UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Reform of Generator Interconnection Procedures and Agreements	**Docket No. RM17-8-000**

COMMENTS OF THE ENERGY STORAGE ASSOCIATION

The Energy Storage Association ("ESA") submits these Comments in response to the notice of proposed rule issued December 15, 2016 pertaining to the above-captioned docket. ESA generally supports the Commission's proposed rule and appreciates the Commission's initiative to better enable electric storage resources to participate in wholesale markets. Reducing backlogged interconnection queues will increase the ability of electric storage to interconnect, both as stand-alone facilities and as resources co-located with generation. The Commission's proposed rule will also broadly improve the certainty, transparency, and process for interconnecting electric storage technologies. Moreover, transparency about constrained flowgates and congestion will allow storage developers to better identify opportunities for solving congestion problems.

These comments focus on proposed changes particularly pertinent to the interconnection of electric storage. The high controllability of storage input and output, the wide range of use cases of storage, and the ability to co-locate storage with existing generation resources are key reasons for different interconnection rules and procedures for storage than are applied to generators or loads. ESA strongly supports enabling interconnection of facilities at levels of service below installed capacity rating, provided

appropriate controls and protections are installed. The Commission can reduce the cost and time of interconnection if operational assumptions and conditions of storage interconnection are driven by an interconnection customer's request and proven capability of performance within those parameters, rather than the inapplicable assumptions of generating technologies. Additionally, ESA strongly supports the establishment of Surplus Interconnection Service to make efficient utilization of existing interconnection capacity of generating facilities through an expedited process. ESA also supports the establishment of provisional interconnection service, as doing so will enable grid operators to benefit from the short deployment timelines of storage facilities, which generally outpace regular interconnection processes. Finally, ESA recommends foundational principles for modeling electric storage for interconnection be implemented across RTOs/ISOs, recognizing that each RTO/ISO will use a method integrated with its existing practice.

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 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-level grid operations relevant to energy storage, as well as firsthand knowledge of the regulatory challenges to planning, financing, and operating commercial energy storage facilities to provide electric system efficiency and reliability benefits.

III. ESSENTIAL ELECTRIC STORAGE CHARACTERISTICS

Electric storage is poised to become a regular and ubiquitous component of the electric energy system for managing the momentary and daily variations of electric supply. Electric storage technologies, particularly batteries, have experienced rapid cost reductions and are now increasingly deployed across the electric grid, including at transmission voltages.[1]

However, electric storage differs significantly from generators in technical and operational characteristics. In particular, storage both injects and withdraws energy from the grid as a part of rendering service, presenting characteristics commonly associated with both generation and load. Storage is an inverter-based resource that uses software controls to provide service; as such, it is highly controllable with nearly instantaneous capability to respond to control signals and to ramp up or down to precise levels of energy injection and withdrawal. That precise control allows storage to provide dynamic grid services efficiently and contribute to reliability. For example, storage can synchronize to the grid and maintain appropriate frequency with even greater fidelity

[1] To date, all transmission interconnections of electric storage have been conducted through the Small Generator Interconnection Process, as projects have not been greater than 20 MW in size.

than the mechanical governor devices common to conventional generation that are required in generator interconnection agreements. Storage has been deployed to provide energy and flexible capacity as well, and it can operate under a wide range of use cases and configurations. Furthermore, storage can readily pair with existing generation resources at the same point of interconnection.

The system benefits of electric storage resources have been well documented. For example, in both the PJM and in ISO-NE markets, the participation of electric storage resources has increased competition and reduced system costs. [2] From these results and other successes where electric storage has been installed worldwide, the flexibility that electric storage provides is an efficient solution to ensure system reliability, particularly as trends toward more variable generation and higher local and system load factors continue.

This point was affirmed most recently in a Massachusetts-commissioned study of large-scale electric storage deployment in ISO-NE. The study concluded that deploying electric storage resources on the grid results in significant benefits, including, but not limited to, avoided capacity payments, lower peak prices, reduced generator cycling, effective ramp management, avoidance of generator start-up and shut-down costs, and absorption of over-generation.[3] Similarly, a recent National Renewable Energy Laboratory study of storage deployment in CAISO demonstrated a significant decrease

[2] PJM observed a 30% reduction in overall the Regulation reserve requirement as more fast-responding resources, including storage, cleared the market. See PJM's report *Performance Based Regulation: Year One Analysis*, submitted on October 16, 2013 in Docket No. ER12-1204. In ISO-NE, the deployment of electric storage resources for Regulation and the "pay-for-performance" incentives for fast-response service since 2005 has contributed to a 50% reduction in the Regulation reserve requirement. See Comments of ISO New England Inc. submitted on May 2, 2011 in Frequency Regulation Compensation in the Organized Wholesale Power Markets, Docket Nos. RM11-7 and AD10-11.

[3] See Massachusetts Department of Energy Resources, *State-of-Charge: Massachusetts Energy Storage Initiative Study*, Sep 2016, available at http://www.mass.gov/eea/docs/doer/state-of-charge-report.pdf

in generator start-up and shut-down costs, in addition to existing market services.[4] In fact, rapidly deployed electric storage has been credited for mitigating the natural gas shortages experienced by CAISO.[5]

To ensure that these benefits may be realized, the Commission must remove barriers to electric storage interconnection. The instant docket provides a significant opportunity to better enable storage interconnection and ultimately ensure fair access to markets for storage.

IV. COMMENTS

The generator interconnection process was originally devised to address the technical and operating characteristics of generator technologies to ensure that the grid operated reliably at a just and reasonable cost. When the Commission last made significant and systematic changes to large generator interconnection rules and processes in Order 2003, electric storage resources were not yet deployed on the transmission system. As such, existing interconnection agreements and processes do not consider the attributes of electric storage and instead require storage facilities to 'force-fit' their characteristics and study requirements into the frameworks built for evaluating and interconnecting generator technologies.[6] Therefore, storage faces undue uncertainty and complexity in interconnecting, creating a barrier to grid access, which presents lost opportunities to provide system reliability at lower cost.

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[4] Josh Eichman, et al. "Operational Benefits of Meeting California's Energy Storage Targets." National Renewable Energy Laboratory. December 2015. Available at http://www.nrel.gov/docs/fy16osti/65061.pdf.

[5] In California, multiple battery storage projects totaling over 70 MW were placed in service less than 6 months from contract approval to ensure system reliability after failure and shut down of the Aliso Canyon natural-gas storage facility. See https://www.greentechmedia.com/articles/read/aliso-canyon-emergency-batteries-officially-up-and-running-from-tesla-green

[6] The Commission explored the divergence between storage and generator characteristics at greater length in previous dockets; see for example P 12 in Docket No. RM16-23, *Electric Storage Participation in Markets Operated by Regional Transmission Organizations and Independent System Operators,* 17 Nov 2016.

In the instant docket, the Commission has found that the *pro forma* LGIP and *pro forma* LGIA may not be just and reasonable, and may be unduly discriminatory or preferential; it is thus appropriate for the Commission to consider how to update interconnection agreements and processes to better accommodate the attributes of storage as a way to ensure system reliability at a just and reasonable cost. ESA supports several such proposals and provides its comments below.

A. ESA supports the proposed revised definition of Generating Facility to include electric storage, provided that doing so does not unduly burden storage from the assumption of generator characteristics nor limits storage from providing service as a transmission asset.

The Commission proposes to revise the definition of a "Generating Facility" in the *pro forma* LGIP/LGIA to include electric storage resources. ESA generally supports this explicit inclusion, which also brings consistency with *pro forma* SGIP/SGIA definition of a "Generating Facility." However, as ESA has also noted and the Commission has previously determined, electric storage can also provide service as a transmission asset. ESA is concerned that inclusion of storage in the definition of a "generating facility" for the *pro forma* LGIA/LGIP may inadvertently prohibit employment of storage as a transmission asset. Additionally, as ESA has noted in previous comments in other dockets, storage technologies are different than generation technologies, and specific technical assumptions and terms of the *pro forma* LGIP/LGIA are inapplicable or inappropriate for storage.[7] ESA is concerned that agreements designed for generators will continue to impose barriers to storage interconnection.

[7] See "Comments of the Energy Storage Association" in Docket No. AD16-20, *Electric Storage Participation in Regions with Organized Wholesale Electric Markets*, 6 June 2016. See also "Motion to Intervene and Comments of the Energy Storage Association" in Docket No. EL17-8, *Indianapolis Power & Light v. Midcontinent Independent System Operator*, 10 Nov 2016.

ESA recommends that the Commission ensure the *pro forma* LGIA/LGIP does not prevent storage from providing services to the grid through other channels. Specifically, ESA recommends that the Commission explicitly state that neither SGIA nor LGIA are required for electric storage resources employed on the grid as transmission assets and not participating in wholesale generator services. Clarification of this point will provide needed certainty for transmission owners wishing to employ storage. Additionally, storage resources providing transmission service should not be excluded from subsequently seeking a *pro forma* LGIA or SGIA to also provide wholesale generator services, which the Commission has RTOs/ISOs may allow.[8]

Second, ESA recommends that the Commission clarify that RTOs/ISOs must develop Electric Storage Interconnection Agreements and Processes, conducted in coordination with LGIP. The Commission has previously approved separate agreements and processes for merchant transmission in PJM and ISO-NE, which are conducted in coordination with the generator interconnection queue.[9] The Commission could similarly establish separate processed and agreements for electric storage resources that incorporate the appropriate technical and operational characteristics and planned use cases of a storage resource, conducted in coordination with generator interconnection queue. The Commission should also clarify that interconnection customers are not obligated to avail the Electric Storage Interconnection Agreements and Processes. If a customer does avail these, then they should not be required to also go through the *pro forma* LGIA/LGIP.

[8] Docket No. ER17-2, *Utilization of Electric Storage Resources for Multiple Services When Receiving Cost-Based Rate Recovery*, 19 Jan 2017.
[9] See, for example, the Commission's April 14, 2015, "Order Accepting Proposed Tariff Revisions" in Docket No. ER15-1050-000.

Alternatively, ESA recommends that the Commission revise tariffs and modify the *pro forma* LGIA/LGIP into a *pro forma* Large Facility Interconnection Agreement and Process (LFIA/LFIP), in which facilities are defined to consist of only a generating unit, only an electric storage unit, or a combination of generating units and electric storage units. In a *pro forma* LFIA/LFIP, clear, consistent, and appropriate conditions for interconnection could apply to different facilities based on their technical and operational characteristics. In addition, such an approach could preserve the use of a single interconnection agreement and process, enabling consistency across tariff language. In the remainder of ESA's comments, ESA will use the term "facility" to mean either a generator, an electric storage resource, or a combination thereof.

B. ESA strongly supports the Commission's proposal revising the *pro forma* LGIA and *pro forma* LGIP to allow interconnection customers to request service at a level below facility capacity.

ESA strongly supports allowing interconnection customers to request interconnection service below the installed capacity of a resource. The NOPR finds that, in disallowing requests for interconnection service below facility capacity, the *pro forma* LGIP and *pro forma* LGIA may force an interconnection customer to pay for unneeded interconnection facilities and network upgrades, which may be unduly discriminatory or may not present just and reasonable costs to customers.

Allowing customers to request service that reflects the intended operation of a given resource can reduce the overbuilding of interconnection facilities and network upgrades. Doing so will create more reasonable interconnection costs while removing undue discrimination toward highly controllable resources, like electric storage, in interconnection processes. This is particularly important for electric storage being sited at an existing point of interconnection. Many generators, especially renewable

generators such as wind and solar, utilize their full level of interconnection service only a fraction of the time, and co-located storage can be designed and operated as a complement to the existing generator, injecting energy to the system only when the generator is not. For example, a a solar photovoltaic facility will only reach its maximum rated output during daylight hours. A solar project with 100 MW maximum output would therefore have interconnection service for 100 MW but might only a fraction of that service during parts of the day (*e.g.*, during sunrise and sunset, from cloud cover) and none of that service during night hours. A developer wishing to add a 20 MW storage unit to the project might wish to avoid the cost of additional facilities and upgrades by continuing to use only the 100 MW of interconnection service, rather than seek the 120 MW of total facility capacity as service. During times of peak output from the solar project, the storage unit could be set to not discharge, such that the total output does not exceed generation capacity. The storage unit could be controlled to discharge only at levels when solar generation is a fraction of maximum output or zero, remaining within existing interconnection service levels. Controlling storage in this way is easy and common practice.

As long as the combined facility does not exceed the existing injection rights, such an arrangement would allow greater utilization of existing interconnection service without requiring costly network upgrades. This is likely to be true for non-dispatchable resources like wind or solar, where storage is not only highly unlikely to inject at the same time peak deliveries are made, but also can be designed with control systems to ensure that it doesn’t. If, on the other hand, a co-located electric storage facility were required to have sufficient interconnection service to enable the simultaneous operation

of the full capacity of the combined storage and generator, then the cost of network upgrades can ultimately deter the installation of storage to make more efficient use of existing interconnection service, resulting in lost efficiencies. For that matter, when siting storage as a standalone resource, an interconnection customer may wish to request service below rated capacity if the unit will be sized for the purposes of providing longer duration discharges at partial capacity.

Through this proposal, the Commission would remove barriers to more efficient use of interconnection capacity across regions without incurring greater network costs or adversely impacting reliability. The Commission's proposals on this point are of particular significance for facilitating market entry of electric storage. Presently, while market participants may be aware of existing interconnected generators with unused interconnection capacity, co-locating storage with those generators presents excessive costs because of the inability to interconnection below rated capacity. This represents lost opportunities to utilize spare interconnection capacity throughout the grid, "repowering" existing conventional generators or firming the deliveries of variable generators.

Interconnection service lower than installed capacity is already allowed and is occurring without reliability problems. In CAISO,[10] MISO,[11] and PJM,[12] wind or solar projects have been oversized to allow greater generation deliveries over time, with the result being that these generators never deliver at maximum output. It is likely that

[10] *See, e.g., Southern California Edison Co*., Docket No. ER16-2064-000, letter order dated Aug. 11, 2016 (accepting interconnection agreement providing for 487 MW of interconnection service for a solar generation facility with a net output of 514.5 MW),

[11] *See, e.g., Midcontinent Independent System Operator, Inc*., Docket No. ER14-1709-000, letter order dated June 9, 2014 (accepting interconnection agreement providing for 101 MW of interconnection service for a wind generation facility with an aggregate rating of 105.61 MW).

[12] *See, e.g., PJM Interconnection, L.L.C.,* 137 FERC ¶ 61,084 (2011) (accepting interconnection agreement providing 200 MW of interconnection service for a wind generation facility with a gross capacity of 214.4 MW).

requesting interconnection service to meet maximum output would result in interconnection facility and upgrade costs greater than the incremental revenues to be attained. At least one such project in CAISO involved storage co-located with a generator.[13] Additionally, in Order 792 the Commission revised the SGIP to allow small generating facilities to attain interconnection service below installed capacity, provided acceptable control technologies are installed to avoid violating injection limits.[14] It is inconsistent to not allow the same for large generating facilities.

For these reasons, ESA strongly supports the revision of the *pro forma* LGIA and *pro forma* LGIP to enable interconnection service lower than installed capacity. An *ad hoc* basis for consideration does not provide sufficient certainty to interconnection customers seeking interconnection service below a resource's installed capacity. Moreover, an *ad hoc* basis puts the onus on customers to propose such service, rather than on transmission providers to offer such service. Ultimately, revising the *pro forma* LGIA/LGIP only requires transmission providers establish a process to consider requests of interconnection below installed capacity and thereby allows variation by region and type of customer.

ESA agrees that such interconnection customers should provide safeguards for safety and reliability, and ESA discusses these aspects below.

[13] *See, e.g., Southern California Edison Co.*, Docket No. ER16-1459-000, letter order dated June 14, 2016 (accepting interconnection agreement providing for 128.075 MW of interconnection service for a co-located solar and battery project with a combined gross output of 253.075 MW).
[14] Order 792 at P 230.

1. ESA supports requiring interconnection customers to install monitoring and control technologies at facilities where the level of interconnection service is lower than installed capacity. ESA recommends the tariff reflect that doing so obviates the need for thermal studies at full capacity.

Monitoring and controls for resources with interconnection service below installed capacity would be the same as used for inverter-based resources with interconnection service at or above installed capacity. Indeed, wind and solar projects already use software control systems and inverters to modulate output for deliveries and maintain reliability, especially crucial when such projects are oversized relative to interconnection service. Failures of such equipment are in practice quite rare.

Given the sophisticated and highly reliable characteristics of these monitoring and control technologies, ESA recommends that the Commission require transmission providers to account for them and not require study of thermal performance above the level of interconnection service requested. Allowing study of thermal violations above requested levels of service would effectively eliminate one of the key rationales for allowing interconnection below rated capacity, i.e., remove barriers to the development of facilities which do not intend to operate at full facility capacity. Rather, if a transmission provider believes that control systems are inadequate to ensure compliance with interconnection limits below rated capacity, then the transmission provider should describe to the interconnection customer the shortcomings of their proposed control and contractual scheme and what modifications would make it acceptable.[15] In contrast, ESA acknowledges that short-circuit and stability studies may

[15] Preferably, transmission providers should work with interconnection customers to seek reasonable monitoring and control equipment and not simply default to the most burdensome controls, such as installing and enabling automatic disconnect equipment. ESA cautions that use of automatic disconnects may both inadvertently limit storage from

require that the full capacity of each facility be used in modeling regardless of level of requested interconnection service.

Also, ESA again notes that the revisions to the *pro forma* SGIA/SGIP that the Commission developed in Order 792 have been considered sufficient for ensuring safety and reliability when facilities request interconnection below rated capacity. ESA recommends that application of these rules be extended to the *pro forma* LGIA/LGIP to ensure consistency and non-discrimination between small and large resources.

2. ESA suggests that existing penalties as specified in the pro forma *LGIA serve as an effective deterrent to violation of injection rights, even when installed capacity exceeds injection rights.*

The *pro forma* LGIA presently stipulates financial liabilities for interconnection customers who violate their interconnection service, as well as the authority of transmission providers to control deliveries from an interconnection customer. The aforementioned projects in CAISO, MISO, and PJM, the transmission providers rely on the remedies afforded to them in the *pro forma* LGIA. ESA supports reliance on the interconnection agreement to establish the rights and obligations of the parties, including consequences for violating the terms such as output level.

C. ESA strongly supports the Commission's proposal establishing Surplus Interconnection Service enabling customers to transfer surplus interconnection service to other parties.

ESA strongly supports the establishment of Surplus Interconnection Service, which would expedite the interconnection of storage co-located with generation at existing points of interconnection and provide for the more complete utilization of existing interconnection service. Doing so will ensure reasonable costs for

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providing useful service in post-contingency conditions and lead to further disputes over responsibility for responding to system contingencies.

interconnection and increase efficient use of system reliability resources. ESA also recommends that the Commission clarify that Surplus Interconnection Service, which does not increase net output, be considered on a separate, faster timeline from the generator queue process.

Additionally, ESA strongly supports the Commission's proposal to allow interconnection customers the opportunity to transfer unused capacity in their existing interconnection rights service to the party of their choosing. The Commission's previous ruling on MISO Net Zero service requiring that surplus service be effectively bid in open solicitation had the unintended effect of discouraging its utilization.[16] By offering existing interconnection customers the option to choose the parties to which to transfer service, ESA expects surplus interconnection service will be far better utilized, making efficient use of interconnection service and contributing to lower system costs.

The Commission outlines appropriate interconnection studies for Surplus Interconnection Service, and ESA generally agrees with this set. However, the proposed *pro forma* LGIP would allow the transmission provider to perform additional steady state analyses "as necessary to ensure that all required reliability conditions are studied." Doing so may lead to transmission providers unnecessarily requiring steady-state analyses of the same level of interconnection rights already studied in the existing customer's interconnection agreement, contrary to the Commission's intention. Rather,

[16] Since 2008, MISO's Net Zero policy allows a new interconnection customer and an existing generating resource (i.e., an existing interconnection customer) to operate such that the sum of the net output of all generation resources at their shared point of interconnection does not exceed the output capability or study rating of the existing generating resource--see https://www.misoenergy.org/Library/Repository/Study/Generator%20Interconnection/Midwest%20ISO%20Policy%20on%20Net%20Zero%20Interconnection%20Requests.pdf. Similar to the Commission's proposed Surplus Interconnection Service but different in several details, no interconnection customer has yet requested MISO's Net Zero interconnection service to date since its establishment nearly a decade ago.

ESA recommends that the Commission specify that transmission providers must present a rationale for requiring steady-state analyses for the use of surplus interconnection service.

Further, ESA recommends that an interconnection agreement based on Surplus Interconnection Service survive termination of the interconnection of the initial facility providing such surplus. A transfer of service from one entity to another should establish the rights and obligations between each entity and the transmission provider, and that no rights or obligations between entities should be assumed to exist. Doing so is critical to ensuring that interconnection customers do not exercise undue influence on the operations of other interconnection customers that might otherwise influence market participation and/or reduce market efficiency. To the extent additional arrangements are needed between the two interconnection customers, such as agreements governing the sharing of interconnection facilities, such arrangements can be negotiated between the customers and filed for Commission review as relevant.

D. ESA supports the Commission's proposal of provisional interconnection service to better take advantage of the short lead times for storage construction and operation.

ESA supports the establishment of provisional interconnection agreements as a method for expediting interconnection of electric storage to enhance system reliability. Electric storage can often be built and placed in service faster than generation assets. For example, several battery electric storage projects of over 70 MW with 4-hour duration at rated capacity were installed and operational in the CAISO territory less than

six months from contract approval.[17] At the same time, storage can provide services that enhance local and system reliability, such as voltage support or frequency response, prior to the completion of network upgrades that enable greater service provision in energy or ancillary services markets.[18]

By allowing interconnection customers to enter into provisional agreements for limited interconnection service prior to the completion of the full interconnection process, the Commission would allow market participants to deploy electric storage resources commensurate with their short construction timelines, increasing system reliability. To ensure that such service indeed expedites interconnection as intended, ESA recommends that the Commission clarify that provisional interconnection service may be considered outside of group study processes and allows a resource to achieve commercial operations before completion of all facility or group study processes. Finally, ESA recommends that the Commission make explicit that the terms of provisional interconnection service may be utilized in applications for Surplus Interconnection Service.

E. ESA recommends that the Commission require transmission providers to utilize a common set of basic principles for modeling storage and respectfully requests a proceeding to follow submittal of pertinent RTO/ISO reports.

Preceding dockets concerning electric storage, such as AD16-25 and RM16-23, present a set of details for understanding how to model electric storage in bidding and dispatch. Many of these considerations can similarly be considered for the purpose of

[17] See J. Pyper, "Tesla, Greensmith, AES Deploy Aliso Canyon Battery Storage in Record Time," *Greentech Media*, 31 Jan 2017, available at https://www.greentechmedia.com/articles/read/aliso-canyon-emergency-batteries-officially-up-and-running-from-tesla-green

[18] A full description of the set of services that electric storage can offer is detailed in Chapter 1 of the *DOE/EPRI Electricity Storage Handbook*, Sandia National Laboratory, Feb 2015, available at http://www.sandia.gov/ess/publications/SAND2015-1002.pdf

interconnection study. While ESA respects that each region will choose its own methods for modeling electric storage for interconnection study since there is not yet significant experience or consensus, ESA recommends that the Commission require some basic principles for modeling storage for interconnection across regions—key among them, a clear, consistent, and specific means by which transmission providers and system operators model storage charging.

ESA supports the two items noted by the Commission: using the "negative generation" approach currently employed in CAISO, and allowing interconnection customers to specify charge and discharge parameters. A negative generation approach will enable interconnection study of storage assets as a single resource, rather than separately modeling them as supply and load. Controlled withdrawals of electric storage for charging differ significantly from the behavior of largely uncontrollable and unpredictable loads, particularly since withdrawals for charging storage may be a provision of wholesale service (*e.g.*, Regulation-down service). ESA notes that, even if the negative generation modeling approach is implemented, nevertheless these studies may still use "worst-case" scenarios regarding storage charging behavior that are unrealistic and do not account for how storage controls and logic determine timing and rate of charging activity;[19] such approaches may lead to requirements for network upgrades and/or disqualify storage for Resource Adequacy. Additionally, the fast ramps of storage and changes between charging and discharging modes, which are mediated by controls, may be incorrectly interpreted as a potential

[19] For example, CAISO studies the maximum theoretical charging of a storage facility during both peak and off-peak periods. Even though storage controls can readily prevent storage from charging at times of grid stress, incremental charging requirements found in this process can lead to the ISO requiring network upgrades.

threat to power quality. Therefore, allowing customers to specify charge and discharge parameters will ensure that resources are studied according to real-world operations, rather than inappropriate analogues in generation and load. Furthermore, if an interconnection customer can demonstrate sufficient sub-minute control of the bi-directional dispatch of a storage asset at the instruction of the system operator, the customer should not be required to make upgrades based on "worst-case" scenarios. As previously stated, transmission providers and interconnection customers can specify that performance in an Interconnection Agreement, as well as penalties for adverse impacts from lack of performance.

ESA looks forward to reviewing the reports submitted by RTOs/ISOs on their methods for modeling electric storage, which will be provided in response to the Commission's request in the instant docket. ESA respectfully requests that the Commission consider a subsequent proceeding on the topic of a unified modeling approach for electric storage after these reports are submitted.

F. ESA also supports extending the proposals regarding interconnection service below facility capacity, surplus interconnection service, provisional interconnection service, and electric storage modeling to apply to the *pro forma* SGIA/SGIP.

While some of the features of the Commission's proposals in the instant docket are already reflected in the *pro forma* SGIA/SGIP, ESA recommends that the Commission extend these proposals to consistently reflected in the *pro forma* SGIA/SGIP to avert undue discrimination.

V. CONCLUSION

When the Commission last made significant changes to interconnection rules and procedures in Order 2003, no advanced electric storage resources were

interconnected to the transmission system and providing wholesale generator services. As such, the rules and processes did not contemplate the barriers to interconnection of storage. Since that time, market participants have begun interconnecting electric storage resources, and those barriers have been addressed piecemeal if at all.

While the Commission's proposals apply more generally than electric storage resources, the focus on tailoring interconnection service and study to resource use and utilizing spare interconnection service are likely to remove significant barriers to the interconnection of electric storage resources. The Commission's proposals in the instant docket would not only avoid undue discrimination regarding the interconnection of electric storage resources, but also ensure just and reasonable rates by maximizing the efficient use of interconnection service. ESA believes that the Commission's proposals strike an effective balance between transmission customer flexibility and interconnection customer certainty, and we encourage the Commission to finalize these provisions expeditiously.

Respectfully submitted,

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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 13th day of April 2017.

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