UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Utilization In the Organized Markets of Electric Storage Resources as Transmission Assets Compensated Through Transmission Rates, for Grid Support Services Compensated in Other Ways, and for Multiple Services	**)**	**Docket No. AD16-25-000**

COMMENTS OF THE ENERGY STORAGE ASSOCIATION

The Energy Storage Association ("ESA") submits these Comments in response to the directives issued by the Federal Energy Regulatory Commission's ("FERC" or the "Commission") Office of Energy Policy and Innovation dated November 14, 2016 pertaining to above-captioned docket. As documented below, feasible pathways exist for enabling electric storage to provide multiple services while respecting the institutional design of organized wholesale markets. Within the scope of the instant docket, there are several fundamental principles that FERC can establish in short order that would support greater system flexibility and resource efficiency. Those changes would remove further barriers to storage in most markets.

These Comments highlight paths forward for participation for electric storage resources in multiple services and recommend actions that FERC is respectfully requested to take, including but not limited to: establishing foundational guidance for RTOs/ISOs to allow electric storage providing transmission services to receive market revenues for generator services under certain circumstances; incorporating electric storage into RTO/ISO transmission planning processes; and establishing foundational guidance for RTOs/ISOs to

allow electric storage providing wholesale market services to also provide distribution or end-user services.

I. COMMUNICATIONS

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II. ABOUT THE ENERGY STORAGE ASSOCIATION

Since its inception 27 years ago, the ESA has promoted the development and commercialization of competitive and reliable energy storage delivery systems for use by electricity suppliers and their customers. ESA's membership comprises a diverse group of electric sector stakeholders, including utilities, independent power producers, manufacturers of advanced technologies -- such as batteries, flywheels, thermal energy storage, compressed air energy storage, supercapacitors, and other technologies -- component suppliers, and system integrators.

ESA's nearly 200 member companies have expertise in transmission- and distribution-level grid operations relevant to electric storage, as well as firsthand knowledge of the regulatory challenges to financing and operating commercial electric storage facilities to realize full system benefits.

III. DISCUSSION

A. FERC is correct that electric storage has the flexibility to successfully provide services in different markets. Thus, ESA respectfully requests that the Commission set foundational principles for the development of appropriate regulatory frameworks at each RTO/ISO.

Fundamentally, organized wholesale markets are predicated on efficient signaling of supply resources to enter and exit the market to meet system demand. However, power system engineering ultimately constrains the extent to which markets can do so while meeting reliability needs. The resulting reliability gaps are met with transmission infrastructure through non-market cost-recovery mechanisms, with cost allocated to system users. Electric storage's key value is flexibility: it is technically capable of offering generator services while providing transmission service. Similarly, electric storage is technically capable of offering retail services while providing wholesale service. ESA appreciates that FERC recognizes that continuing barriers to storage acting in a multiple-use capacity represents a lost opportunity for greater competition among reliability solutions and market service provision.

For example, a 2014 study of multiple-use storage in the ERCOT system found that, while large-scale storage deployment would provide significant net system benefits, ultimately the fragmented revenue streams between T&D and generator services would prevent storage from being commissioned.[1] The report concluded: "Given the significant benefits that storage can bring to the system as a whole, enabling cost-effective investments in electricity storage will require a regulatory framework that helps investors

[1] Brattle Group, *The Value of Distributed Electricity Storage in Texas*, Nov 2014, available at http://www.brattle.com/system/news/pdfs/000/000/749/original/The_Value_of_Distributed_Electricity_Storage_in_Texas.pdf?1415631708

capture both the wholesale market and the T&D system values associated with the storage devices."

Electric storage solely providing transmission service remains rare, although instances of capacity deferral exist. For example, the Presidio Battery Project in Texas represents a specific demonstration of electric storage providing transmission service. Installed in 2010 as part of a regional transmission upgrade approved by ERCOT and the Texas Public Utilities Commission, a 4.8 MW battery unit has facilitated network reliability while deferring a 69 kV sub-transmission line upgrade.[2] Similarly, the 2MW Balls Gap Storage System in West Virginia, installed in 2008, deferred a more expensive 138 kV transmission line upgrade and has since islanded customers from system outages.[3] As AEP noted in testimony at the November 9, 2016, technical conference, electric storage resources provide transmission owners the ability to manage uncertainty and avoid unwarranted investments, given that planning horizons (typically 10-20 years) are shorter than asset lifetimes (40-50 years).

While there remain few instances of storage providing transmission service, electric storage is being deployed on the distribution system to provide distribution network capacity. For example, in Texas, AEP has proposed storage to avoid required distribution system upgrades at one-quarter of the cost.[4] In Utah, Rocky Mountain Power has proposed

[2] Edison Electric Institute, *Transmission Projects at a Glance – American Electric Power*, available at http://www.eei.org/ourissues/ElectricityTransmission/Documents/Trans_Project_A-D.pdf#4
[3] "AEP Milton NaS Battery Energy Storage System," DOE Global Energy Storage Database, available at http://www.energystorageexchange.org/projects/268
[4] TX PUC Project No. 46368, *Application of AEP Texas North Company For Regulatory Approvals Related To The Installation Of Utility-Scale Battery Facilities*, 16 Sep 2016, available at http://interchange.puc.texas.gov/WebApp/Interchange/application/dbapps/filings/pgControl.asp?TXT_UTILITY_TYPE=A&TXT_CNTRL_NO=46368&TXT_ITEM_MATCH=1&TXT_ITEM_NO=&TXT_N_UTILITY=&TXT_N_FILE_PARTY=&TXT_DOC_TYPE=ALL&TXT_D_FROM=&TXT_D_TO=&TXT_NEW=true

storage to avoid needed distribution upgrades at two-thirds of the cost.[5] In Connecticut, electric distribution companies have proposed electric storage projects with a primary focus on deferring distribution feeder and substation capacity upgrades.[6] Additionally, electric storage is providing transmission deferral in combination with other distributed resources. For example, the Boothbay Smart Grid Reliability Project in Maine has deployed electric storage as part of a suite of resources to avoid building a new transmission line.[7]

Storage is also used behind-the-meter as a load-modifying resource to defer network capacity. In New York, storage technologies are being deployed in behind-the-meter applications for T&D deferral – notably in the Brooklyn-Queens Demand Management project that will use storage and other resources to provide peak load reductions that avoid a $1 billion substation upgrade at half that cost.[8] Moreover, behind-the-meter storage resources are similarly capable of wholesale services in addition to retail services, such as demonstrated recently in California.[9]

While these examples are promising signs of the value storage can bring to transmission and distribution networks, there are challenges to the economics of electric storage implemented in this manner. In *Western Grid,* FERC indicated that electric storage could be treated as a transmission facility; however, in that Order, FERC did not provide a path forward for higher utilization of such assets, which would increase competitiveness of

[5] See "Solar and Energy Storage Technology Program" in Utah PSC Docket 16-035-36 Rocky Mountain Power STEP Act Initiatives, available at http://www.psc.utah.gov/utilities/electric/16docs/1603536/289007Exhibit%20D%20-%20Solar%20and%20Energy%20Stroage%20Progam%20REDACTED%209-12-2016.pdf

[6] See Grid-Side Enhancement Demonstration Project proposals filed by CL&P and UIL at the Connecticut Department of Energy and Environmental Protection, 4 Nov 2016, available at http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8525797c00471adb85257f53007086cd?OpenDocument and http://www.dpuc.state.ct.us/DEEPEnergy.nsf/c6c6d525f7cdd1168525797d0047c5bf/8525797c00471adb85257f53006aef95?OpenDocument, respectively.

[7] "Maine turns to battery storage to avoid transmission investment," *Utility Dive*, 9 June 2015, available at http://www.utilitydive.com/news/maine-turns-to-battery-storage-to-avoid-transmission-investment/400440/

[8] NY PSC Docket No. 14-01390/14-E-0302, available at http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=45800

[9] "Stem, PG&E bid aggregated energy storage into CAISO real-time market," *Utility Dive*, 8 Sep 2015, available at http://www.utilitydive.com/news/stem-pge-bid-aggregated-energy-storage-into-caiso-real-time-market/405218/

storage as an alternative to conventional transmission and increase the capabilities of the electric system. Electric storage will tend to have low utilization if limited by regulations to only providing network service. As such, unless the avoided transmission or distribution capacity is particularly expensive, electric storage providing only network service does not presently offer sufficient revenue to justify investment. Similarly, while CAISO in engaged with relevant state authorities on a path forward for distribution-connected storage to provide both wholesale and retail services, no other market has clarified a framework to do so.

As ESA and its membership have stated repeatedly, and has been successfully demonstrated time and time again, using storage in different markets is achievable and fundamentally necessary to ensure rates that are just and reasonable, as well as increase grid reliability and resiliency. The path forward to using storage in different markets is for FERC to provide certainty that the rules will be modified and the markets opened. Thus, ESA respectfully requests that FERC do just that in this rulemaking.

In the comments that follow, ESA wishes to bring to the Commission's attention the principles and activities that can support each organized wholesale market to determine a path forward on enabling multiple-use electric storage.

B. The Commission should establish the principles by which an electric storage resource can be used for both transmission services and competitive generator services.

Electric storage can provide several transmission services. It can provide ancillary services offered by transmission assets, such as voltage/var management and thermal overload protection. It can be employed in post-contingency operations. It can provide outage mitigation and islanding capabilities. In the event that generator retirements are identified in advance, it can substitute for reliability-must run contracts. Additionally, by time-

shifting supply and demand, storage is capable of providing transmission congestion relief and avoiding or deferring additional transmission capacity. These latter functions are not the traditional domain of transmission assets, yet bear on transmission service market efficiency—and the distinction between asset identification and service provision is critical. Electric storage should always be viewed as capable of providing transmission *services*, regardless of whether it is deemed a transmission *asset* in a particular instance.

ESA respectfully requests that the Commission affirm that electric storage resources providing transmission services can offer market services. Absent a statement from the Commission to this effect, RTOs/ISOs and market participants will not have a sufficient foundation upon which to develop such a method, and the uncertainty over its viability before the Commission will defeat market innovation

At the technical conference, most stakeholders agreed that allowing electric storage to provide both transmission and generator services is in the public interest and could be accomplished in accordance with traditional ratemaking standards. For example, during the technical conference, participants identified three models that RTOs/ISOs could adopt: (1) a third-party provider model, in which a merchant storage resource contracts out rate-based transmission service to a transmission owner and otherwise shoulders market revenue risk; (2) a price taker model, in which a storage resource providing rate-based transmission service only access market-compensated services as a price-taker, with all revenues subtracted from the cost-recovery basis of the unit; and (3) a system control model, in which a storage resource providing rate-based transmission service provides operational control to an RTO/ISO to dispatch for market services. Each proposal has its own advantages and drawbacks, and all could be used a stepping stone towards the development of an appropriate framework. The latter two models create significant disincentives for conventional generators to seek inappropriate cost-recovery for transmission service; the

first model could conceivably be modified further to address cross-subsidization concerns, such as through requiring a "primary use" standard to ensure that market revenues are secondary to transmission cost-recovery. The first two approaches address the RTO/ISO independence concern; the third approach could conceivably be modified further to address RTO/ISO independence concerns, such as through publication of a default dispatch algorithm for selected products prior to taking control of any storage assets.

Fundamentally these questions are best addressed by each RTO/ISO in their stakeholder processes; nevertheless, elucidation of even one example approach by the Commission will support development of a framework in RTOs/ISOs. The Commission can best move this process forward by stating unequivocally that RTOs/ISOs should evaluate including storage in both markets for transmission and generation and to outline tariff provisions to incorporate storage into those existing markets.

For the purposes of meeting reliability concerns, ESA recommends that the Commission incorporate electric storage into transmission planning processes, as explained in the following section.

C. The Commission should direct RTOs/ISOs to develop methods for incorporating electric storage into transmission planning and for forecasting uncertainty associated with transmission capacity.

Electric storage is for the most part absent from consideration in transmission planning processes.[10] As a result, even if a storage resource might be cost-effective and viable for meeting RTO/ISO reliability needs, there is not an adequate way to identify it in the planning process.

[10] Pumped hydro may be considered in transmission planning processes. However, the resource parameters of pumped hydro are inappropriate for electric storage. For example, MISO's recent MTEP 2017 Futures Study uses EPRI's EGEAS tool for scenario planning, in which electric storage is modeled as hydro and constrained to on-peak/off-peak arbitrage only.

The exception is CAISO, which has developed a basic process for evaluating storage and as a non-transmission alternative in its transmission planning process (TPP) with ongoing stakeholder input.[11] As a result, in the 2015-16 TPP electric storage solutions were explicitly described as potential mitigation solutions to address system needs.[12] Although CAISO cannot specifically approve non-transmission alternatives as projects or elements in the comprehensive plan, CAISO identifies them in the same manner that operational solutions are often selected in lieu of transmission upgrades. Further, load modifying resource assumptions are also incorporated into the base case and provide an additional opportunity to address transmission needs.

Conventional transmission assets fail from time to time, and that risk is managed through planning processes; the best solution to concerns of electric storage reliability are similarly to include it in the planning process. Inclusion of electric storage using appropriate parameters in transmission planning will enable potential deployments to be studied as a part of system reliability and economic analysis, using standard technical and contingency operations assessment methods. By doing this, RTOs/ISOs will be able to scope the impact of specific electric storage projects and allow market participants to address reliability concerns associated with facility characteristics and planned operations.

Inclusion of storage in transmission planning will best contribute to risk management when RTOs/ISOs also study scenarios of insufficient or excess transmission capacity. For example, RTOs/ISOs do not currently identify potential generator retirements that would lead to the use of reliability-must-run (RMR) contracts. As a result, there is not sufficient

[11] CAISO began such efforts in 2013. See CAISO, *Consideration of alternatives to transmission or conventional generation to address local needs in the transmission planning process*, Sep 2013, available at https://www.caiso.com/Documents/Paper-Non-ConventionalAlternatives-2013-2014TransmissionPlanningProcess.pdf.

[12] Storage was identified as potential mitigation in planning areas where reliability concerns were described. See CAISO, *2015-2016 Reliability Assessment Study Results*, 11 Nov 2015, available at http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=3510E4DF-32A7-4065-AF05-655F83411A99. For

lead time to seek cost-effective alternatives to RMRs and associated transmission upgrades through a competitive process. Similarly, RTOs/ISOs do not consider electric storage as an option to manage uncertainty over future utilization of proposed transmission. As a result, a full consideration of alternatives to conventional transmission investments is not possible; the shorter lifetime of storage could provide optionality to transmission owners in the face of such uncertainty.

ESA respectfully requests that the Commission direct RTOs/ISOs to assure electric storage resources are able to be appropriately studied and included in transmission planning processes. Fundamentally, RTOs/ISOs and stakeholders must work out the details of how to achieve this goal. Nevertheless, by ensuring that storage resources are at least visible and legible to the transmission system, RTOs/ISOs and market participants can begin to move past arguments over reliability from storage providing both transmission and generator services and begin the careful work of modeling, analysis, and planning that will meet grid operators' needs while expanding the set of feasible reliability solutions for the system.

D. The Commission should affirm the ability of electric storage providing wholesale services to also provide retail or end-user services.

Current market rules do not support the stack of incremental values that distributed electric storage systems can provide to the wholesale market, distribution grid, and end users. As a result, electric storage cannot yet provide the full scope of multiple benefits and services it is capable of and realize its full economic value to the electricity system—including the avoidance of over-building infrastructure.

CAISO, working with the California Public Utilities Commission (CPUC), has taken some initial steps in this domain, having convened stakeholders to work out a regulatory

framework for multiple-use electric storage.[13] Specifically, CAISO has asked the CPUC to determine the parameters of storage offering retail or end-user service, presuming wholesale service. Specific use cases for multiple use applications have been defined by both the CPUC and the CAISO, and stakeholders have offered solutions about how to develop market rules for these types of applications. This is the correct approach for wholesale markets operated by RTOs/ISOs, which should remain technology-neutral—including agnostic on non-wholesale operations of resources—in determining market participation eligibility and compensation.

Most of the barriers to multiple-use storage are fundamentally addressed in the distribution system, which is subject to the jurisdiction of state regulators. Concerns over "primacy" of dispatch or utility cost recovery are addressable by state utility commissions, and RTOs/ISOs would play a more appropriate role as a key stakeholder in those discussions than as the determinant of them. "Primacy" concerns stem from traditional utility planning efforts where grid components may have been planned for only a single use. With respect to concerns over dispatch priority, the onus should be on storage resource operators to manage the risks as specified by system rules and contract penalties and incentives; the solution to higher-reliability services is contracts with stricter performance requirements, notwithstanding important safety considerations that may be identified. Similarly, utility cost recovery concerns with multiple-use can be addressed through traditional accounting, cost allocation, and ratemaking principles. In the case that the same unit of electric output from a storage device provides distinct and

[13] "Joint Workshop on Multiple-Use Applications and Station Power for Energy Storage," in *Order Instituting Rulemaking to consider policy and implementation refinements to the Energy Storage Procurement Framework and Design Program (D.13-10-040, D.14-10-045) and related Action Plan of the California Energy Storage Roadmap,* California Public Utilities Commission R. 15-03-011 (2015), available at http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M159/K876/159876453.PDF

incremental value to different markets, ESA supports separate compensation for each service.

One key barrier to storage providing both wholesale and retail/end-user services are RTO/ISO rules that disallow electric storage resources to switch roles. For example, there may be periods where a storage resource is not contractually required to participate in RTO/ISO markets, but current rules disallow coming in and out of the market. Such storage resources should have the capability to operate as a retail or end-user resource outside of the RTO/ISO market without a market settlement when not needed for service, pursuant to its contract. Similarly, RTO/ISO rules may prohibit demand response resources providing wholesale service from participating in retail programs.

ESA respectfully requests that the Commission affirm that electric storage resources participating in the wholesale market are allowed to offer retail or end-user services as well. ESA recommends that the Commission clarify that it is the responsibility of RTOs/ISOs to identify reliability, safety, and market irregularities associated with a particular storage project if it is to be restricted from doing so. This is particularly critical to clarify to ensure coordination with the framework the Commission has proposed in RM16-23-000 concerning the market participation of storage and distributed energy resource aggregations. Each RTO/ISO should determine its particular rules for enabling storage to do so as part of its own stakeholder processes, again recognizing that the Commission's most useful role is to create a guiding foundation for such discussions.

V. CONCLUSION

ESA acknowledges and commends the efforts that FERC has taken over many years to expand the use of electric storage in the marketplace. FERC's broad vision for

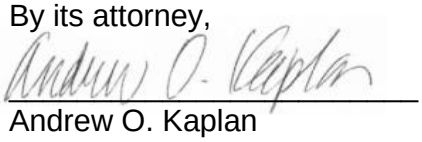
greater market efficiency and just and reasonable rates by better utilizing storage is both viable and achievable in the short-term.

By enabling electric storage resources to participate fully in organized wholesale markets, FERC can ultimately ensure that those markets have access to the widest range of solutions and the capability to capture their full system benefits. That competition is critical to ensuring that markets remain competitive, efficient and cost effective. Accordingly, ESA respectfully requests that FERC: (1) establish the principles by which an electric storage resource can be used for both transmission services and competitive generator services; (2) direct RTOs/ISOs to develop methods for incorporating electric storage into transmission planning and for forecasting uncertainty associated with transmission capacity; and (3) affirm the ability of electric storage providing wholesale services to also provide retail or end-user services.

Respectfully submitted,

Energy Storage Association

By its attorney,



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CERTIFICATE OF SERVICE

I, Anne O'Hanlon, hereby certify that the foregoing Comments were served via electronic mail to the service list.

Dated in Boston, MA this 14th day of December 2016.

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