

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

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

**COMMENTS OF THE R STREET INSTITUTE**

Pursuant to the Federal Energy Regulatory Commission’s (the “Commission” or “FERC”) Notice of Proposed Rulemaking (“NOPR”) issued on November 17, 2016,<sup>1</sup> the R Street Institute (“RSI”) respectfully submits these comments in response to the Commission’s proposed revisions to remove barriers to the participation of electric storage resources and distributed energy resource aggregations in the capacity, energy and ancillary service markets operated by regional transmission organizations (RTO) and independent system operators (ISO). The Commission specifically proposed to require each RTO and ISO to revise its tariff to (1) establish a participation model consisting of market rules that, recognizing the physical and operational characteristics of electric storage resources, accommodates their participation in the organized wholesale electric markets and (2) define distributed energy resource aggregators as a type of market participant that can participate in the organized wholesale electric markets under the participation model that best accommodates the physical and operational characteristics of its distributed energy resource aggregation.

**I. ABOUT R STREET INSTITUTE**

The R Street Institute (RSI) is a pragmatic, free market oriented think tank. RSI aligns with such thinkers as Milton Friedman, Friedrich Hayek, Ronald A. Coase, James M. Buchanan and Arthur C. Pigou. RSI favors consumer choice; regulation that is transparent and applied equitably; and systems that rely on price signals rather than central planning.

RSI recognizes market failures – including public goods and externalities – are valid concerns governments must sometimes address. RSI also recognizes the nature of a democratic society often means agreeing on a compromise that may not always represent the first, best solution. RSI sees its role as offering research and analysis that advance the goals of a market-oriented society and efficient

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<sup>1</sup> *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Notice of Proposed Rulemaking, 157 FERC ¶ 61,121 (Nov. 17, 2016).

government, with the full realization that progress often occurs incrementally. In other words, RSI looks for free market victories on the margins.

In 2016, RSI launched an electricity policy program to research and promote consumer choice and economically sound market and rate design. RSI believes competitive electricity markets and consumer choice yield superior economic and environmental results relative to the regulated monopoly model.

## **II. COMMENTS OVERVIEW**

RSI agrees with the need for extensive reform to enhance market performance by removing artificial barriers to entry for energy storage and distributed energy resources (DERs).<sup>2</sup> RSI requests that the Commission pursue actions that reduce or eliminate such discriminatory market rules and practices and clearly avoid preferential treatment for energy storage and DERs. The NOPR is effectively two proposed rulemakings in one, each on a very complex and novel subject. Proceeding concurrently on these subjects, given their degree of overlap, is prudent. However, the Commission may receive higher quality comments and compliance filings if barriers to energy storage and DERs are broken into separate NOPRs.

Critics sometimes argue that accommodations to allow new technologies to participate in a market is preferential treatment or favoritism. The validity of this argument hinges on the nature of the accommodations. The NOPR is consistent with established principles of market design in aiming to reduce artificial barriers to entry and foster competition, which benefits market performance.

Proactive market design is not merely constrained to enhancing static economic efficiency but stimulating dynamic economic efficiency. The latter requires open markets that send transparent prices, signaling the value of advancing pre-commercial resources. Waiting to adjust market design to commercial technologies inhibits new entry and innovation, which thrives on transparent price signals and ease of market entry. Ambiguity in unconventional resource value and artificial barriers to entry create an information shortage to innovators and hinders their ability to attract capital by artificially inflating investment risk.<sup>3</sup> The NOPR proposes critical reforms to counteract these concerns for two classes of resources. It will enhance both static and dynamic efficiencies.

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<sup>2</sup> DERs include, but are not limited to, distributed energy storage resources.

<sup>3</sup> Devin Hartman, "Wholesale Electricity Markets in the Technological Age," R Street Institute, August 2016. <http://www.rstreet.org/wp-content/uploads/2016/08/67.pdf>

Artificial barriers take a variety of forms, from directly prohibiting participation to ambiguity in market rules. A principled approach will remedy these more efficiently than an overly prescriptive decree of market design changes. Clear principles and compliance criteria are critical as similar attempts to reform market design have yielded wide variance in compliance quality (e.g., Order No. 755 compliance).<sup>4</sup> RSI requests the Commission create a policy framework that stimulates continual learning and adoption of best practices.

### **III. COMMENTS ON THE ELIMINATION OF BARRIERS TO ELECTRIC STORAGE RESOURCE PARTICIPATION IN ORGANIZED WHOLESALE ELECTRIC MARKETS**

The NOPR offers a robust framework to reduce many artificial barriers to entry for energy storage. However, it does not exhaustively address all key aspects of how to accommodate the limited-use nature of storage. In particular, the Commission should call more attention to how discharge limitations affect capacity market participation, especially in performance-based capacity constructs, as well as the treatment of opportunity costs in energy and ancillary service markets.

Some aspects of ensuring economically efficient market design with respect to energy storage resources may go beyond the current scope of this proceeding. For example, storage resources are particularly well suited to provide services not procured through RTO/ISO market mechanisms, such as reactive power, black-start capability and primary frequency response. Failure to develop market mechanisms undervalues storage and other resources capable of providing these services. Storage economics are also heavily impacted by rules affecting energy and ancillary service price formation, including scarcity pricing, pricing intervals, make-whole payments and treatment of opportunity costs. Such processes and rules require examination for reasons beyond energy storage, but the rise of economical storage prospects should elevate the prioritization of their review and reform, if necessary.

#### **A. Creation of a Participation Model for Electric Storage Resources**

RSI supports the principle of an energy storage participation model and agrees with the NOPR position that it will help eliminate artificial barriers to entry and promote competition and economic efficiency. Executing this in practice will prove challenging. The heterogeneity of physical characteristics of various energy storage technologies may require some degree of compromise between principle and practice (e.g., minimum size requirement).

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<sup>4</sup> *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, Order No. 755, 137 FERC ¶ 61,064 (Oct. 20, 2011).

Defining qualification criteria is the first test. One question will be whether accommodations should exist for pre-commercial as well as commercially-available energy storage. In theory, this should include all pre-commercial technologies, but clear cost-benefit concerns would arise if it requires incurring sizable market reform and implementation costs for speculative benefits. Therefore, RSI suggests using expected future costs and benefits as drivers of qualification criteria for determining whether and how to reform a market to accommodate energy storage. Quantifying the expected benefits of prospective technologies is challenging, but a weighted scenario analysis or probabilistic assessment would be suitable.

The Commission should make it an objective for its energy storage policy to age well. The rapidly evolving state of energy storage technologies may result in discriminatory rules in the near future that do not appear discriminatory today. This places emphasis on instituting processes to periodically re-evaluate market design for evidence of discriminatory practices. This is not currently routinized in RTO/ISO practices, nor those of their independent market monitors. RSI suggests the Commission consider directing RTO/ISOs or a third-party to conduct periodic reviews of the state of emerging and contemporary technologies and evaluate whether market rules create artificial barriers to entry and, if so, offer preliminary evaluations of market design reform options. This would result in expedient identification of discriminatory rules that either the Commission or RTO/ISOs and/or their stakeholders could seek to rectify.

## **B. Eligibility to Participate in Organized Wholesale Electric Markets**

Removing explicit eligibility restrictions is simple. For example, ISO-NE, NYISO, and MISO allow storage resource eligibility to a subset of market services (e.g., frequency regulation) but restrict access to other markets that storage resources have the physical capability to provide. The NOPR addresses these concerns sufficiently. Implicit barriers are harder to identify, such as the tariff ambiguity on storage resource eligibility and compensation (e.g., SPP). RSI supports directing RTO/ISOs to clarify the eligibility, treatment and compensation of storage resources. This will require judgement of what constitutes “sufficient clarity,” however providing explanations in the tariff, RTO/ISO business practice manuals and RTO/ISO training materials is a reasonable expectation.

Regarding more nuanced eligibility concerns, ideally storage resources should not have to submit an energy schedule to participate in ancillary service markets unless they have a must-offer energy obligation (i.e., cleared as a capacity resource). As the Commission seeks input on software changes needed to accommodate the elimination of the energy schedule requirement, it should weigh such costs against projected benefits in reaching a determination.

The NOPR's proposal to allow capacity de-rates for energy storage is necessary to facilitate efficient participation. De-rates should be permitted not only to meet minimum run-time requirements but also to manage the risk of capacity underperformance penalties. Other than de-rates, the NOPR sidesteps capacity construct compatibility concerns associated with the use-limited nature of storage resources.

Resource adequacy is a dynamic condition (i.e., system resource needs vary dramatically by time and location, often at granular intervals) poorly captured by rigid administrative rules. Such rules do not present extensive barriers to most conventional resources, given rule tailoring to their rigid performance profiles. In contrast, energy storage is a dynamic resource class with an immense diversity of attributes that enhance resource adequacy. The dynamism of storage and resource adequacy needs align well in theory, but a variety of administrative capacity rules limit this realization in practice.

Capacity products and performance requirements may not be well-suited to extract the full economic value of storage for resource adequacy purposes. These can create prohibitive artificial barriers to capacity market participation for storage resources but, at the same time, relaxing them too aggressively may raise reliability concerns. For example, scarcity events have a variety of durations poorly captured by a single minimum run-time requirement. The requirement would preclude participation of resources that may reliably perform during scarcity events with shorter duration than the required run-time. However, if the capacity construct does not distinguish between short and long duration resource needs, then relaxing the requirement may result in inferior products undermining reliability during long duration shortages.

RSI encourages the Commission to seek further detailed comments and analysis on methodologies for storage participation in capacity markets, especially in a performance-incentive context (e.g., revisiting penalty factors and the definition of shortage events). Any reforms may best be left for individual RTO/ISO compliance filings or separate individual RTO/ISO proceedings, but the record would benefit from a more robust discussion.

### **C. Bidding Parameters for Electric Storage Resources**

The required and optional physical parameters proposed in the NOPR are reasonable. Incorporation of optional parameters into RTO/ISO software should proceed if justified by forward cost-benefit analyses.

The NOPR does not discuss economic parameters. In particular, treatment of opportunity costs centrally affects the bid and offer strategies and value proposition of energy storage resources. The Commission should ensure rules affecting energy opportunity costs, especially for cleared capacity

resources, do not create an undue burden constraining sound offer and bid strategies. This may require reconciling performance incentives between the energy and capacity markets. For example, the PJM independent market monitor has expressed concern that allowing opportunity costs in energy offers by capacity resources undercuts capacity performance incentives. To the extent opportunity cost treatment differs between capacity and non-capacity resources, any de-rated capacity storage resource participating in the energy and ancillary service markets may face inconsistent rules.

RTO/ISOs will dispatch energy storage resources as supply during high-priced periods, which are especially vulnerable to the exercise of market power. The NOPR provides no discussion on market power mitigation. Economic withholding is harder to detect accurately for offers reflecting opportunity costs, which are more difficult for market monitors to verify than physical operating costs (“hard” marginal costs). A storage resource may exercise market power under a loose determination of opportunity costs (e.g., a lax conduct threshold). Conversely, mitigation practices using an opportunity cost methodology more constrictive than storage owners’ market expectations may result in wrongful mitigation.

Physical withholding detection will also prove challenging, given the complexity and heterogeneity of physical characteristics of storage resources. For example, a storage resource may have an economically sound rationale for altering its charge/discharge rates and upper and lower charge limits (e.g., similar to the cost-avoidance reasoning behind a thermal plant differentiating economic and emergency parameters). At the same time, a storage resource may have incentive to manipulate these parameters to exercise market power. RSI suggests the Commission seek comment on energy storage economic and physical withholding methodologies, especially from the independent market monitors.

#### **D. Eligibility to Participate as Wholesale Seller and Buyer**

Enabling energy storage to participate as a supply and demand resource simultaneously is appropriate to optimize unit commitment and dispatch. The concern of an RTO/ISO accepting both a supply offer and demand bid from a single resource over the same interval seems unwarranted provided that the security-constrained software correctly recognizes the conflict with physical parameters submitted (i.e., a resource cannot simultaneously charge and discharge). This may require a modest software improvement.

Storage resources should be available to the RTO/ISO as a dispatchable resource capable of setting market prices. Limitations in the ability of offline resources to set price in some RTO/ISO markets exists, however the Commission’s efforts in the price formation proceedings should address this.

If a RTO/ISO dispatches a storage resource as load when the energy price is higher than its bid price, the resource would only lose the opportunity to earn greater revenues if the RTO/ISO would otherwise dispatch it as supply. A storage resource dispatched as load when the price is above the bid and beneath the supply offer would not create a lost opportunity (i.e., the resource would otherwise be idle). If the market price exceeded the supply offer, then the resource should receive a make-whole payment equal to the foregone revenue at the prevailing market price. Regardless of the supply offer, a storage resource dispatched as load when the market price exceeds the bid price should only pay the bid price. This would create a need for a mechanism to address the resulting system revenue deficit.

#### **E. Minimum Size Requirement**

No economic rationale justifies variance in minimum size requirements across the RTO/ISOs. Lowering the requirement across RTO/ISOs will reduce this barrier to entry. Retaining any minimum size requirement risks creating an artificial barrier to entry as well as an inferior product by effectively requiring broader aggregation of small storage devices that may undermine the granularity of dispatch capability (or exacerbate the barrier to entry if combined with a granular locational requirement). The NOPR correctly notes the need to balance the benefits of lowering the requirement with the ability of RTO/ISO market clearing software to model and dispatch small resources.

The best approach to determining the minimum size requirement explicitly weighs benefits and costs. It is unclear how the proposed 100 kW minimum size requirement, which appears arbitrary, balances benefits and costs. The Commission should request further information, if needed, before basing its decision on expected future costs and benefits.

#### **F. Energy Used to Charge Electric Storage Resources**

Compensating behind-the-meter resources at full LMP raises concerns (see comments at IV. A.).

### **IV. COMMENTS ON PARTICIPATION OF DISTRIBUTED ENERGY RESOURCE AGGREGATORS**

The NOPR correctly recognizes the extensive barriers to entry for DERs and also that DERs should be able to participate in all wholesale electric markets for which they are technically capable. The NOPR proposes important steps to eliminate such unduly discriminatory rules.

The Commission should only attempt to reduce artificial barriers to entry – such as excessive requirements on individual DERs – not natural sources, such as those necessary to treat DER aggregators on a consistent and comparable basis with other resources. Relaxing some resource requirements for DER aggregators, such as locational requirements, could result in an inferior product. On the surface, this could constitute preferential treatment and unjust and unreasonable rates. However, the

inevitability of some DER development requires expanded thinking about how to best harness these unconventional resources.

Barriers to wholesale market entry will not deter behind-the-meter resource development to the same degree as front-of-the-meter resource investment. DER development will persist largely because of retail compensation and tax incentives. Without proactive reforms supporting economic DER integration, inevitable DER development will create growing market disruption and potential reliability concerns from lack of resource control and visibility. These include exacerbating load forecast uncertainty and forward resource over- and under-procurement risk. This underscores that even imperfect market integration of DERs is a worthy pursuit. Market design experimentation is a given, with success likely to come through trial-and-error. Still, precedent remains important since this proceeding marks the launch of RTO/ISO-wide market design path dependency on DER participation.

#### **A. Eligibility to Participate in the Organized Wholesale Electric Markets through a Distributed Energy Resource Aggregator**

The NOPR correctly finds that limiting the type of technologies allowed to participate in organized wholesale markets through DER aggregators would create a barrier to entry for emerging or future technologies by precluding their eligibility to provide energy, capacity and ancillary services. At the same time, the NOPR makes an important recognition of the need to avoid duplicate compensation that DER aggregators may receive for the same services at the wholesale and retail levels. This may avoid extending the flawed Order No. 745 compensation scheme (full locational marginal price without netting avoided retail compensation) for demand response resources to a broader suite of technologies.<sup>5</sup> However, most retail rates do not provide customer-producers with an accurate, transparent wholesale price signal. Thus, precluding a retail program recipient from participating in the wholesale market may not result in an efficient rate for the resource owner, as it would if it received the wholesale price net retail compensation for the same service. Revising Order No. 745 is outside the scope of this proceeding, but the Commission may wish to consider internally the effects of its reform by enabling flexibility in the participation model to net-out retail sales.

The Commission should not establish minimum or maximum capacity limits for individual DERs. The performance of the DER aggregator is what affects the wholesale market and reflects individual DERs. Thus, wholesale eligibility rules should apply exclusively to the DER aggregator.

#### **B. Locational Requirements for Distributed Energy Resource Aggregations**

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<sup>5</sup> *Demand Response Compensation in Organized Wholesale Energy Markets*, Order No. 745, 134 FERC ¶ 61,187 (March 15, 2011).



The locational characteristics of DER aggregation dispatch are very important, since the highest value for DER resources is in import-constrained areas, especially load pockets. This makes the use of DER dispatch particularly impactful on transmission congestion management. Geographically broad demand response dispatch has sometimes worsened transmission constraints, which highlights the need to ensure DER aggregation aligns with granular dispatch capability. If DER aggregation proves an effective transmission management tool, it will also provide a product capable of substituting for transmission upgrades and expansion.

The more geographically granular the aggregation requirement, the higher the per unit transaction costs (e.g., more separate metering, telemetry and communication equipment needs as well as the overhead costs of building and submitting more sets of economic and physical parameters). This suggests that DER aggregators will pursue aggregations at broad levels. A broad locational requirement would likely result in DER aggregation groups that eclipse the capability of nodal dispatch. Thus, locational requirements broader than a pricing node risk diluting energy price signals and could raise local reliability challenges at times of high concentrated transmission congestion.

At the same time, strict locational requirements may deter DER aggregation, resulting in unmanaged DER development – the worst possible scenario. Thus, allowing DERs to aggregate broader than a pricing node may result in the best initial management of inevitable DER resources. The locational requirement should weigh the benefits of granular dispatch with the costs of expanded unmanaged DER development. RSI suggests that FERC consider directing the RTO/ISOs or a third-party to study the costs and benefits of different levels of DER locational requirements.

Ideally, a single DER aggregation participating in the energy market would align with a pricing node, consistent with the prevailing paradigm for transmission congestion management. Conceivably, phasing-in tighter locational requirements for DER aggregators may prove cost-effective. If the Commission elects to relax locational requirements for DER aggregators, RSI suggests the development of a roadmap to phase-in more granular DER aggregation dispatch capabilities. This should apply lessons learned from advancing the granularity of demand response dispatch in a manner lowering transaction costs.

Broader locational requirements should be mindful of the consequences of exceeding modeled transmission constraints for energy market participants. DER participation in capacity and ancillary service resources could be broader without adverse market or reliability effects, provided it is consistent with existing locational sub-market definitions. However, a resource clearing the capacity market has a

must-offer energy market requirement, such that the requirements on energy markets will de facto apply to capacity resources.

### **C. Information and Data Requirements for Distributed Energy Resource Aggregations**

Aggregated resources face transaction costs, including information and data requirements, with per unit costs inversely proportionate to the size of the aggregation group. Requiring the same meteorological data for DER aggregators as standalone variable energy resources could create an undue burden on individual DERs. The variances in individual and aggregated resources' physical and economic parameters from meteorological conditions is generally *de minimis* across adjacent locales. At some level of geographic dispersion, such variances would affect parameters significantly enough to justify separate meteorological reporting. These geographic intervals would be location-specific, consistent with established sub-regional meteorological profiles. The Commission could direct RTO/ISOs to require information from DER aggregators based on geographic dispersion parameters tailored to the specific nature of the DER and geographic conditions. This would allow DER aggregators to derive meteorological information across a broader resource base, possibly consisting of multiple DER aggregation points to reduce costs.

### **D. Metering and Telemetry System Requirements for Distributed Energy Resource Aggregations**

The NOPR correctly identifies the transaction costs of metering, telemetry and communication equipment impose disproportionately high transaction costs for smaller individual resources, which may prove cost-prohibitive. Requiring metering and telemetry capabilities of DER aggregators, not individual DER resources, is reasonable. This places the responsibility on the aggregator, the only party interfacing at the wholesale level, to perform consistent with RTO/ISO needs. The aggregator can decide the capabilities of the individual resources needed to ensure suitable performance. This approach creates an appropriate incentive structure and avoids state jurisdictional concerns.

### **E. Coordination between the RTO/ISO, the Distributed Energy Resource Aggregator, and the Distribution Utility**

Capturing the critical opportunity to facilitate economically efficient DER aggregation requires providing the correct incentives for active network management at the wholesale and retail levels. Advances in software and other digital technologies have enhanced the ability to facilitate transactive platforms. A framework that creates incentives for innovation and deployment of advanced active network management practices (e.g., real-time operating procedures) and technologies (e.g., software-enabled communications among control centers) is imperative to harness the economic value of DERs and avoid the downsides of uncontrolled DERs.

To co-optimize transmission and distribution systems, DER aggregators' submitted wholesale economic and physical parameters should accurately reflect distribution system constraints. This may require a dynamic distribution platform, otherwise unpredicted distribution constraints may cause inaccuracies in DER aggregators' wholesale forward parameters and adversely affect wholesale market performance. Development of a robust distribution platform requires state action, such as that explored in New York's Reforming the Energy Vision initiative. The Commission's actions should aim to maximize compatibility with various DER distribution-pricing models, which will help co-optimize platforms and avoid double-counting of services in the retail and wholesale markets.

The Commission should consider organized state outreach to facilitate robust coordination between retail and wholesale policies. Establishing a shared framework of policy principles and a working committee may drive improved federal-state policy coordination.

## **V. CONCLUSION**

In response to the NOPR, RSI respectfully requests the Commission consider the comments contained herein.

Respectfully submitted,

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