UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators	)	Docket Nos. RM16-23-000 AD16-20-000

COMMENTS OF THE NEW ENGLAND STATES COMMITTEE ON ELECTRICITY

Pursuant to the Federal Energy Regulatory Commission's ("Commission") November 30, 2016 Notice of Proposed Rulemaking ("NOPR")[1] and December 20, 2016 Notice of Extension of Time, the New England States Committee on Electricity ("NESCOE") hereby files these comments on the participation of electric storage resources and aggregated distributed energy resources ("DER") in the capacity, energy, and ancillary service markets.

I. Introduction

The Commission initiated this proceeding to reduce or eliminate barriers to the participation of these resources in wholesale electricity markets.[2] NESCOE supports this objective and looks forward to working with the Commission and ISO New England Inc. ("ISO-NE") to develop rules for electric storage resources and aggregated DER to promote competition and economic efficiency for the benefit of New England consumers.

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1 Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators, Notice of Proposed Rulemaking, 157 FERC ¶ 61,121 (2016), 230 Fed. Reg. 86522 ("NOPR").

2 NOPR, at 86525.

NESCOE generally supports the mechanisms reflected in the NOPR to effectuate the proposed changes. However, NESCOE notes that there are many issues that have implications for how regional rules might be structured and which require further information and consideration, such as (i) the diversity of emerging storage technologies, wide range of use cases for electric storage resources and DER aggregations, and a lack of clarity regarding technical feasibility and cost issues, at least in New England; and (ii) the potential economic and reliability benefits associated with electric storage resources and DER aggregations. NESCOE appreciates the Commission's proactive work to reduce or eliminate barriers to the participation of these resources in wholesale electricity markets and urges the Commission at this juncture to afford regions flexibility to design and implement changes that appropriately account for technical, market-specific, jurisdictional and other issues.

II. Description of the Commenter

NESCOE is the Regional State Committee for New England. It is governed by a board of managers appointed by the Governors of Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont and is funded through a regional tariff that ISO-NE administers.[3] NESCOE's mission is to represent the interests of the citizens of the New England region by advancing policies that will provide electricity at the lowest reasonable cost over the long term, consistent with maintaining reliable service and environmental quality.

[3] ISO New England Inc., 121 FERC ¶ 61,105 (2007).

III. Communications

NESCOE requests that the individual identified below be placed on the Commission's official service list in this proceeding and that all communications concerning this filing and future filings in this proceeding should be directed to:

Benjamin S D'Antonio
Counsel & Analyst
New England States Committee
on Electricity
655 Longmeadow Street
Longmeadow, MA 01106
Tel: (603) 828-8977
Email: BenDAntonio@nescoe.com

IV. Comments

A. NESCOE Supports the Participation of Electric Storage Resources in the Wholesale Markets and Establishment of an Appropriate Participation Model that Considers the Potential to Leverage Existing Frameworks

NESCOE supports the Commission's efforts to reduce barriers to participation for electric storage resources into the wholesale energy, capacity, and ancillary services markets. NESCOE agrees that these resources' participation in the wholesale markets improves competition and "enhances reliability, provides congestion relief, improves integration of variable energy resources, and reduces the burden on the transmission system."[4] NESCOE supports the NOPR's objectives and agrees that enhanced participation of these resources could lead to consumer benefits, but the appropriate participation model to achieve these objectives may vary depending on existing structures within a region. As discussed below, the final rule must take into account threshold considerations around consumer benefits and expected implementation costs. The Commission should afford regions flexibility in implementing any final rule, which could leverage existing participation models.

[4] NOPR, at 86525-86526.

1. Additional Clarity Regarding Electric Storage Resource Participation in Capacity, Energy, and Ancillary Services Markets is Necessary and Appropriate, at Least In New England

According to ISO-NE, electric storage resources can already participate in the wholesale electricity markets in several ways.[5] Registering resources as several different existing resource types enables participation in various wholesale markets.[6] ISO-NE states that its market rules are "resource neutral to the maximum extent possible" and that "electric storage resources are eligible to qualify as sellers in all ISO-NE markets provided that they meet the requirements associated with that market."[7] Currently, the region has almost 2,000 MW of commercially operating pumped hydro storage and approximately 95 MW of battery storage in the interconnection queue.[8]

In the NOPR, the Commission identifies certain limitations in ISO-NE's current market rules that may limit storage resources' participation. For example, when storage resources register as demand response or as non-dispatchable generators, they may not provide certain types of reserves.[9] Also, storage resources must register as a dispatchable resource type to be eligible to set the market price.[10] In addition, ISO-NE's current market rules require "the same bidding parameters from all resources, including electric storage resources, participating in its capacity, forward reserve, and regulation markets."[11] To encourage new and innovative market opportunities, the Commission proposes to require each Regional Transmission Organization/

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5 Response of ISO New England Inc., Docket No. AD16-20-000 (May 16, 2016) ("ISO-NE Data Response"), at 3 and 28, available at https://www.iso-ne.com/static-assets/documents/2016/05/ad16-20-000_electric_storage_data_request.pdf.

6 *Id.*, at 2, 5, and 7.

7 *Id.*, at 1 and 11.

8 See March 2016 ISO-NE Paper, How Energy Storage Can Participate in New England's Wholesale Electricity Markets, at 1, available at https://www.iso-ne.com/static-assets/documents/2016/01/final_storage_letter_cover_paper.pdf; ISO-NE Interconnection Request Queue available at https://www.iso-ne.com/system-planning/transmission-planning/interconnection-request-queue.

9 NOPR, 230 Fed. Reg. at 86527 and 86529, citing ISO-NE Data Response at 3-5 and 11.

10 NOPR, 230 Fed. Reg. at 86535, citing ISO-NE Data Response at 12-13.

11 *Id.*, at 86532, citing ISO-NE Data Response at 24-25.

Independent System Operator ("RTO/ISO") to establish a new participation model for electric storage resources.[12]

NESCOE agrees that the Commission's focus on reducing or eliminating barriers to the participation of electric storage resources in wholesale electricity markets is appropriate. For example, advanced energy storage penetration in the wholesale markets has vast potential to provide significant economic efficiency and system reliability benefits, and market rules can and should be developed to help facilitate the industry's growth potential. However, based on the record in this and related proceedings, whether existing participation models could be adjusted to resolve any barrier to participation in the wholesale markets requires additional information. Further analysis would also help inform whether and how a new model would resolve any such barriers. NESCOE cautions the Commission against mandating a new participation model without a fuller analysis of the cost, time, and expected value derived in connection with a new model. The Commission appears to acknowledge this uncertainty in its request for comments from the RTOs/ISOs "on the changes that would be required to implement the proposed participation model for electric storage resources as well as the associated costs and how those costs could be minimized."[13] Any final rule must be informed by this information and analysis.[14]

a) Today In New England, It is Unclear Whether Existing Participation Models Could Accommodate with Adjustments the Characteristics and Capabilities of Advanced Energy Storage Resources

According to ISO-NE, electric storage resources can participate as sellers in the wholesale markets as Generator Assets (both dispatchable and non-dispatchable), Dispatch Asset

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12 NOPR, at 86523.

13 NOPR, at 86529.

14 In addition, traditional energy storage resources that are well established in the marketplace await reforms that could enhance energy market participation. See, for more information, ISO New England Inc. and New England Power Pool, DARD Pump Parameter Changes; Docket No. ER16-954-000 (February 17, 2016).

Related Demands ("DARD"), Settlement Only Resources ("SOR"), Real Time Demand Response ("DR"), and Alternative Technology Regulation Resources (ATRR).[15] As buyers, electric storage resources can participate as Asset Related Demands (both dispatchable and non-dispatchable) and as Load Assets.[16] As previously referenced, electric storage resources can register and participate as more than one resource type. By concurrently registering as several resource types (as both sellers and buyers), an electric storage resource can maximize economic opportunities through its modes of market participation. Active market participation also enables electric storage resource owner/operators to manage the resource's state of charge. ISO-NE also has plans to "enable storage resources to more fully participate in the Real-Time Energy Market as dispatchable resources while continuing to participate in the regulation market as ATRRs."[17]

Given that an electric storage resource can register for a combination of resource types and participate in markets in which it is capable of providing a service, it is possible that adjustments to existing participation models may be sufficient to enable the participation of electric storage resources in the wholesale markets and may do so at the lowest reasonable cost to consumers. This should be verified as part of this proceeding.

Consider Figure 1, below, which overlays ISO-NE wholesale market resource types on a depiction of the current state of the technology. The underlying graphic, developed by Sandia National Laboratory for the U.S. Department of Energy / Electric Power Research Institute's 2015 Storage Handbook, presents various energy storage technologies by size and discharge time

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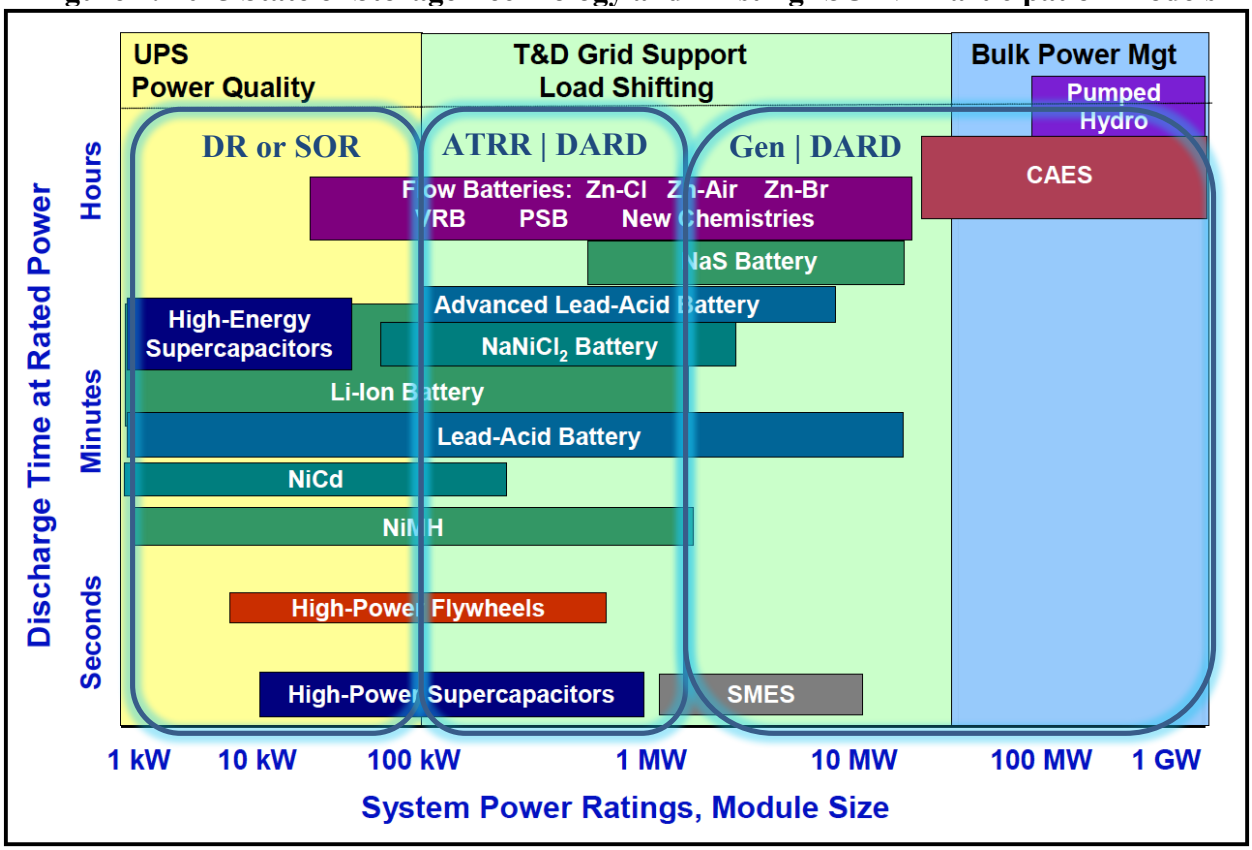
15 ISO-NE Data Response at 3-10. Capitalized terms not defined in this filing are intended to have the meaning given to such terms in the ISO-NE Transmission, Markets and Services Tariff (the "Tariff").

16 ISO-NE Data Response at 28-29. Electric storage resources may also buy energy through an intermediary, a Load Serving Entity.

17 ISO-NE Data Response at 3-10. ISO-NE's 2017 Wholesale Markets Project Plan has the beginning of stakeholder discussions on this topic scheduled for the third and fourth quarters of 2017. *2017 Wholesale Markets Project Plan* (December 15, 2016), at 1, available at https://www.iso-ne.com/markets-operations/markets-development/wholesale-markets-project-plan.

with generalized power system applications.[18] Based on information from ISO-NE's Data Response, Figure 1 identifies potential participation models for electric storage resources with existing resource types in the ISO-NE wholesale markets.

Figure 1: 2015 State of Storage Technology and Existing ISO-NE Participation Models



Note: DR – Demand Response, SOR – Settlement Only Resource, ATRR – Alternative Technology Regulation Resource, DARD – Dispatchable Asset Related Demand, Gen – Generator. See ISO-NE Data Response, at 3-10, for more information.

As shown in Figure 1, existing participation models, when considered together, cover a broad range of energy storage module sizes. The discharge time for each technology type provides an indication of the markets in which a resource type may be economically and physically capable of providing service. The ability to concurrently register as multiple resource

[18] Akhil, A., et al., DOE/EPRI Electricity Storage Handbook in Collaboration with NRECA, February 2015, Figure 19 at 29, available at http://www.sandia.gov/ess/publications/SAND2015-1002.pdf. *See also* www.sandia.gov/ess/publication/doeepri-electricity-storage-handbook/.

types may enable electric storage resources to customize a participation model that works best for its combination of size and discharge capability. Without more information, it is unclear whether current resource type size and performance requirements cannot be remedied by simply registering as another resource type with different size and performance requirements. Similarly, it is unclear whether an entirely new participation model, and attendant consumer costs and implementation effort, is necessary at this time.

b) Adapting Existing Participation Models, if Feasible and Effective, May Reduce Consumer Costs and Limit Time, Costs and Challenges Associated with Creating a New Model

Depending on the information that the Commission receives through this proceeding, there may be consumer value in leveraging existing participation models rather than mandating a new model. New England's experience with implementing full integration of demand response in to the energy market and changes to the frequency regulation market illustrate some of the factors involved in an RTO/ISO implementing significant market redesign. The technical issues associated with designing and implementing significant software changes, ISO-NE's workload, and its software vendor's availability were significant factors affecting the time that it took to implement these changes to the wholesale markets.[19]

To the extent that the information provided by ISO-NE (or others) in response to the NOPR indicates that: (1) establishing a new participation model would be challenging and/or expensive to implement from a software design perspective, (2) current modes of participation can be expanded with relatively less implementation issues (e.g., ISO-NE's plan to expand ATRRs' opportunities to participate in the energy and reserves markets); or (3) existing

[19] See, for example, 138 FERC ¶ 61,042 (2012); 150 FERC ¶ 61,007 (2015); ISO New England Inc., Docket Nos. ER16-167-000 and ER16-167-001 (December 23, 2015) and (December 6, 2016) (unpublished letter orders); 143 FERC ¶ 61,250 (2013), Notice of Extension of Time (July 29, 2013) in Docket No. ER12-1643-002, and 149 FERC ¶ 61,268 (2014).

participation models (or combinations thereof) provide or can be adjusted to provide successful means of participation for electric storage resources, such information will indicate that New England consumers may derive greater value from working to adjust existing participation models. Any final rule should consider the level and pace of consumer investment in market infrastructure necessary to implement a new participation model, and implementation costs and outcomes should be reasonably commensurate with expected consumer benefits.

For these reasons, NESCOE strongly encourages the Commission to provide regional flexibility in implementation. For example, NESCOE supports the Commission's proposal "to provide the RTOs/ISOs with flexibility to propose qualification criteria that best suits their proposed participation models."[20]

2. To the Extent that Existing Participation Models are Inadequate and Implementation of a New Participation Model is Technically Feasible and Economically Sensible for Consumers, a New Participation Model Would Reduce Barriers

The Commission will determine, after considering comments filed in this proceeding, where barriers to electric storage participation exist and how to address those barriers. To the extent that a new participation model is required and reflects the most cost-effective and appropriate approach to removing any such barriers, NESCOE supports several components of the Commission's proposed rule.

a) Inverter-Based Resources are Capable of Providing Ancillary Services

Inverter-based resources, like electric storage resources, combined with power electronics can, and do, provide ancillary services. As discussed in the NOPR, certain definitions in the

[20] NOPR, at 86529.

North American Electric Reliability Corporation's ("NERC") Glossary of Terms may limit electric storage resources' participation in the reserves markets.[21] To the extent that such definitions and the Northeast Power Coordinating Council's ("NPCC") requirements regarding synchronous generation artificially constrain electric storage participation in wholesale markets,[22] the Commission should clarify that electric storage resources "may provide services in the organized wholesale markets that they are technically capable of providing."[23]

If electric storage resources are fast enough to respond to frequency regulation dispatch, they are also capable of responding fast enough to provide 10-minute reserves. NERC or NPCC requirements that specify that certain reserves must be provided by spinning, synchronous generation are inconsistent with the technical capabilities of inverter-based resources like electric storage. There may be performance-based reasons for limiting participation in ancillary services markets, but an outdated definition or reliability standard based on more traditional forms of technology should not be a barrier to participation. Accordingly, NESCOE supports the Commission's preliminary finding that "participation in ancillary service markets should be based on a resource's ability to provide services when it is called upon rather than on the real-time operating status of the resource."[24]

b) Storage Resources Should be Permitted to De-Rate Capacity to Satisfy Technical Requirements for Market Participation

Similarly, a minimum run time requirement for a particular wholesale market should not preclude participation if an electric storage resource can de-rate its capacity in order to meet the minimum run time requirement. Electric storage resources with flexible rates of discharge may

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21 *Id.*, at 86530-86532.
22 *Id.*
23 *Id.*, at 86526.
24 *Id.*, at 86531.

be physically capable of meeting minimum run time requirements. For these resources, owner/operators should be permitted to optimize the use and market participation of their electric storage resources. De-rating a resource's capacity to extend its run time is a reasonable accommodation for wholesale market participation. NESCOE supports the Commission's proposed requirement to clarify the right to de-rate capacity in order to meet minimum run time requirements.

c) Optimal Electric Storage Resource Participation May Require New Bidding Parameters

Managing an electric storage resource's state of charge is critical for optimizing the use and market participation of electric storage resources. While some markets and applications place control of the storage resource in the hands of the RTO/ISO, participation in most markets is at the discretion of the asset owner/operator. To ensure economic efficiency, resources need to respond to dispatch instructions from the RTO/ISO and be made whole for any lost market revenue opportunities. To do this properly, RTOs/ISOs must receive and incorporate bidding parameters that reflect the operational characteristics of electric storage resources. In particular, NESCOE believes the Commission should require RTOs/ISOs to evaluate existing market bidding parameters to identify revisions necessary to reflect the unique characteristics of advanced electric storage resources and their ability to seamlessly transition between charging and discharging. NESCOE supports the Commission's proposed bidding parameters for the electric storage participation model including state of charge, upper and lower charge limits, and maximum charge and discharge rates. NESCOE also supports the Commission's proposal to require that RTOs/ISOs allow electric storage resources to self-manage their state of charge and upper and lower charge limits. NESCOE further agrees that electric storage providers should be

permitted to submit, at their discretion, additional bidding parameters including minimum and maximum charge time and minimum and maximum run time.

d) The Proposed Minimum Size Requirement (100 kW) Appropriately Balances Participation and Feasibility Concerns

In the NOPR, the Commission proposes to set the minimum size requirement for the electric storage resource participation model at 100 kW. The proposed size threshold is currently lower than the minimum size requirement for several ISO-NE markets. It is also larger than many smaller electric storage resources. The Commission preliminarily concludes that the proposed 100 kW minimum size requirement "balances the benefits of increased competition with the ability of RTO/ISO market clearing software to effectively model and dispatch smaller resources often located on the distribution system."[25] NESCOE supports the Commission's effort to balance these two important considerations and looks forward to the responses of RTOs/ISOs and others on the efficacy of the 100 kW requirement reflected in the NOPR.

In New England, the wholesale markets appear to be capable of accommodating resources of this size without compromising the efficiency of market dispatch. ISO-NE energy market bids must be at least 100 kW and some existing participation models use this size as a minimum capacity requirement.[26] It therefore seems likely that ISO-NE's market operation and administration software is currently capable of handling resources of this size. Thus, the Commission's 100 kW minimum size requirement proposal appears to be technically feasible in New England. Clarifying this eligibility threshold should enable greater participation of smaller electric storage resources in the wholesale markets.

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[25] *Id.*, at 86537.

[26] *Id.*

B. NESCOE Generally Supports the Eligibility of Distributed Energy Resource Aggregations to Participate in Wholesale Electricity Markets

NESCOE supports the Commission's efforts to remove barriers to participation for aggregated DER into the wholesale energy, capacity, and ancillary services markets. NESCOE understands that these resources' participation in the wholesale markets may improve competition and may "provide numerous supplementary benefits to the RTO/ISO systems."[27] In New England, some resource types are already permitted to aggregate individual resources into a larger resource for the purpose of wholesale market participation, subject to locational and other configuration requirements.[28] In the NOPR, the Commission proposes to "expand the types of distributed energy resources that are eligible to participate" through aggregators. Barring any technical objections raised by RTOs/ISOs in response to the NOPR, NESCOE supports the Commission's proposal to expand eligibility for market participation to DER aggregations, subject to a clear statement by the Commission that any final rule does not, and is not intended to, alter federal and state jurisdictional boundaries as discussed further below.

1. Simultaneous Participation in Retail Compensation Programs Should Not Categorically Disqualify Participation in Wholesale Electricity Markets or Consideration in Transmission Studies

Out of concern for duplicate compensation, the Commission proposes to make DERs that participate "in one or more retail compensation programs such as net metering or another wholesale market participation program" ineligible to participate in the wholesale markets as part of a DER aggregation.[29] As discussed below, while well intended to prevent certain instances of duplicate compensation, the Commission's proposed ineligibility criterion is overly broad.

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27 *Id.*, at 86542.
28 *Id.*, at 86539.
29 *Id.*, at 86543.

Instead, the standard can and should be straightforward: aggregated DERs should be permitted to participate in wholesale electricity markets if they provide an incremental service to those markets. Provided there are adequate protections in place to prevent duplicate compensation for the same service, similar to storage resources, DERs should be permitted to participate in wholesale markets through an aggregator to the extent to which they are physically capable of providing services.

While the Commission's proposed criterion for ineligibility (concurrent participation in a retail compensation or other wholesale market participation program) may address some instances of potential duplicate compensation, it goes too far in restricting other legitimate modes of participation. Consider a DER that provides transmission and/or distribution system services, but has additional capacity to spare that could be employed in the wholesale markets through an aggregation. Or, a DER could participate in the wholesale market under one participation model, but has additional capacity it could utilize as part of an aggregation in another wholesale market. In these instances, it is unclear why these DERs should be precluded from participating through an aggregation. When there is truly a different or incremental service being provided by the same resource, there is no duplicate compensation. In such a case, *additional* compensation is materially different from *duplicate* compensation.

As the Commission recently clarified in its Policy Statement on electric storage resources providing multiple services, enabling resources to provide multiple services "ensures that the full capabilities of these resources can be realized, thereby maximizing their efficiency and value for the system and to consumers."[30] What is true for electric storage resources is also true for DERs: there may be other ways of preventing double recovery of costs besides categorical

[30] Utilization of Electric Storage Resources for Multiple Services When Receiving Cost-Base Rate Recovery, Policy Statement in Docket No. PL17-2-000 (January 19, 2017) at P 2.

disqualification for concurrent wholesale market participation. DER owners/operators should be able to present an approach for preventing double recovery that comports with Commission precedent.

Moreover, the Commission should not prohibit RTOs/ISOs from considering DERs in transmission planning and resource adequacy studies when the resource is simultaneously participating in a retail compensation or other wholesale market program. For example, ISO-NE accounts for current and foreseeable state-supported energy efficiency and DER in transmission studies, which has provided a more accurate picture of future system conditions and has delivered significant consumers economic benefits.[31] The NOPR speaks directly to prohibiting wholesale market participation in certain circumstances, but such a rule could be misinterpreted to apply in other contexts. The Commission should clarify in any final rule that any proposed prohibition on double compensation does not preclude RTOs/ISOs from considering DER in transmission planning and resource adequacy contexts.

2. Participation in Wholesale Electricity Markets Through an Aggregation Does Not Alter Jurisdiction Over DER Located on the Distribution System

In the NOPR, the Commission states that the manner in which a resource consumes or produces energy will determine whether the "resource is engaging in a sale for resale subject to [the Commission's] jurisdiction."[32] In addition, the Commission defines "distributed energy resources as a source or sink of power that is located on the distribution system, any subsystem thereof, or behind a customer meter."[33] NESCOE appreciates the Commission's recognition in the NOPR of the jurisdictional issues implicated by the proposed rule. The elective participation

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31 *See, e.g.,* ISO New England Inc. 154 FERC ¶ 61,008 (2016).
32 NOPR, at 86538.
33 NOPR, at 86539.

of DER in the wholesale markets as part of an aggregation does not, and will not, change the states' jurisdiction over retail sales or facilities used in local distribution. To ensure a shared and clear understanding among the Commission, states, and interested entities, any final rule would need to make clear that the Commission's proposed rule does not, and is not intended to, alter federal and state jurisdictional boundaries. Absent such a definitive statement, it is unclear whether NESCOE would be able to support any Commission rules regarding aggregated resources located on the distribution system.

V. Conclusion

For the reasons stated herein, NESCOE respectfully requests that the Commission consider these comments as it determines how to proceed with removing barriers to participation in the organized wholesale electricity markets for electric storage resources and DER aggregations.

Respectfully submitted,

THE NEW ENGLAND STATES COMMITTEE ON ELECTRICITY

By its attorney,

/s/ Benjamin S D'Antonio

Benjamin S D'Antonio, Esq.
Counsel & Analyst
New England States Committee
on Electricity
655 Longmeadow Street
Longmeadow, MA 01106
Tel: (603) 828-8977
Email: BenDAntonio@nescoe.com

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