Subject: Institute for Policy Integrity Comments on Resource Adequacy

Dear Acting Secretary Phillips:

The Institute for Policy Integrity at New York University School of Law[1] (Policy Integrity) appreciates the opportunity to submit these initial comments to the New York Public Service Commission (Commission) on its August 8, 2019 Order instituting the above-captioned proceeding and soliciting comments. Policy Integrity is a non-partisan think tank dedicated to improving the quality of government decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy.

We are grateful for your consideration of the attached comments.

Sincerely,

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[1] This document does not purport to present the views of New York University School of Law.

Institute for Policy Integrity Comments on Resource Adequacy

In its August 8, 2019 Order, the Commission asks multiple questions about resource adequacy. Below are Policy Integrity's responses to Questions 1 and 3.

I. Response to Question 1

Question 1) Are the State's energy policies and mandates, such as those related to Offshore Wind, photovoltaics, other renewables, and energy storage compatible with the NYISO's resource adequacy mechanisms? If not, what issues are manifested? Also, if not, how could they be aligned?

The state energy policies and mandates prescribed by the Climate Leadership and Community Protection Act (CLCPA) are not only generally compatible with the functioning of wholesale markets like those managed by NYISO, including the capacity market that facilitates investments in resource adequacy, but are also aided by the existence and operation of wholesale markets. Wholesale markets work to ensure that decisions about the development and operation of power sector resources are efficient. Specifically, those markets provide efficient price signals to consumers and generators, and, as a result, allocate resources in ways that are beneficial for stakeholders in general and ratepayers in particular. As has been emphasized in recent reports by researchers at Resources for the Future and the Analysis Group, wholesale markets can be an important tool in achieving state policy goals in a low cost manner.[2]

However, this general compatibility does not automatically mean that state goals and the outcomes of current NYISO market mechanisms are completely aligned. Below, we first explain how current market design rules can lead to divergences between the current NYISO markets and state policy objectives, and the effects of these rules. Then, we provide a list of modifications to these NYISO rules that could help alleviate the discrepancy in outcomes.

A. Buyer Side Mitigation rules could lead to partial misalignment between market outcomes and state policies

The fundamental source of any misalignment is the fact that NYISO markets currently do not take into account externalities that are valued by New York State. Socially inefficient outcomes result from the wholesale markets established and managed by NYISO not taking the full external damages from pollutants emitted by electricity generation into account. In particular, the current market design leads to an excess of emitting resources, and not enough of non-emitting resources.

[2] SUSAN F. TIERNEY & PAUL J. HIBBARD, ANALYSIS GRP., CLEAN ENERGY IN NEW YORK STATE: THE ROLE AND ECONOMIC IMPACTS IN NYISO'S WHOLESALE ELECTRICITY MARKETS—SUMMARY FOR POLICY MAKERS AND FINAL REPORT 35-36 (2019); DANIEL SHAWHAN ET AL., RESOURCES FOR THE FUTURE, BENEFITS AND COSTS OF POWER PLAN CARBON EMISSIONS PRICING IN NEW YORK—OVERVIEW AND SUMMARY 2-4 (2019).

To remedy this market failure, New York State currently supports renewable, nuclear, and energy storage resources to help meet the targets for electricity sector decarbonization, by requiring distribution utilities to purchase Renewable Energy Credits (RECs) associated with land-based solar and wind resources, Zero Emissions Credits (ZECs) from nuclear, Offshore wind RECs (ORECs) from offshore wind resources, and also by providing direct subsidies for qualifying energy storage resources.[3] This approach compensates those resources for specified attributes, such as the ability to supply electricity without polluting. These mechanisms help—albeit indirectly and approximately—to internalize the externalities of pollution emitted by electricity generation resources, and thereby to improve economic efficiency, insofar as the support helps to internalize externalities. In this way, state programs are aligned with the goal of market efficiency in the wholesale markets. Notably, NYISO itself has characterized the State's practice of closing REC contracts with renewable resources as having "a track record of compatibility with the competitive wholesale markets."[4]

However, the Buyer's Side Mitigation (BSM) rules in NYISO's current tariff can hinder this alignment by preventing socially efficient resources from clearing the market. BSM rules, originally intended to limit a resource's ability to use market power to inefficiently suppress prices, require that, unless exempt from mitigation, new capacity resources in the New York City and Lower Hudson Valley (G-J Locality) must offer their full capacity in a spot market auction at a price at or above the applicable offer floor until their capacity clears 12 monthly auctions.[5] This floor is set by NYISO's estimate of a metric called Net Cost of New Entry, which is intended to represent a resource's private cost of entering net of projected market revenues.[6]

Importantly, there are multiple exemptions from BSM. New capacity will be exempt from the offer floor requirement if NYISO determines that it passes either Part A or Part B of NYISO's mitigation exemption test, or if it qualifies for a categorical exemption, like the competitive entry exemption. The Part A test compares the forecasted annual capacity spot market auction revenues with 75% of Mitigation Net CONE to establish whether the new resource would create a capacity surplus. If the expected capacity market revenue is higher, the resource is exempted. The Part B test compares a unit's Net CONE with the annual capacity spot market auction

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[3] Order Adopting a Clean Energy Standard, N.Y. Pub. Serv. Comm'n Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard (Aug. 1, 2016); Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement, N.Y. Pub. Serv. Comm'n Case 18-E-0071, In the Matter of Offshore Wind Energy (July 12, 2018); Order Establishing Energy Storage Goal and Deployment Policy, N.Y. Pub. Serv. Comm'n Case 18-E-0130, In the Matter of Energy Storage Deployment Program (Dec. 13, 2018).

[4] DAVID B. PATTON ET AL., POTOMAC ECON., 2018 STATE OF THE MARKET REPORT FOR THE NEW YORK ISO MARKETS 47 (2019).

[5] NYISO, Market Administration and Control Area Services (MST) Tariff, Att. H, § 23.4.5.7.

[6] NetCONE represents localized levelized embedded costs of a specified Installed Capacity Supplier, including interconnection costs, and for an Installed Capacity Supplier located outside a Mitigated Capacity Zone including embedded costs of transmission service, in either case net of likely projected annual Energy and Ancillary Services revenues, and revenues associated with other energy products. *Id.*, Att. H, § 23.2.1.

clearing price forecasts for three years.[7] If its Net CONE is lower, the unit is exempted. The competitive entry exemption applies to entrants that NYISO views as competitive entrants because they recover their costs through wholesale market revenues rather than contracts and have no incentive to suppress ICAP market prices.[8]

NYISO has also recently proposed, in accord with FERC's direction in a 2015 order, a limited Renewable Exemption, which is capped at 1000 MW of annual capacity.[9] FERC's 2015 order had determined that "renewable resources that are purely intermittent and that have relatively low capacity factors and high development costs . . . have limited or no incentive and ability to artificially suppress capacity prices."[10] Unless FERC acts to modify or reject this filing, 1000 MW of installed capacity of renewable resources in the downstate region would be exempt from BSM.[11]

1. Ways that BSM could encumber progress toward state goals

First, if the renewable exemption cap noted above is not high enough, application of BSM rules could cause some socially desirable state-supported resources to be subject to mitigation, and, as a result, prevent them from clearing the capacity market. For example, NYISO recently decided that new energy storage deployments would be subject to BSM,[12] potentially slowing progress toward the State's speedy deployment goals.

Second, if, contrary to past practice of treating the sales of environmental attributes as market revenues, NYISO excludes revenue earned from state policy credits as market revenue in its application of BSM rules, state-supported resources might end up being subject to a price floor in their bids, and might eventually not clear the capacity market. Current tariff language identifies only RECs as a source of market revenue associated with energy products,[13] and NYISO has

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[7] For details see NYISO, Buyer Side Mitigation Narrative and Numerical Example. New York System Independent Market Operator, Market Mitigation and Analysis (May 17, 2018), https://perma.cc/5FSA-6CKJ.

[8] For the detailed prerequisites for the competitive entry exemptions, see NYISO, Market Administration and Control Area Services Tariff, Att. H, §23.4.5.7.9

[9] Compliance Filing and Request for Commission Action within Sixty Days, *N.Y. Indep. Sys. Operator, Inc.*, Docket No. ER16-1404-000 (Apr. 13, 2016).

[10] *N.Y. Pub. Serv. Comm'n, N.Y. Power Auth., and N.Y. State Energy Res. & Dev. Auth. v. N.Y. Indep. Sys. Operator, Inc.*, 153 FERC ¶ 61,022 at P 51 (2015), *aff'd on rehearing*, 154 FERC ¶ 61,088 at P 12 (2016).

[11] Motion Requesting Commission Action on Compliance Filing, Notice of Implementation Plans, and Conditional Request for Tariff Waivers of the New York Independent System Operator, Inc., *N.Y. Indep. Sys. Operator, Inc.*, Docket No. ER16-1404-000 (July 19, 2019) (indicating that NYISO will apply the Renewable Exemption to resources in its 2019 Class Year unless FERC acts one month prior to completion of that class year to modify the filed exemption).

[12] *See* Complaint, *N.Y. State Pub. Serv. Comm'n and N.Y. State Energy Res. & Dev. Auth. v. New York Independent System Operator, Inc.*, FERC Docket No. EL19-86-000, at 2 (July 29, 2019).

[13] "For purposes of Section 23.4.5 of this Attachment H, "Unit Net CONE" shall mean localized levelized embedded costs of a specified Installed Capacity Supplier […] net of likely projected annual Energy and Ancillary Services revenues, and revenues associated with other energy products such as energy services and renewable energy credits, as determined by the ISO […]." NYISO, Market Administration and Control Area Services Tariff, Att. H, §23.2.1)

retained authority to conduct case-by-case review to determine whether revenue accruing from other credits created by state policy should also be considered market revenue.[14]

Notably, NYISO's recent hint in its May 2019 report, *Reliability and Market Considerations For A Grid In Transition*, that ORECs might merit different treatment than RECs,[15] suggests that revenues accruing from state-created credits might increasingly be considered "out of market," resulting in those resources being mitigated.[16] Furthermore, a decision by NYISO to expand the application of its existing BSM rules to generators that sell their environmental attributes would be congruent with the reforms undertaken in two other regions with mandatory wholesale capacity markets, ISO-New England and PJM Interconnection.[17] Even if NYISO does not treat ORECs as "out-of-market" compensation or expand its application of BSM rules, NYISO's Market Monitor anticipates that current BSM rules will create a temporary misalignment over the next two years between state policies and NYISO's implementation of measures designed to mitigate market power as storage is deployed in the downstate region on a schedule consistent with achieving the targets specified in PSC orders and the CLCPA.[18] In subsequent years, however, the Market Monitor expects that energy storage resources will pass the Part A BSM test, and hence be exempt from mitigation.[19]

2. Factors that could limit the misalignment arising from NYISO's current BSM rules

Two factors could limit the extent to which a broad application BSM rules can cause the misalignment between capacity market operation and state policies. The first is the partial Renewable Exemption described above. Importantly, this exemption would only partially

[14] *Id.*

[15] NYISO, RELIABILITY AND MARKET CONSIDERATIONS FOR A GRID IN TRANSITION—A REPORT BY THE NEW YORK INDEPENDENT SYSTEM OPERATOR 53-54 (2019).

[16] According to NYISO's Market Services Tariff, buyer-side market power mitigation rules require that, unless exempt from mitigation, new capacity resources must enter the New York City and Lower Hudson Valley (G-J Locality) ICAP markets (mitigated capacity zones) at a price at or above the applicable offer floor until their capacity clears 12 monthly auctions. New capacity will be exempt from the offer floor requirement if NYISO determines that it passes either part A or part B of NYISO's mitigation exemption test or if it qualifies for a categorical exemption, like the competitive entry exemption. NYISO, Market Administration and Control Area Services Tariff, Att. H, § 23.4.5.7.

[17] Order on Tariff Filing, *ISO-New England, Inc.*, 162 FERC ¶ 61,205, at P 22 (2018); Order Rejecting Proposed Tariff Revisions, Granting in Part and Denying in Part Complaint, and Instituting Proceeding Under Section 206 of the Federal Power Act, *Calpine Corp. et al. v. PJM Interconnection LLC*, 163 FERC ¶ 61,236, at P 66 (2018).

[18] Motion to Intervene and Comments of the New York ISO's Market Monitoring Unit, *N.Y. Pub. Serv. Comm'n v. N.Y. Indep. Sys. Operator, Inc.*, Docket No. EL19-86-0004, at 7 n.5 (Aug. 19, 2019) (citing 2018 State of the Market report, which estimates that ". . . 64 percent of subsidized resources may receive exemptions in their first year of operation . . . ," leaving 36% subject to BSM); *see also* PATTON ET AL., *supra* note 4, at 73-76.

[19] *Id.*

prevent the application of BSM over the coming years, as renewable resource capacity well in excess of the exemption's 1000 MW annual cap is needed to meet state policy goals. [20]

The second factor that could limit mitigation pursuant to BSM rules is the retirement of significant amounts of generation in New York City and Long Island in the next few years. As noted by the NYISO market monitor, sufficient retirements of old resources would prevent any surplus capacity, and, hence, allow new resources to pass the Part A Test.[21] However, as deployments continue to increase in order to meet CLCPA targets, retirements of old resources could be too low to offset the effects of new resources' entrance vis-à-vis the BSM Part A test.

B. This misalignment could be socially costly

Failure to avoid these misalignments between NYISO BSM rules and state policies would lead to higher social costs, which would be paid by rate payers. Those costs would accrue in the following three ways.

First, because NYISO would end up ignoring some of the capacity of the state-sponsored resources in procuring enough capacity to meet its resource adequacy goals, ratepayers would end up making payments for redundant capacity. The magnitude of this redundancy would depend on the difference between capacity bids assigned by NYISO to units to which BSM was applied and the bids of non-mitigated power plants which are either new or close to retiring.

Second, because some amount of state-supported resources would be prevented from receiving payments through capacity markets, yet would still be deployed to meet the state targets, the State would presumably have to provide more support to enable that deployment. As a result, the same number of new resources would be deployed and on a similar schedule,[22] but ratepayers would pay more for them. This effect would be compounded by the fact that both state-supported resources and any resource procured in the capacity market would still generate electricity. By pushing energy prices downwards compared to the levels that would be achieved without redundant capacity, this could potentially lead to further increases in the level of state support required for clean resource deployments to meet the State's goals.

Finally, because state-supported resources would be at least partly excluded from capacity markets, some number of emitting resources that would have been displaced by non-emitting, state-supported alternatives would instead continue receiving capacity payments. Non-retirement

[20] *See* Lou Lombardi, NYISO, Buyer Side Mitigation: Overview 33 (July 26, 2019), https://perma.cc/76CQ-AAUM (noting Renewable Exemption's 1000 MW installed capacity limit).

[21] Potomac Economics predicts that "Starting in 2021, energy storage resources are likely to be exempt under the Part A test, and this would continue for most energy storage resources added in 2022. In 2023, a large number of retirements of peaking units would likely allow all energy storage resources to be exempt from mitigation." PATTON ET AL., *supra* note 4, at 72.

[22] For example, NYISO is currently planning to conduct a Congestion Assessment and Resource Integration Study that assumes compliance with the target of 70% renewable generation by 2030 established by the CLCPA. BENJAMIN COHEN, NYISO, DRAFT 2019 CARIS 70X30 SCENARIO ASSUMPTIONS AND CALCULATION (2019), https://perma.cc/4457-W5DF.

and occasional operation of these resources would also potentially result in higher emission levels than a situation where BSM is not applied, increasing the social costs of BSM.

C. There are multiple ways to correct the potential misalignment

It is important to note that while NYISO's present approach to resource adequacy could increase the costs to ratepayers of achieving some state policy goals, if the State ends up seeking to maintain resource adequacy without the benefit of NYISO's institutional capacity, it would also incur other significant costs. Furthermore, investment and retirement decisions in the electric sector rely on certainty, predictability, and trust in the ongoing operation of these markets. Therefore, the New York Independent System Operator (NYISO), which has earned stakeholders' confidence over the years, is especially well-positioned to continue managing the wholesale markets in New York. And, collaboratively seeking ways to correct misalignments might be a prudent first-step in the State's resource adequacy inquiry.

The potential for the misalignment between NYISO's wholesale markets and state policies could be avoided by one of the ways we describe below.

1. Pollution pricing

As explained above, the main cause of the perceived conflict between markets and clean energy goals is that wholesale markets do not take into account externalities. Ideally, these externalities would be internalized by an economy-wide policy that forces all polluters to pay for the full external damages they cause. A sector-specific carbon pricing policy, like the one developed by NYISO, could also improve market efficiency in a way that provides technology-neutral support for progress toward the State's emissions-reduction goals.[23]

As the Analysis Group's October 2019 report on NYISO's carbon pricing proposal observes, payments for RECs, ZECs, and ORECs would likely drop in response to adoption of NYISO's proposed carbon pricing program—potentially, in some instances, to zero.[24] Resources for the Future's analysis of that proposal was more specific, estimating that a $63 carbon price would result in the State hitting the deployment targets prescribed in the Commission's 2016 Clean Energy Standard Order.[25] It is reasonable to anticipate a similar effect if the State adopted an economy-wide or energy sector pollution price on its own. In these scenarios, resources supported by state policies would receive more revenue from NYISO's energy market, and would rely less on either revenues from the capacity market or the sale of credits created by state policies. Consequently, even if BSM rules still applied to state-supported resources, those rules

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[23] *See generally* https://www.nyiso.com/carbonpricing.

[24] TIERNEY & HIBBARD, *supra* note 2, at 35-36.

[25] SHAWHAN ET AL., *supra* note 2, at 2-4.

would apply to fewer such resources (if any) and to a lesser degree.[26] This could reduce (or eliminate) the costs to ratepayers of the policy misalignment described above.

2. Expanding exemptions to the BSM rules by raising (but not eliminating) the current caps on state-supported capacity.

In 2020, NYISO is scheduled to review and update the renewable resource exemption to its BSM rules.[27] To qualify, a resource must be "purely intermittent," "have relatively low capacity factors and high development costs," and be "shown to have limited or no incentive or ability to suppress capacity prices. . . ."[28] Through its participation in relevant NYISO stakeholder processes, the State can argue—as it has done in complaints filed before FERC[29]—for an expansive revision to the existing exemption. Such a revision could better align NYISO's approach to resource adequacy with the State's support for renewables (and potentially also energy storage resources).

3. Revising the BSM rules pursuant to NYISO's scheduled Comprehensive Mitigation Review.

NYISO plans to undertake a Comprehensive Mitigation Review over the coming two calendar years; its scoping phase is currently slated for completion in 2020, and the Review itself will not be completed until 2021. As described by NYISO, that Review would entail "a holistic evaluation of the BSM rules and methodology to evaluate whether the current framework will be adequate in a future with significant renewable resources and policy objectives that impact the capacity market."[30] NYISO clearly recognizes the problem of uninternalized externalities and is cognizant of the fact that the State's subsidies may improve the efficiency of the market. [31] The Review could result in changes that better align BSM rules and state policies. For example, NYISO can deem revenue resources receive from selling RECs or ORECs to be "market revenue" in its calculations. Alternatively, if resources fail the BSM tests only because NYISO

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[26] As Potomac Economic predicts, "Although carbon pricing would not automatically exempt all resources that are subsidized for public policy reasons, it would greatly reduce the amount of capacity that would not be exempt under the Part B test. Furthermore, carbon pricing would provide market signals that would encourage the retirement of some older existing generators. Such retirements would, in turn, make new subsidized resources more likely to be exempt under the Part A and Part B tests. In conjunction with a renewable exemption, carbon pricing would likely lead much of capacity that currently receives subsidies to be exempt from mitigation" PATTON ET AL., *supra* note 4, at 21.

[27] NYISO, 2020 Market Project Candidates 6 (Aug. 28, 2019). This review is mandatory. *Id.* at 5; *see also* 153 FERC ¶ 61,022, at PP 50-51.

[28] NYISO, 2020 Market Project Candidates, *supra* note 27, at 6.

[29] *See* Complaint, *Consolidated Edison Co. of N.Y., Inc. v. N.Y. Indep. Sys. Operator, Inc.*, FERC Docket No. EL15-26-000 (Dec. 4, 2014); 2019 Complaint, *supra* note 12.

[30] NYISO, 2020 Market Project Candidates, *supra* note 27, at 8.

[31] *See, e.g.*, NYISO, GRID IN TRANSITION, *supra* note 15, at 52 ("Recognizing that electricity markets do not fully incorporate environmental attributes which are very important to State Regulators and the Public, the NYISO is considering formalizing the BSM rules to recognize the value of external environmental attributes in the BSM evaluations.").

deems revenue they receive from selling environmental attributes "out of market," NYISO could create another exemption to allow resources to sell capacity through bilateral contracts.

II. Response to Question 3

> `**Question 3)**` Is an ICAP product an effective long-term solution for resource adequacy given the required future generating resource mix, which may have lower marginal costs or different availability profiles than many current generation resources in operation? What are the salient attributes of such long-term solutions?

The functioning of well-designed energy and capacity markets does not depend on the mix of participating resources, even if the cost or availability profiles of these resources differ greatly from one another. Instead, market dynamics, by providing signals to invest or exit, cause market prices to adjust to levels consistent with long-term market equilibrium.

If low-marginal cost resources dominate the generation mix, then energy prices can be expected to stay low most of the time.[32] Yet, there will also be substantial spikes in energy prices concentrated mostly in high-demand periods that would signal scarcity. There will also be an overall increase in energy price volatility, especially if a significant share of resources are intermittent. However, energy price volatility in itself would not constitute a problem, especially if the price fluctuations follow a predictable pattern, e.g., diurnal, weekly, or annual.[33]

In fact, it is not clear empirically whether average energy prices will actually fall as more intermittent resources are deployed—that is, energy price spikes could be high enough to raise the average energy price level. Importantly, even if the average energy price does go down, the energy price received by generation resources that rank higher in the merit order (such as "peaker plants") could increase substantially. And so, depending on demand peaks' frequency and the availability of the intermittent resources during those peaks, the equilibrium energy revenue per MW of peaker plant capacity could increase along with the prevalence of low-cost intermittent resources.

Furthermore, even if energy market prices decrease on average, capacity market prices will adjust in response, both because of how the capacity demand curve is designed,[34] and because

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32 Frank Sensfuß, Mario Ragwitz & Massimo Genoese, *The Merit-Order Effect: A Detailed Analysis of the Price Effect of Renewable Electricity Generation on Spot Market Prices in Germany*, 36 ENERGY POL'Y 3086 (2008).

33 Energy prices typically have high variance, with a large portion of operating profits coming in a few hours with particularly high prices. Jacob Mays, David P. Morton & Richard P. O'Neill, *Asymmetric Risk and Fuel Neutrality in Electricity Capacity Markets*, NATURE ENERGY, Oct. 2019, https://doi.org/10.1038/s41560-019-0476-1. The price spikes are worrisome if driven by exercise of market power instead of representing real market scarcity.

34 The willingness to pay for capacity is summarized by the capacity demand curve and set by a statistic called Net Cost of New Entry (Net CONE), which, in turn, is determined by expected energy market revenue. As the energy market revenue decreases, Net CONE rises, shifting the capacity demand curve outwards and, ceteris paribus, increasing capacity prices.

competitive power plants modify their capacity bids when their energy revenues change.[35] Through those capacity price adjustments, and the investment and exit decisions that follow from them, the capacity market ensures long-term resource adequacy irrespective of the marginal cost profiles of the available resources.

A. Attributes of Long-Term Solutions

More intermittent generation will make some features of capacity market design much more important than they are today for the proper functioning of the market. In particular, the definition of capacity credits, the seasonal design of the market, and the inclusion of pay-for-performance elements will play crucial roles in maintaining resource adequacy. The appropriate seasonal design and capacity credits assignment will also play an important role if resources being brought online have availability profiles that do not match up with demand. Finally, in the process of transition to the new resource mix, it is important to update the parameters for setting the capacity demand curve as frequently as possible, and to design the look-back period for setting those parameters so that it is relatively short, as the optimal parameters will vary quickly as the transition progresses.

1. Obligation period

The longer the duration of the procured capacity product ("obligation period"), the more difficult it is for renewables to participate in the capacity market as their generation capability changes seasonally and diurnally. Therefore, shorter-duration capacity products and more seasonal capacity credits would help to better incorporate renewables into the capacity market. Additionally, shorter-duration capacity products also provide for better alignment between the needed and the procured amounts of capacity.[36] The importance of the obligation depends on how fluctuations in resources' availability interacts with the spikes in electricity demand. While NYISO currently holds separate capacity auctions for winter and summer capability periods, accompanied by monthly strip auctions, an even more granular approach to capability periods could be helpful for smooth market functioning as renewables' share of the generation mix grows.

2. Capacity credits

As intermittent capacity grows, the assignment of capacity credits to generators becomes more

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[35] Capacity markets are thought to enable resources to cover the part of their fixed and annual operation and maintenance costs that are not recovered through energy (and ancillary services) markets. Consequently, should energy market revenue change, the resource will need to submit a higher capacity market bid. If enough resources change their bids or if the resource changing its bid is marginal in capacity market, the prevailing capacity price will change. *See* Memorandum from ISO New England to NECPUC, NESCOE and NEPOOL (June 3, 2015) (regarding discussion paper on New England's capacity markets and renewable energy future).

[36] Sylwia Bialek & Burcin Unel, *Will You Be There for Me the Whole Time? On the Importance of Obligation Periods in Design of Capacity Markets*, 32 ELECTRICITY J. 21 (2019).

important for market efficiency.[37] Because the intermittent capacity is often installed in a geographically concentrated manner, and hence the output of various generators is correlated, explicitly accounting for this generation correlation in the design is important. Taking into account this correlation in Loss of Load Probability can help ensure that there is no mismatch between the amount of capacity procured and the actual amount of capacity available to meet the highest level of demand.[38] The improved design of capacity credits is also important considering some of traditional resources that, while not intermittent, tend to have correlated outages and generation capability changing between seasons, as is the case with natural gas plants, among others.

3. Pay-for-performance incentives

Enhancing pay-for-performance elements in the compensation of generators that clear capacity auctions would lead to improvements in the capacity market design. Putting more emphasis on pay-for-performance gives generators incentives to properly predict their availability in the future and to offer the correct share of their nameplate capacity into the market, and hence partly substituting for improvements in capacity credit assignment. If the penalties for non-performance are too weak, generators have an incentive to offer too much capacity.[39] On the other hand, the additional revenue that some RTOs offer for consistent performance serves as an incentive to maintain high availability, especially when the energy demand is expected to be high relative to the supply.

4. Ensuring access to the market for flexible resources

The design of energy and capacity markets should ensure that flexible resources face no artificial obstacles to their market participation. Greater intermittency will make flexibility of supply and demand more socially valuable. A high share of intermittent resources can, under extreme conditions, strain the available supply, especially when the capacity credit system is poorly designed. In addition, intermittency might increase the possibility of exerting market power, especially for generation owners that have both intermittent and non-intermittent resources.[40] However, flexible resources would reduce the possibility of these problems. Therefore, any future design should avoid rules that decrease market participation of flexible resources.

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[37] The nameplate capacity of the generation is reached only under very specific conditions, usually defined in terms of the weather. Most of the time, the generation capability is lower than nameplate capacity. To reflect that, generators bid only a fraction of their nameplate capacity into the capacity market. The amount allowed by market operator to bid is called "capacity credit."

[38] For discussions of the issue see Michael Milligan et al., *Wholesale Electricity Market Design with Increasing Levels of Renewable Generation: Revenue Sufficiency and Long-Term Reliability*, 29 ELECTRICITY J. 26 (2016), and also MIDCONTINENT ISO, PLANNING YEAR 2019-2020 WIND & SOLAR CAPACITY CREDIT (2018).

[39] This happens if the penalty for 1 MWh of non-performance multiplied by the number of hours when the generators expects not to be able to perform is lower than the capacity payment per MW.

[40] Matt Butner, Gone with the Wind: Consumer Surplus from Renewable Generation (Mar. 3, 2019) (unpublished paper), https://perma.cc/WKQ5-5MG3.