UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

Third Party Provision of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies	)))))	**Docket Nos. RM11-24/AD10-13**

COMMENTS OF THE ELECTRICITY STORAGE ASSOCIATION

The Energy Storage Association d/b/a Electricity Storage Association ("ESA") appreciates the opportunity to submit comments on behalf of its Advocacy Council[1] in response to the Federal Energy Regulatory Commission's ("FERC" or the "Commission") Notice of Inquiry ("NOI") as issued in the above-captioned matter.[2] ESA commends FERC for its pro-active approach to ensure that ancillary services markets are open to competition from storage resources and result in just and reasonable rates for the services provided. As detailed below, ESA recommends that FERC implement several changes to its policies pertaining to ancillary services markets in order to facilitate the provision of ancillary services from all resources, including storage technologies. The reforms recommended herein will facilitate the participation of new advanced storage resources (such as flywheels and batteries) that have the potential to improve the operational and economic efficiency of the transmission system and to lower costs to consumers in regions that are outside the current organized markets. Additionally, as FERC acknowledged in the NOI, current accounting procedures do not specifically provide for the

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[1] The ESA's Advocacy Council engages in legislative, regulatory, and policy advocacy efforts on behalf of its members and the ESA. The Advocacy Council members (individually listed below) include energy storage entities that use batteries, flywheels, compressed air and have firsthand industry knowledge of the challenges that must be overcome to successfully finance and operate commercial-scale energy storage facilities. Advocacy Council Members: A123 Systems, Inc., AES Energy Storage, Altairnano, Aquion Energy, Beacon Power Corporation, FIAMM, Prudent Energy Corporation, S&C Electric Company, Saft America Inc., SustainX and Xtreme Power.

[2] *Third-Party Provision of Ancillary Services; Accounting and Financial Reporting for New Electric Storage Technologies,* 135 FERC ¶61,240 (Notice of Inquiry) (issued on June 16, 2011).

accounting of costs related to new energy storage resources and operations, nor do they clearly indicate how best to classify storage technologies that can provide a range of services to the grid. ESA recommends herein several changes to the existing accounting instructions and reporting requirements so that storage resources can provide accurate information about its costs, operations and services for the purpose of developing and monitoring rates. The issues in this proceeding, taken together with FERC's initiatives pertaining to pay for performance[3] will allow energy storage technologies to fund and construct facilities to offer fast, reliable, cost effective and environmentally-friendly energy storage.

I. COMMUNICATIONS

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II. ABOUT THE ELECTRICITY STORAGE ASSOCIATION AND ITS ADVOCACY COUNCIL

The ESA is an international trade association that was established over 20 years ago to foster development and commercialization of electricity storage technologies. Since then its mission has always been the promotion, development and commercialization of competitive and reliable energy storage delivery systems for use by electricity suppliers and their customers. ESA members represent a diverse group of entities, including electric utilities, energy service companies, independent power producers, technology developers involved with advanced batteries, flywheels, compressed air energy storage, pumped hydro, supercapacitors and

[3] *Frequency Regulation Compensation in the Organized Wholesale Power Markets,* 134 FERC ¶61,124 (issued on February 17, 2011) (the "NOPR").

component suppliers, such as power conversion systems. ESA's members also include researchers who are committed to advancing the state-of-the-art in energy storage solutions.

The ESA's Advocacy Council engages in regulatory, legislative and policy advocacy efforts on behalf of the ESA and includes among its membership, A123 Systems, Inc., AES Energy Storage, Altairnano, Aquion Energy, Beacon Power Corporation, FIAMM, Prudent Energy Corporation, S&C Electric Company, Saft America Inc., SustainX and Xtreme Power. These companies have firsthand knowledge of the regulatory challenges that need to be overcome to finance and operate commercial-scale energy storage facilities and are working to promote the development and commercialization of competitive and reliable electricity storage systems within the United States.

III. COMMENTS

ESA appreciates FERC's ongoing efforts to ensure just and reasonable compensation for ancillary services in the organized wholesale electricity markets and to determine how best to develop robust competitive markets for the provision of ancillary services in the non-RTO/ISO regions of the country.

The Advantages of Using Energy Storage for Ancillary Services

Many new advanced electricity storage technologies are designed specifically to provide Ancillary Services. For example, several storage technologies (such as batteries and flywheels) have a 4:1 power to energy ratio and are able to respond nearly instantaneously to an Automatic Generation Control ("AGC") or dispatch control signal (up to one hundred times faster than traditional generation resources). Thus, these resources are ideally suited to provide fast-response regulation or other reserves.

Storage technologies are a valuable new source of supply for ancillary services making it essential for FERC to ensure that open, transparent, robust Ancillary Services markets exist for the proliferation of storage's use on the grid.

Storage technologies offer many key advantages over the conventional generation resources now used to provide Ancillary Services. When commercially deployed, storage technologies will assist FERC's efforts to enhance system reliability, lower costs to ratepayers, integrate renewable resources, reduce CO_2 greenhouse gas emissions and increase regional generation capacity. As fast regulation resources are significantly more effective at responding to system imbalances than slower-ramping generation resources, their use on the grid can lower the overall amount of Regulation that needs to be purchased by ratepayers to maintain system reliability.

A recent study requested by the California Energy Commission documented that a 30-50 MW fast-response storage device could provide as much or more Regulation capability than a 100 MW combustion turbine.[4] Furthermore, new competition from storage resources can lower ancillary service costs by displacing relatively high cost regulation and reserve deployments by traditional generators. Once displaced by storage resources, existing fossil fuel-powered plants can be used to provide added peak generation capacity. In doing so, these plants can run at full capacity, improving their energy efficiency, lowering their operating costs and reducing emissions.

The Commission's inquiry into barriers to third-party providers of ancillary services is especially relevant in regions working to include more variable energy resources ("VERs") on the grid. Multiple environmental and state policy modifications will lead to changes in the

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[4] "Research Evaluation of Wind Generation, Solar Generation, and Storage Impact on the California Grid," Study by KEMA, Inc., done for California Energy Commission funded via Public Interest Energy Research Program (PIER) page 6, June, 2010.

supply and demand for ancillary services. Transmission providers, generators and loads will benefit from storage's fast response capability to address power supply control issues. Fast regulation resources, such as storage, will assist grid operators in maintaining grid reliability as the generation fleet changes.

Moreover, unlike generators that consume fossil fuel, storage resources recycle existing power, thereby lowering its operating costs to provide ancillary services and benefiting the environment by producing zero direct CO_2 greenhouse gas, particulates or other air emissions. A study by KEMA concluded that a 20MW Flywheel Energy Storage System emits 56% less CO2 than a natural gas power plant providing regulation and 26% less emissions than a pumped hydro power plant.[5] KEMA notes that continued reliance on thermal generating units to meet increased regulation requirements could actually increase emissions of CO2, NOX and other pollutants, thereby limiting one of the main benefits of increased generation from VERs.

And, the energy storage industry has already demonstrated success. There are a number of energy storage entities that are either operational and/or developing facilities in those ISO/RTO regions that implemented market reforms and removed barriers to the participation of storage technologies in the ancillary services marketplace. (See Figure 1.) The number of storage projects will increase after FERC mandates that ISOs/RTOs implement the compensation reforms that FERC proposed in its Frequency Regulation Compensation NOPR.[6] Similarly, with changes in the rules and regulations that pertain to the non-ISOs/RTO regions of the country, FERC will encourage new advanced storage projects to enter those regions. Conversely, there are relatively few, if any, merchant storage projects in the areas of the country without RTO/ISO markets. Furthermore, advanced storage projects for VERs integration in the areas of the

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[5] KEMA, Emissions Comparison for a 20MW Flywheel-based Frequency Regulation Power Plant, May 18, 2007.
[6] *See NOPR* at 10-27.

country without RTO/ISO markets, namely Hawaii, have been adopted but under an administratively determined requirement.

Figure 1. Energy Storage projects in ISO/RTO Markets in the United States

ISO/RTO Organized Market Applications				
Technology	Owner/ Technology Provider	Operating Capacity	Commercial Operation Date	ISO/RTO
Flywheel	Beacon/Beacon	Up to 3 MW	November 2008	ISO-NE
Battery	AES/A123	8 MW	December 2010	NYISO
Flywheel	Beacon/Beacon	20 MW	January 2011	NYISO
Battery	AES/Altairnano	1 MW	May 2009	PJM
Battery	AES/A123	32 MW	2011	PJM
Flywheel	Beacon/Beacon	20 MW	2012	PJM
Battery	AES/A123	2 MW	2008	CAISO
Battery	Prudent Energy	Up to 750kW	Q4 2012	CAISO
Battery	AES/Altairnano	1 MW	In Operation	ERCOT
Battery	Xtreme Power	36 MW	Q3 2012	ERCOT
Total		*124 MW*		

ESA appreciates FERC's undertaking an evaluation of what market reforms are necessary for implementation in non-RTO/ISO regions to enable fast accurate storage technologies to compete to provide service and to send appropriate market signals to encourage investment in new energy storage facilities. The implementation of these new rules will ensure grid reliability is maintained efficiently and in a cost effective manner throughout the nation.

A. Third-Party Provision of Ancillary Services and the *Avista* Restriction

Ancillary services in non-RTO/ISO regions, where transmission providers must meet their OATT ancillary service obligations, represents a market with significant opportunities for efficiency and competitive improvements. In order to foster robust markets in the non-RTO/ISO regions, transmission providers and their customers must have access to competitive ancillary services, such as those offered by third-party storage providers.

Under the Commission's *Avista* policy, unless third-party sellers of ancillary services can demonstrate a lack of market power, they are precluded from providing services at market-based rates to a transmission provider seeking to meet its OATT ancillary service obligations. Recently, Western System Power Pool ("WSPP") sought FERC's approval to waive *Avista* restrictions to allow market-based rate sales of ancillary services without the need to perform market studies or propose alternative mitigation measures to ensure just and reasonable ancillary service rates.[7] FERC rejected WSPP's Tariff Amendment stating its need to "guard against potential anticompetitive behavior by third-party suppliers who may have market power", but encouraged the submission of proposals that would address FERC's concerns yet "foster entry into ancillary services markets."[8]

Because of the proprietary nature of the information, sellers of ancillary services have no access to information pertaining to frequency regulation, spinning and non-spinning reserve capability of individual generating units in the non-ISO/RTO markets and therefore cannot perform market power studies for FERC's review and determination that the seller's rates are just and reasonable. The inability to perform the market power studies has significantly stifled competition of these services and is a significant barrier to entry of the marketplace for new technologies and providers.

In an effort to balance the lack of data needed for market power studies with FERC's jurisdictional mandate to ensure just and reasonable rates, ESA recommends that FERC allow third-party sellers to demonstrate a lack of market power based on alternative market power mitigation measures as outlined below.

1. *Market Power Study*

To ensure that rates are just and reasonable and to remove the barrier to energy storage development that effectively results from FERC's *Avista* policy, ESA supports the elimination of

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[7] *Western Sys. Power Pool.*, 134 FERC ¶ 61,169 (2011) at 24.
[8] *NOI* at P 24.

the requirement that third-party sellers prove they lack market power in order to sell services to providers seeking to meet their OATT obligation if the service has been: (1) procured under a competitive solicitation; (2) is below a *de minimis* threshold; or (3) is at or below either the seller's cost-based rate and/or the Transmission Provider's OATT cost-based rate plus a new resource margin.

If the Commission ultimately decides to retain the requirement that formal market power studies must be done by third-party ancillary service providers, then FERC should mandate all parties (transmission providers and third-party sellers) selling ancillary services to report to FERC on an individual unit basis (generating or non-generating unit) data that outlines the quantity of energy, capacity and the ancillary services sales of the unit. Moreover, each transmission provider should be required to list the total quantity of purchases it makes for each type of ancillary service so that the total market size can be determined.

2. *De Minimis Threshold Below Which Market-Based Rates Authorized*

In lieu of requiring sellers to submit formal market power studies, ESA supports a measure of *de minimis* market presence that would justify a grant of market based-rate authority. A *de minimis* threshold would greatly facilitate the entry of new storage resources in the non-ISO/RTO regions of the country without the burdensome requirement of formal market studies that are difficult for small storage providers to undertake. In turn, ratepayers would more readily benefit from the ability of storage resources to enhance system reliability, lower costs to ratepayers, integrate renewable resources, reduce CO_2 greenhouse gas emissions and increase regional generation capacity.

ESA proposes a capacity threshold as a means of determining whether an entity has market power. An entity that owns or controls less than the threshold amount of capacity would be presumed to lack market power for provision of ancillary services. Although not wed to a specific threshold level, ESA suggests a threshold based on 10% of the size of the market is a reasonable measure of *de minimis* market presence that would justify a grant of market based-rate authority. For example, in approving ISO New England's Alternative Technologies Regulation Pilot Program, FERC found that limiting the size of the pilot program to 10% of the total market size is small enough that the performance, or lack thereof, of participating resources would likely have a negligible impact on the ISO's overall Regulation service obligation and that any additional costs borne by ratepayers for the pilot program are outweighed by the long-term benefits of opening the market to new alternative technologies. Likewise a *de minimis* threshold of 10% of total market capacity in the non-ISO/RTO regions is likely to be small enough such that the benefits of facilitating the entry of alternative technologies into these regions, far outweighs any concerns of not performing a market power study.

Whatever threshold percentage FERC ultimately chooses, the threshold should be established for individual ancillary services and be based on the total requirement per service needed. Furthermore, it is appropriate to vary the threshold across different balancing authority areas and/or different regions because the threshold should be tied to the overall size of each regions ancillary service requirement. However, because some transmission providers' individual ancillary services markets may be small compared to the size of a typical seller, a *de minimis* threshold of 10% may result in a threshold capacity value for some markets that is too small to encourage entry and would negate the usefulness of such a *de minimis* threshold. Therefore, ESA suggests that in those cases, it may be appropriate to have a *de minimis* threshold based on a capacity floor (versus a percentage of the market) of 10 MW in markets where the 10% capacity threshold results in a value less than 10 MW. This would result in some small entities to be presumed to lack market power in small markets, thus maintaining the usefulness of a *de minimis* threshold. The *de minimis* capacity threshold to determine whether an entity has market power can then be determined by using the greater of 10% of total market capacity or 10 MW. Limiting the *de minimis* threshold to 10% of total market capacity or 10 MW in the non-ISO/RTO regions is likely to be small enough such that the benefits of facilitating the entry of alternative technologies into these regions, far outweighs any concerns of not performing a market power study.

Once entities receive authorization to provide a certain capacity of ancillary services at market-based rates based on a *de minimis* presence, the authorization should remain effective until the name-plate capacity size of the resource is modified. This is essential to ensure that storage projects have the regulatory and revenue certainty needed in order to receive project financing.

3. ***<u>Alternative Mitigation to Permit Rate Flexibility</u>***

In lieu of requiring formal market power studies from the sellers of ancillary services to transmission providers, ESA supports alternative mitigation measures to ensure just and reasonable rates for third-party market-based ancillary services as detailed below.

a. Competitive Solicitations

ESA strongly supports competitive solicitations as a method of ensuring just and reasonable rates while fostering robust competitive markets. Market-based sales by a third-party supplier should not be prohibited to satisfy the purchasing utility's own OATT requirements to offer ancillary services to its customers when services are procured through competitive requests for proposals. This procedure inherently assures competitive rates and thereby negates any need to stifle competition by requiring market power studies. A competitive process will increase the opportunities for storage to provide ancillary services in the non-RTO/ISO regions in the country.

There is ample evidence that demonstrates the benefits of competitive solicitations for ensuring just and reasonable rates. For example, in today's robust RTO/ISO markets, RTO/ISOs assure just and reasonable rates by procuring ancillary services through competitive wholesale markets that award procurement based on the most economic bids. Suppliers are thus incented to offer their services at the most cost effective rate possible. Another example, is where Load Serving Entities (LSEs) have divested their generation and must procure ancillary services for their retail ratepayers without an available backstop of cost-based ancillary services. In those situations, the LSEs are required to conduct competitive Requests for Proposals ("RFPs") for procurement of energy, capacity and ancillary services. Once the state regulatory agency approves the LSE's RFP, a bidder is chosen and, based on the RFP, the costs to procure the energy, capacity and ancillary services are deemed to be just and reasonable and passed through to ratepayers. In these states, there is no backstop of cost-based ancillary services and state public utility commissions have determined that the retail rates are just and reasonable because they have been competitively procured.

To truly foster robust competitive markets, FERC should consider mandating that procurement of all ancillary services be obtained through a competitive procurement process when a transmission provider no longer has sufficient ancillary service capacity. Given that transmission providers represent the most significant potential market for ancillary services in non-RTO/ISO regions, FERC's mandating that transmission providers conduct competitive solicitations for ancillary services will greatly increase the opportunities for new storage resources to provide ancillary services in the non-RTO/ISO regions in the country. In doing so, ESA agrees with WSPP that shifting from requiring proof of an absence of market power to requiring procurement through competitive processes should be broadened by eliminating the *Avista* restriction on sales entirely and ESA respectfully requests that FERC consider this recommendation as part of its decision in this proceeding.

b. Price Caps

ESA supports using a price cap mechanism similar to one proposed by WSPP as an adequate vehicle for implementing a cost-based rate cap for ancillary service rates. If such a cap were established, the provision of all ancillary services that remain at or below such cost-justified rate caps should be considered just and reasonable with no need for additional mitigation measures. It is reasonable that such a cap for ancillary services be subject to the same "up to" cap that the WSPP agreement has for power and energy.. Furthermore, ESA also supports a waiver of the current third-party sales restriction in those cases where the purchasing transmission provider voluntarily commits not to pass-through the price of non-cost-based third-party purchases that exceed its OATT rates to its wholesale and native load retail customers. However, ESA is concerned that it will be difficult to compare costs of service of new-energy resources, such as flywheels and batteries, that are specifically designed to provide ancillary services only, and must include the entire cost of their facilities in their cost of service, versus transmission providers and other third party sellers of Regulation markets, *i.e.* conventional generation resources, that are able to spread the costs of their projects across sales of energy, capacity and ancillary services. ESA is concerned that conventional general resources may under-state their true costs to provide ancillary services, because those resources are allocating a greater proportion of their costs to energy and/or capacity sales. Therefore, a new resource margin "adder" to the OATT-based cost cap is an appropriate vehicle for ensuring a level playing-field when evaluating the fixed costs for new market entry.

In order for these price cap mitigation measures to be successful in fostering robust competitive markets, FERC must ensure that cost-based schedules for ancillary services are submitted on a comparable basis and take into consideration resource performance. Please see ESA's recommendations below in the section on Advancing the Goals of the Frequency Regulation NOPR in non-ISO/RTO regions.

4. ***Advancing the Goals of the Frequency Regulation NOPR in all Regions***

ESA supports extending the goals of the Frequency Regulation NOPR to regions outside the organized wholesale energy markets. In its NOPR, FERC proposed a two-part payment structure to ensure that the Organized Wholesale Regulation markets are not unduly discriminatory and are just and reasonable by compensating resources commensurate with the amount of service they perform for the system operator. The two-part payment would consist of: (1) a uniform capacity payment that includes the marginal regulating resource's opportunity costs (*i.e.*, the amount of megawatts that a resource makes available to provide Regulation) and (2) a performance payment based on the amount of up and down movement, in megawatts, the resource accurately provides in response to a control signal. Paying resources based on these two components will ensure that fast-ramping regulation resources are justly and reasonably compensated for the additional value they provide to the grid in correcting the Area Control Error ("ACE").

Using fast-ramping resources to provide regulation service in the non-ISO/RTO markets will yield lower costs for consumers, increase flexibility to maintain reliability, and deliver environmental benefits. Therefore, ESA strongly recommends that FERC extend the resultant rules from the NOPR to the non-ISO/RTO regions by creating a methodology that would differentiate the compensation paid to Regulation resources based on the additional value provided by their ability to respond to an ISO control signal nearly instantaneously. Until the design of the ancillary services compensation is reformed to allow fast-ramping regulation resources to get paid based on the comparative value they provide to the grid, the market signals will not be strong enough to encourage wide-spread selection of faster resources and ratepayers will not benefit from the associated savings from the reduced use of slower-ramping resources.

Benefits of Speed and Accuracy for Regulation Service

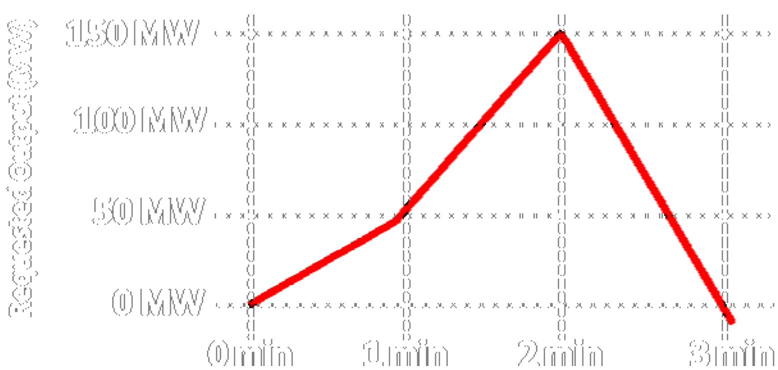
Unlike existing generation technologies, new advanced storage resources (such as flywheels and batteries) designed specifically to provide Ancillary Services have the unique ability to respond nearly instantaneously to a regulation control signal. As acknowledged by FERC in its NOPR, using fast-ramping resources to provide regulation will result in improved operational and economic efficiency of the transmission system and lower costs to consumers in the organized wholesale energy markets.[9] A transmission provider's ability to correct ACE is a function of both the amount of capacity in MWs available to respond to an ISO control signal *and* the speed in which the imbalance is corrected. This is the reason why all markets have a minimum response time (5 – 10 minutes in most markets) required to provide frequency

[9] *Id.* at P 2.

regulation. The physics of controlling frequency is analogous to a car that rolls downhill gaining momentum – the longer the car rolls before the driver applies the brake, the more pressure he/she will need to exert to stop the car. Likewise, the faster the system operator responds to frequency, the less Regulation that will need to be deployed to correct the deviation resulting in lower costs for consumers.

The premise that procuring more ramp capability reduces the total capacity required to meet Regulation needs can be seen in Figure 3 below which shows a representative AGC signal for a system over 3 minutes. In the first minute, the system is requested to ramp from 0 MW output to 50 MW. This produces a signal ramp rate of 50 MW/minute. In the second minute, the system is requested to ramp from 50 MW output to 150 MW, which produces a signal ramp rate of 100 MW/minute. In the third minute, the system is requested to ramp from 150 MW output to 0 MW, which produces a signal ramp rate of -150 MW/minute.

Figure 3



Signal Ramp Rate (MW/min)	50	100	-150
Total capacity required to meet signal with 20%/min Ramp Rate	250 MW	500 MW	750 MW
Total capacity required to meet signal with 40%/min Ramp Rate	125 MW	250 MW	375 MW

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Figure 3 shows the capacity required to meet the signal in each minute, using two different ramp rates. In the first minute, 250 MW of resources with a 20%/min ramp rate would be required to meet the signal with its 50 MW/min ramp rate. However, only 125 MW of resources with a 40%/min ramp rate would be required to meet this same signal. The faster ramp rate allows the signal to be met with less capacity. In the second minute, the 100 MW/min ramp rate would require 500 MW of resources with a 20%/min ramp rate, or only 250 MW of resources with a 40%/min ramp rate. In the third minute, the -150 MW/min ramp rate would require 750 MW of resources with a 20%/min ramp rate, or only 375 MW of resources with a 40%/min ramp rate. This illustrates how procuring Regulation supply with more ramp capability reduces the capacity required to meet system need.

This concept has been confirmed in a Pacific Northwest National Laboratory ("PNNL") study, *"Assessing the Value of Regulation Resources Based on Their Time Response Characteristics,"* which determined that fast responding storage resources could reduce CAISO procurement of Regulation by as much as 40%[10] because the sooner the System Operator can correct the ACE, the less amount of total regulation is needed. PNNL compared the regulation effectiveness (*i.e.*, the ability of a given resource to correct the ACE per MW offered) of an "ideal regulation resource" (defined as one that has infinite energy and can respond instantly with perfect accuracy to any system imbalance) with a number of regulation resources and concluded that fast-responding regulation resources could be as much as 17 times more effective than conventional ramp limited regulation resources due to how quickly and accurately it responds to a system imbalance. (See Figure 4.)

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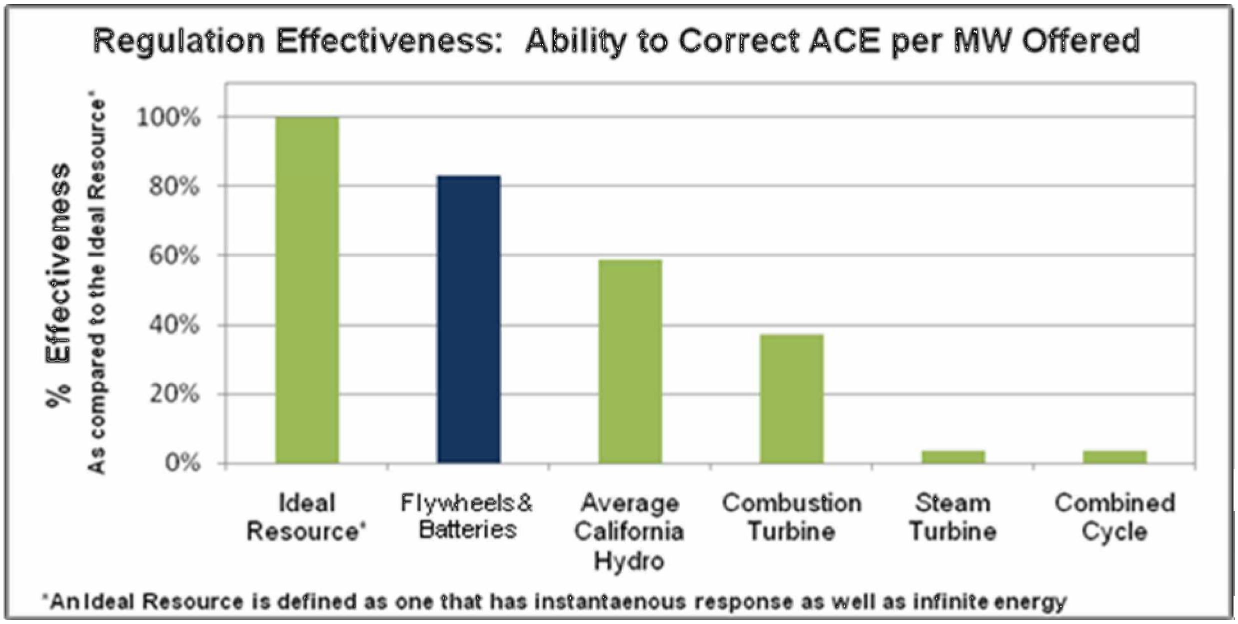
[10] Makarov, Y.V., Ma, J., Lu, S., Nguyen, T.B. "Assessing the value of Regulation Resources Based on Their Time Response Characteristics." Pacific Northwest National Laboratory, PNNL – 17632, June 2008.

Figure 4



Another way to consider the benefits of procuring regulation from new fast-ramping storage resources is to compare the amount of MW capacity that needs to be installed and reserved from other types of Regulation resources in order to provide the same amount of ACE Correction. For example, gas turbines provide the fastest of conventional regulation capacity reserve. Typical gas turbines ramp at a rate of 20% ramp rate per minute and typically can use about 20% of their total capacity for regulation without violating their emissions permits or significant degrading efficiency. New storage technologies can use 100% of their total capacity for regulation, can both absorb and provide energy to the grid, and can ramp from zero to full capacity in a few seconds. This means that a 100 MW gas turbine can set aside approximately 20 MW of its capacity for regulation to provide 10 MW of regulation (up and down). The gas turbine can then provide 10 MW of regulation in either direction within thirty seconds, whereas a 20-MW storage resource can provide all 20 MW of its capacity up or down within 4 seconds. Most regulation signals change every 2 – 6 seconds depending on the ISO/RTO region. Therefore, for gas turbines to provide 20 MW of regulation response in 4 seconds (like a 20 MW fast-response storage resource) it would require 1500 MW of gas turbines reserving 20% of their capacity for Regulation (300 MW) and then all ramping in unison. This example demonstrates the significance that speed of response plays in the overall amount of regulation capacity that must be procured or self-supplied by a Transmission Provider in order to reliably manage the frequency of its grid.

Similarly, A123 analyzed ACE correction and determined that even with limited energy duration capabilities, the new energy storage technologies are superior to traditional generators in terms of grid reliability and that the binding constraint for frequency regulation service is more likely to be ramp rate rather than energy duration.[11] Per its study, when procuring regulation capacity to match the ACE MW range, A123 found that the use of slower resources was insufficient to meet the NERC BAL criteria for the region evaluated. The slower signal adequately corrects ACE only 79% of the time, which is well under the NERC BAL 90% requirement. Therefore, in order to satisfy the reliability standard, the system operator would need to either use faster ramping resources or over-procure capacity from slower resources (*i.e.* procuring more capacity than the ACE MW range). By adding fast-ramping energy storage resources that can respond to the ramp-focused signal, the net ACE remained within the acceptable range 100% of the time, leaving an additional reliability margin, without needing to procure additional capacity from slower resources. Figure 5 shows these signals over a twelve-hour period.

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[11] See ERCOT, "ACE/REG Data," available at http://www.ercot.com/calendar/2010/11/20101108-PSWG, accessed May 2, 2011. This data set provided four second data over a period of thirty days.

Figure 5

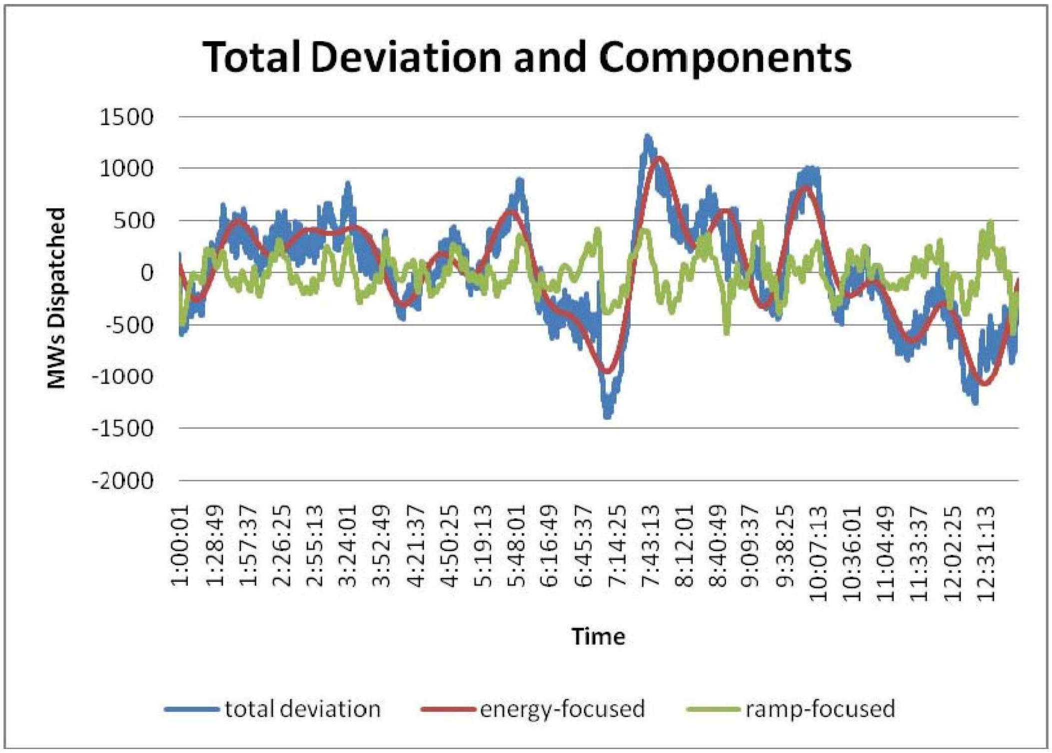


Figure 5: Graph of system total deviation (blue), split into ramp (green) and energy (red) components, showing twelve hours from a thirty day data set. Due to the frequent zero crossings of the ramp signal, a limited energy storage device can follow the signal completely and contribute significantly towards reducing ACE.

A further examination of the fast signal reveals that relatively little energy storage capacity is required to follow the signal. Over the thirty day period, the fast signal changes from charging to discharging 517 times, with an average duration of about 3.4 minutes, normalized to full power output, in any one direction. Assuming one large storage resource was built to provide the system's complete frequency regulation requirements, the 610 MW storage resoruce would at most have to discharge continuously for about nine minutes and charge continuously for about five minutes over any point during the thirty day period. Therefore, a storage device with about fifteen or twenty minutes of duration would provide sufficient energy capability with some margin. A123's analysis showed that storage devices with limited energy durations do provide appreciable benefits for operators seeking to meet applicable NERC reliability criteria.

<u>Recommendations for Extending the Goals of the NOPR to all Regions</u>

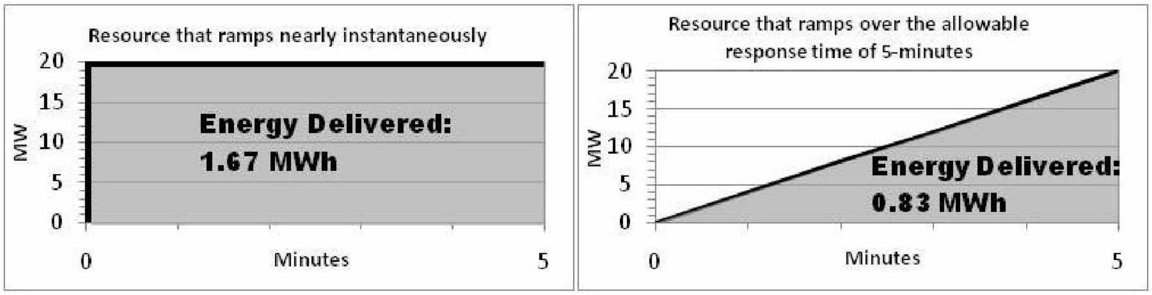
***<u>FERC Request</u>*: *Should we allow transmission customers that self-supply frequency regulation service to determine the amount of capacity they procure based on the third-party resource's performance capability? For instance, if a transmission customer is required to purchase 2 MW of frequency regulation service under pro forma OATT Schedule 3, should we allow that customer to purchase less capacity if it purchases from a resource that responds more quickly and accurately than the resources the transmission provider uses to provide service under Schedule 3? If so, how should we determine the amount of capacity the transmission customer is required to purchase?*[12]**

Because fast-ramping resources provide more regulation value to the grid per MW than slower-ramping resources, if a transmission customer chooses to self-supply regulation from a resource that has a faster ramp-rate than the transmission provider's regulation resource(s) it should be allowed to purchase less regulation capacity. For example, if a wind resource chooses to self-supply its regulation reserve capacity using fast-ramping storage plant, it should be able to self-supply a lower volume of regulating reserve capacity than if it self-supplied from a slow-ramping traditional resource. If two resources can provide comparable regulation service with different levels of capacity, then supplying different levels of capacity should be allowed.

As acknowledged by FERC in its Regulation Compensation NOPR, faster-ramping resources are capable of providing a greater amount of ACE correction per MW of Regulation capacity than slower ramping resources because they can move more quickly to their dispatch target and in turn provide more ACE Correction in real-time. This means that a resource that responds instantaneously with their full output provides twice the amount of energy over 5 minutes than a resource that takes the allowable 5 minutes to respond. (See Figure 6.)

[12] *Id. at* P 22.b

Figure 6

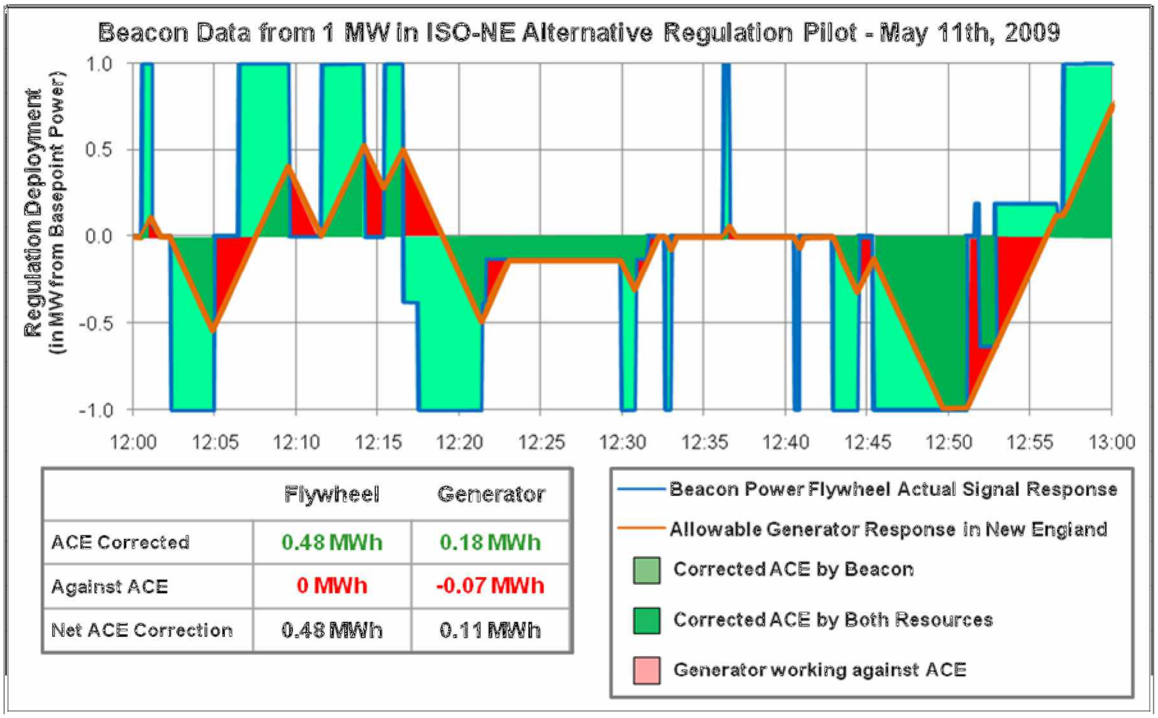


Because the amount of energy that can be provided by fast regulation resources to correct ACE is much greater per MW of procured capacity than would be provided by slower ramping resources, the grid procures less regulation when using fast-responding regulation resources to regulate the grid.

Actual data from Beacon Power's operating experience using flywheels to regulate the grid in ISO-NE illustrates the potential reduction in total regulation capacity that can be achieved by utilizing fast-ramping resources that are capable of rapidly delivering their full power output versus utilizing slow-ramping resources. For example, Figure 7 below, compares the ACE Correction of Beacon Power's 1MW flywheel plant responding nearly instantaneously to the control signal sent by ISO-NE (*i.e.* delivering 1 MW capacity in one four second AGC cycle) with that which would have been provided by 1 MW of a resource with a ramp time of 5 minutes, the allowable response time in ISO-NE.[13]

[13] ISO New England, Transmission, Markets and Services Tariff, Section III, Market Rule 1, Section III.1.10.1A (e), Last Revision Date: March 14 2011. http://www.iso-ne.com/regulatory/tariff/sect_3/mr1_sec_1-12.pdf

Figure 7



As demonstrated in Figure 7, the flywheel provided 0.48 MWh of net ACE correction in this hour whereas the slow-ramping resource provided just 0.11 MWh of net ACE correction. We use the term ACE Correction to mean the total energy delivered by a resource while providing Regulation service in response to a transmission provider's control signal and represents the actual regulation "work" a resource has provided to the grid.

The fast-ramping flywheel is able to provide more ACE correction for two reasons. First, the flywheel can deliver its full regulation power output within seconds, whereas the slow resource takes 5 minutes to deliver the same quantity of power. The flywheel provides more total energy to correct the ACE. Second, because the flywheel can switch directions nearly instantaneously upon receiving a control signal it is always contributing to correcting ACE. Conversely, the slow-ramping resource cannot switch directions quickly and thus often provides regulation in a direction that is counterproductive to the needs of the grid. As a result, the slow-ramping resource actually adds to the ACE, requiring another resource to be dispatched to rebalance the grid. As shown in Figure 7, the slow-ramping resource provided 0.18 MWh of energy in response to the control signal however, because of its slow-ramping time, 0.07 MWh of this energy worked against the ACE correction. Therefore the actual or Net ACE Correction of the slower-ramping resource was just 0.11 MWh.

As the fast-ramping resource corrected significantly more ACE than the slower ramping resource, it provided the grid with more regulation value per MW of regulation capacity, thereby demonstrating that 1 MW of regulation capacity from a fast-ramping resource can displace more than 1 MW of regulation capacity from a slow-ramping resource for the same level of system ACE Correction. Stated another way, if 0.48 MWh of net ACE correction in this hour were desired, 4 MW of regulation capacity would need to be procured by the ISO from slower-ramping generation resources as opposed to 1 MW of regulation capacity using fast-ramping flywheels.

Therefore, ESA respectfully recommends that if a transmission customer chooses to self-supply its regulation reserve capacity using a resource that has a faster ramp-rate than the Transmission Provider's regulation fleet's ramp-rate, it should be allowed to self-supply a lower volume of regulation capacity than it would be required to procure from the Transmission Provider under Schedule 3 (and/or Schedule 10, if applicable).

In order to determine the amount of regulation capacity a resource needs to self supply it is necessary to determine the comparative value the regulation resource's ramp-rate has on a Transmission Providers ability to manage its ACE. Therefore, ESA recommends that the amount of capacity the transmission customer is required to self-supply should be based on a comparison between the amount of ACE Correction the self-supplier's resource(s) and transmission provider's resource(s) can deliver over the balance area's average interval between

ACE direction changes (in minutes). The average time period between when ACE changes direction represents how often a Transmission Provider calls on its fleet to ramp up or down in response to its AGC signal (e.g. how often the transmission provider utilizes the ramp-rate of a given resource) and the average duration of time a resource needs to provide power. To calculate the balance area's average interval between ACE direction changes (in minutes), we recommend that each Transmission Provider determine the average number of time its ACE changes direction per hour and then use this number to calculate the average interval between ACE direction changes.[14]

The Transmission Provider can then calculate the amount of ACE correction provided over the average interval between ACE direction changes by using the ramp-rate capability of its existing fleet of resources and the amount of ACE correction provided over the average interval between ACE direction changes by the transmission customer's self-supplied regulation resource's ramp-rate capability resource(s). The ratio of ACE correction provided by the transmission provider's existing regulation fleet to the ACE correction provided by the self-supplied resource can then be used to determine the amount of capacity required to be self-supplied.

[14] A minimum threshold or deadband can be employed to eliminate "noise"..

Example

Referring to the ISO-NE example above, the ACE changed direction 23 times in that hour,(See Figure 8), which yields an average interval between ACE direction changes of 2.6 minutes (60 minutes divided by 23 changes in direction).

Figure 8

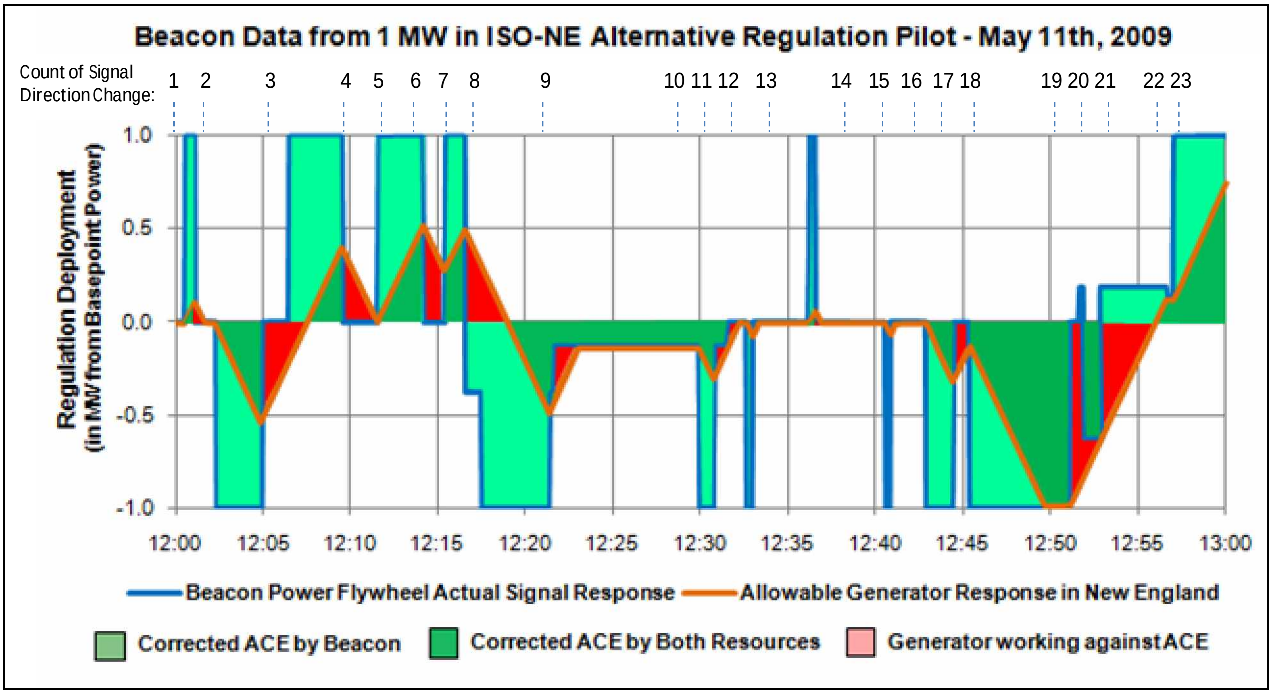


Table 1. Data from the ISO-NE Example shown in Figures 7 and 8.

Resource	Capacity (MW)	Ramp Rate (MW/min)	ACE Correction per hour (MWh)	ACE Correction per 2.6 mins (time per change in direction of ACE) (MWh)
Fast-ramping Storage resource	1	15	0.48	0.043
Slower- Ramping Generator	1	0.2	0.11	0.011
Ratio (Fast Resource: Slow Ramping Generator)	1x	75x	4.4x	3.8x

Table 1 above contains the data comparing the two resources in Figures 7 and 8 above. As can be seen in the Table, each resource provides 1 MW of capacity but have different ramp-

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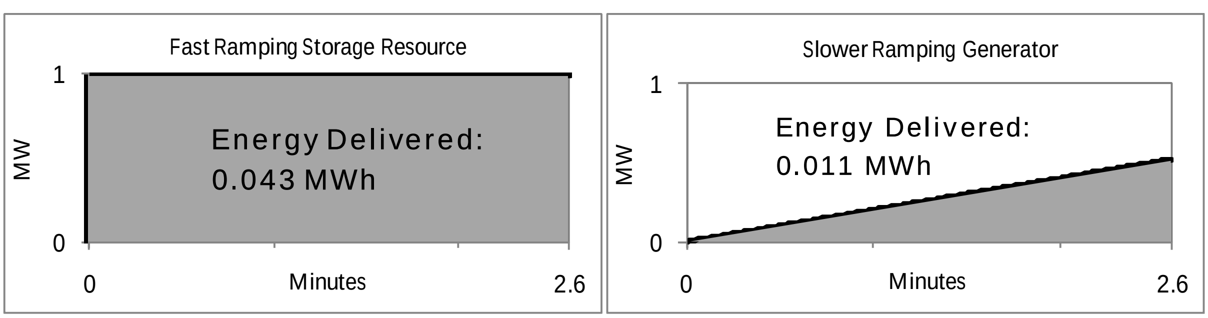
rates. The ramp-rate of the fast resource is 15 MW/min (*i.e.* it can deliver 1 MW in 4 seconds) versus the ramp-rate of the slower resource which is 0.2MW/min (*i.e.* it takes 5 minutes to deliver 1 MW). The comparison of the two ramp rates shows that the fast-ramping storage resource has 75 times the speed of response as the slower ramping generator. In the example, the fast-ramping resource provided 0.48 MWh of ACE Correction over the hour while the slow-ramping resource provided only 0.11 MWh, resulting in the fast-ramping storage resource providing 4.4 times more ACE Correction than the slower ramping generator, even though the two resources have the same capacity.

Thus, a proxy methodology for determining the comparative value of each resource is to compare the ACE Correction provided by each resource over the average time period the ACE changes direction. In this example, the signal changes direction 23 times which yields an average interval between ACE direction changes of 2.6 minutes (60 minutes divided by 23 changes in direction). Over 2.6 minutes, the fast-ramping resource provides 0.043 MWh of ACE Correction on average while the slow-ramping resource provides only 0.011 MWh (see Figure 9). The fast-ramping resource provides 3.8 times the ACE Correction of the slow-ramping resource.

Figure 9: Comparison of ACE Correction over 2.6 minutes



Because ACE Correction is a direct measure of the amount of Regulation service provided per MW of Regulation capacity, the ratio of ACE Correction provided by a faster-

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ramping resource per MW of capacity and the ACE Correction provided by the slower-ramping resource per MW capacity, can be used to determine the amount of regulating capacity a resource must self-supply. In the example, the ratio of ACE Correction per MW by the slow resource to ACE Correction per MW by the fast resource is 1:3.8. So, if a transmission customer were to self-supply regulation with the fast resource, it should be allowed to satisfy its Regulation obligation with 0.26 times or about 1/4 the capacity. This proposed methodology will ensure just and reasonable rates by encouraging self-supply from the most efficient resources available. ESA recommends that FERC apply the above-described formula to determine the amount of capacity a self-supplying transmission provider would require and to mandate that transmission providers include in their Schedule 3 (and Schedule 10, if applicable) the following data on its Regulation resource fleet:

- Total capacity of their Regulation fleet (MW);
- Regulation fleet's ramp-rate capability (MW/min);
- The number of times ACE changes direction on average per hour;
- The average interval between ACE direction changes (in minutes); and
- The average amount of ACE Correction provided per interval.

This information should greatly assist transmission customers in determining the amount of capacity it must self-supply based on its resource(s) ramp-rate. In addition, transmission providers should update their Schedules each time the ramp-rate of its resource mix materially changes.

If FERC decides not to mandate ESA's proposed capacity calculation method and changes to transmission provider's Schedule 3 (and Schedule 10, if applicable) , then at a minimum, transmission customers that chose to self-supply regulation should be allowed the flexibility to work with their transmission provider to determine different volumes of self-supplied regulation reserve capacity required based on the ramp-rate capability of its regulation resource(s).

> ***<u>FERC Request</u>: Were we to allow a cost-based cap for frequency regulation service in the WSPP Agreement as described [in the Notice of Inquiry], how could that cap reflect an individual resource's performance?***[15]

As discussed above, ESA supports the price cap mechanism proposed in the WSPP Agreement as an adequate vehicle for implementing a cost-based rate cap for ancillary service rates. If such a cap were established, the provision of all ancillary services made under the WSPP Agreement that remain at or below such cost-justified rate caps should be considered just and reasonable with no further mitigation measures needed. However, as discussed above, costs must be compared on a level playing field and resource performance should be taken into account. For example, a regulation resource that provides more ACE Correction per MW capacity due to its superior speed and accuracy but has the same cost per MW capacity as a slower responding resource should not be regarded as having the same total cost, because 1 MW of a fast resource actually provides more Regulation service per MW of capacity than 1 MW of slow resource. Thus, while the capacity price per MW may be the same, ratepayers would need to purchase more total capacity from the slower resource in order to achieve the same amount of Regulation service.

Today, in the non-RTO/ISO regions the Schedule 3 Contract Price for Regulating Reserve Service is stated in units of $/kWh or $/kW/Month and the Billing Factor is based on the transmission customers total load. This data is not sufficient for a third-party supplier to reflect an individual resources performance in the comparison of whether the third-party suppliers cost are below the Transmission Providers OATT Schedule 3 rate. Therefore, ESA recommends that

[15] *NOI at* P 22.a

FERC provide specific guidance on the cost-based data to be included in both Transmission Providers and Third Party Sellers Regulation schedules to ensure costs are evaluated on a comparable ("apples-to-apples") basis. Specifically FERC should mandate that the Transmission Providers Schedule 3 (and Schedule 10, if applicable) and Third- Party Sellers schedule (Schedule Q in WSPP) include the following data to ensure costs are compared on an apples-to-apples basis:

- Current total capacity to provide Regulation (MW);
- Ramp-rate of its regulating resource(s) (MW/minute);
- Cost of Regulation per Unit of ACE Correction ($/MWh) with ACE Correction calculated as discussed above; and
- Cost per its Capacity multiplied by its ramp rate ($\$/MW^2/min$).

If implemented, ESA's recommended schedule changes would clearly identify the individual regulation costs of each resource based on their performance characteristics, which would ensure that the benefits gained by procuring regulation from resources that can respond to regulation signals with greater speed and accuracy are reflected in the costs used to compare suppliers. Furthermore, ESA respectfully requests that FERC mandate that this data is included in standardized solicitation data for the procurement of Regulation when Transmission Providers utilize competitive solicitations to procure Regulation resources. Responses to RFPs must be evaluated on a comparable basis and including the above-delineated data as part of the competitive solicitation would allow transmission providers to select the best mix of resources to supply regulation and evaluate the benefits that resources can provide due to their speed and accuracy in responding to a regulation signal. Allowing transparent comparison and evaluation of resources through this metric will ensure the lowest cost resources are identified, thus reducing costs to end-users and the total capacity required.

5. ***<u>Alternative Proposal for Advancing the Participation of Fast Response Storage in non-ISO/RTO Regions</u>***

Even if FERC were to implement each of the reforms recommended by ESA, there remains challenges for third-party storage owners to provide service, because even where markets exist, new-storage resources, must rely solely on the revenues earned in the ancillary services markets to finance their facilities. This is not true of conventional generations, which are able to finance their projects based on their PPAs for sales of energy, capacity *and* ancillary services. In today's market, conventional generation resources are built based on the revenues received from selling in the energy and capacity markets, not revenue from ancillary services. Simply stated, a traditional generators ability to sell energy and capacity subsidizes its ability provide ancillary services.

Without a method of revenue certainty, it is difficult for storage entities to find project financing. Due to these challenges, many of the first commercial-scale storage projects are being financed by loans and grants from the Department of Energy and state agencies. It is unrealistic to expect the government will continue to finance projects indefinitely and therefore, *it is imperative* that FERC consider ways to compensate storage resources that are designed solely to provide Ancillary Services. One mechanism would be to allow Transmission Providers that own/and or contract with energy storage technologies that are solely providing ancillary services to recover their costs as a wholesale transmission facility subject to Commission jurisdiction. This could be done by dividing Regulation and Frequency Response Service into two supply categories as was done with Reactive Supply and Voltage Control Service.[16] NERC has identified that reactive power can be supplied by both transmission facilities and generation

[16] See FERC Order 888,at 209.

resources.[17] Currently reactive power and voltage control provided by transmission facilities is supplied by technologies such as mechanically switched capacitors or reactors, static VAR compensators, and static synchronous compensators Some generation resources can also provide reactive power and voltage control to the transmission system while simultaneously providing energy and other ancillary services. The cost of the reactive power and voltage control transmission facilities are considered as a part of the cost of basic transmission service, while the generation supply of Reactive power and voltage control is an OATT ancillary service, unbundled from the basic transmission service.

The approach of separating the supply of Reactive Power and Voltage Control Service by the facilities that supply can also be applied to Regulation and Frequency Response Service. By dividing Regulation service into transmission facility supply and generation resource supply, resources that are installed for the purpose of exclusively providing Regulation service, such as energy storage resources, and thus in support of transmission service, can be better categorized to align with actual facility operations. This mechanism allows Transmission Providers that own energy storage technologies and /or that contract with third-party storage providers to recover their costs as a wholesale transmission facility subject to Commission jurisdiction. This is appropriate because the storage facilities do not generate electricity and operate only to enhance the reliability of transmission service. This would fully alleviate FERC's market power concerns because rate-recovery would be subject to FERC jurisdiction.

Furthermore, pursuant to section 1223 of EPAct 2005, these facilities are able to earn incentives as advanced transmission assets, because they are the "best available technologies" and provide incremental benefits that increase operational and energy efficiency, enhance grid operations, and result in greater grid flexibility. As discussed above, fast response storage

[17] NERC Comments on RM95-8-000, 8/4/1995, at 28.

technologies have been demonstrated to be more effective at providing Regulation than traditional generation resources by a factor of about 2 – 4 times because they can very rapidly store and inject power to the grid. Treating fast response regulation storage facilities as transmission will spur investment in these facilities because owners will have access to incentive-based rates that they would otherwise not have access to if the facilities were classified as generation and it provides sellers of storage technologies the revenue certainty they need to make their technologies available to the grid. Accordingly, ESA respectfully requests that FERC consider treating fast response regulation storage facilities as transmission facilities as an alternative to treating storage resources that solely provide ancillary services as generation resources.

B. Accounting and Reporting Requirements for Energy Storage Resources

Overall, the Commission seeks comment on whether current accounting and reporting requirements for activities and costs relating to the operations of new electric energy storage resources provide sufficient transparency.[18]

Response

The Commission's accounting requirements (18 C.F.R. Part 101) do not contain specific accounting parameters or functional classification for new electric storage technologies. As such, it is difficult for owners of such technologies to complete their reporting requirements. This in turn makes it difficult for regulators to determine costs and establish appropriate rates for new electric storage technologies. Several modifications and additions to the Commission's accounting requirements are necessary to facilitate cost of service or other rate policies for new electric storage technologies.

The Commission's existing accounting requirements classify utility plant costs under the following accounts: (1) Intangible; (2) Steam; (3) Nuclear; (4) Hydraulic; (5) Other Production;

[18] *Id. at* P 25

(6) Transmission; (7) Distribution; (8) Regional Transmission and Market Operation; and (9) General Plant (18 C.F.R. Part 101). In the Form Nos. 1 and 1-F, the Steam, Nuclear, Hydraulic, and Other plant functions are grouped as "Production Plant" functions. These plant cost classifications have associated plant and equipment (capital) accounts as well as operation and maintenance expense accounts. The lack of 1) a specific utility plant cost classification, 2) plant and equipment accounts, and 3) operation and maintenance expense accounts for electric storage technologies poses a reporting challenge for owners of such technologies and a cost determination challenge for regulators of rate policies. Therefore, we make the specific changes below.

In addition the Commission seeks comments on the distinction between storage that helps move electricity over distance, for example by providing reactive support, which may be included in transmission rates versus using storage to defer transmission or substitute for transmission which does not support the movement of electricity over distance but as a replacement for a transmission service from elsewhere to that point on the system.[19]

Response

Storage technologies can offer cost effective means for a transmission provider to provide critical Transmission functions. In such cases, it is critical that the FERC provide clear practical guidelines on when Storage is serving a Transmission function, and thus can be properly included in Transmission ratemaking. The Commission's practice of reviewing proposed investments on a case-by-case basis, introduces an important barrier to the use of storage technology by transmission planners.

The distinction between when storage is helping to move electricity over distance versus using storage to defer transmission can be made based on how the asset operates. When a Storage asset is set to respond to a Transmission contingency, and the capability of the unit is not otherwise committed through contracts or energy markets, that asset should be viewed as

[19] *Id. at* P 26

dedicated to Transmission Service and thus be included in Transmission rates. Conversely, if the Storage asset were scheduled in advance to provide energy to serve load, or was responding to pricing or demand levels, the asset would be serving as a substitute for Transmission Service.

An example may illustrate the need for guidance. There may be conditions and functions where the Storage asset's function is to maintain grid stability, and the discharge duration is less than a minute. In such cases, there would be benefits from providing a Storage asset that could provide that function. That asset would have a different design or configuration from a Storage asset that was designed to run for the entire peak period. The identification of suitable locations and cost-effectiveness of such cases would necessarily be site-specific. However, without guidance from the Commission that the regulatory obstacle to even classifying the proposed Storage asset as Transmission has been removed for categories of functions, this type of Transmission investment will be less likely to be considered by industry managers that do not want to take the additional risk of having the Storage asset fail to qualify as a Transmission asset.

Proposed Accounting and Reporting for Comment

1. New and Modified Plant Accounts

a. FERC Request: ***Should new accounts for energy storage plant and equipment be created and an existing account be revised as discussed in the above example,[20] should new accounts be created and no existing accounts used, or do the existing primary plant accounts sufficiently provide for energy storage plant and equipment? Please elaborate. Also, if applicable, provide examples of new accounts and existing accounts, including account instructions that could be created or revised to account for energy storage resources.[21]***

Response

[20] Paragraph 36 of the Notice of Inquiry provides the following example: "The instructions to Account 363 could be revised to expand the items includable in the account to recognize the unique operating characteristics of new energy storage technologies which may provide services other than supplying electricity to meet emergency or peak demands. [footnote omitted]." P 36. "For example, as a distribution resource recorded in the account the asset could assist with frequency or voltage regulations which, at times, may require it to withdraw electricity from the grid rather than supply it and for purposes other than to meet emergency or peak demands." Footnote 51.

[21] P 37.a

Given that individual storage assets can be used for multiple purposes, i.e. production, transmission and/or distribution, ESA recommends that new plant and equipment accounts are created for energy storage. Specifically, new electric storage plant and equipment accounts should be created for storage devices, to coincide with the new "Electric Storage" functional classification, recommended in the response to 1c below. This "Electric Storage" plant function should have associated with it a combination of plant and equipment accounts that currently exist under the Production, Transmission, and Distribution plant functions, as well as new accounts. The plant and equipment accounts for the "Electric Storage" plant function should include the following six existing accounts and two new accounts:

Existing accounts to be included in new "Electric Storage" function:

1) Land and Land Rights;

2) Structures and Improvements;

3) Accessory Electric Equipment;

4) Misc. Power Plant Equipment;

5) Station Equipment; and

6) Asset Retirement Costs.

Descriptions of these existing accounts can be taken from existing plant and equipment accounts from the current Production, Transmission, and Distribution plant functions.

In addition to the existing plant and equipment accounts listed above, two new plant and equipment accounts should be created for a new "Electric Storage" plant function. New accounts to be included in new "Electric Storage" function:

1) Production Equipment; and

2) Electric Storage Equipment.

The "Production Equipment" account should have associated with it the relevant electricity production items from Other Production Accounts 342 - Fuel Holders, Products, and Accessories, 343 - Prime Movers, and 344 - Generators. The "Electric Storage Equipment" account should include the following items: storage device (flywheel, battery, etc), storage device connections, charging equipment, miscellaneous equipment, switching equipment, and ventilating equipment.

b. <u>FERC Request</u>: ***If the Commission were to continue use of existing primary plant accounts for energy storage resources, which accounts will provide the transparency needed to develop and monitor cost-based rates? Would revisions to the instructions of the accounts be required to account for energy storage resources? If so, please provide insight into what may be required.*** [22]

<u>Response</u>

If the Commission were to continue use of existing primary plant accounts for energy storage resources, then ESA recommends revising instructions for several accounts. There would be four changes to the existing primary plant accounts needed to better capture storage plant costs:

1. Other Production Account 343 – Prime Movers, which currently includes prime movers devoted to the generation of electric energy, together with their auxiliaries, should be expanded to include other electric storage equipment used to provide services similar to production plants.
2. Transmission Account 353 - Station Equipment, which currently includes control equipment including batteries and battery charging equipment, should be expanded to include other electric storage equipment used to provide services similar to production plants.

[22] *NOI at* P 37.b

3. Distribution Account 362 - Station Equipment, which currently includes control equipment including batteries and battery charging equipment, should be expanded to include other electric storage equipment used to maintain service to retail customers.
4. Distribution Account 363 - Storage Battery Equipment, which currently includes batteries and charging equipment, should be expanded to include all electric storage technologies and should be renamed to "Emergency/Peak Demand Storage Equipment" to coincide with the existing description of including storage equipment used for the purpose of supplying electricity to meet emergency or peak demands.

In addition, ESA would recommend three changes to the general instructions of the system of accounts so as to capture storage plant costs.

1. A description of the Other Production plant function should be added in the Electric Plant Instructions and should explicitly include electric storage technologies that provide services similar to production plants.
2. The existing Transmission Plant function description under Electric Plant Instruction 14A - Transmission and Distribution Plant - Transmission System should be modified to explicitly include electric storage technologies that provide transmission services.
3. The existing Distribution Plant function description under Electric Plant Instruction 14B - Transmission and Distribution Plant - Distribution System should be modified to explicitly include electric storage technologies that provide distribution services.

c. <u>FERC Request</u>: ***Should the cost of new energy storage plant and equipment be recorded within existing utility plant functional classifications (i.e., transmission, distribution, and production) or should a new functional classification be created for energy storage? What are the benefits of one approach over the other? If the Commission were to create a new classification(s), please comment on the specific plant accounts and account instructions that would be created or modified for inclusion in the new asset class.***[23]

[23] *Id. at* P 37.c

Response

Because electric storage assets can serve multiple purposes with the same asset, i.e. may be classified as production, as transmission, and/or as distribution, depending on the circumstances, ESA recommends that a new functional classification should be created for energy storage. The benefits of creating a new storage plant function are that the new classification can be designed to best address the unique characteristics of storage assets. The new electric storage technology plant function could be called "Electric Storage" and the description and associated accounts should include the information listed in ESA's answer to 1a.

d. <u>FERC Request</u>: ***Are there any other accounting issues that relate to accounting for energy storage plant and equipment that should be considered? If so, provide options to address the issues.***[24]

Response

A new storage classification would require some way to identify what costs and revenues fall under production, transmission, or distribution functions and what costs and revenues fall under jurisdictional and non-jurisdictional services when a single storage asset is serving multiple purposes. To allocate at a detailed level storage equipment and operating costs to the appropriate function, ESA recommends that a new schedule be created to record plant statistics for Storage Plants (entitled "Storage Plant Statistics") similar to the existing Generating Plant Statistics schedule found on pages 410-411 of Form No. 1. In this new schedule, storage asset owners would identify the function of the storage asset(s) along with the operating costs and characteristics as described in more detail in the response to 5c below.

To allocate at a detailed level storage revenues to the appropriate function, ESA believes no changes to existing accounts or schedules need to be made. The Form No. 1 schedules Sales of Electricity by Rate Schedule (page 304) and Sales for Resale – Account 447 (page 310) each

[24] *Id. at* P 37.d

require the Rate Schedule associated with the sale. The Rate Schedule listed for each sale will identify the function of the asset that completed the sale(s). For Purchase and Sales of Ancillary Services (page 398), a footnote may be entered for each type of ancillary service purchased or sold that would identify the function of the asset involved with the transactions.

2. <u>Cost of Power Used in Storage Operations</u>

a. <u>FERC Request</u>: ***Should power purchased and stored for resale be recorded in Account 555? Would revisions to the instructions of the account be required to account for the power purchases; if so, please provide insight into what may be required. Are there any alternative methods to account for these costs?***[25]

<u>Response</u>

ESA recommends creating a new account for power purchased and stored for resale from storage operations, instead of using Power Account 555 - Purchased Power. One benefit of having a separate account for power purchased for storage operations is to be able to separate these operating costs, which are organized on a plant level, from traditional utility power purchases and exchanges of electricity, which are organized on a company level. A second benefit of having a separate account for power purchased for storage operations is to keep storage operating costs listed in one place in the storage O&M cost accounts, described in detail in the response to 4b below.

We recommend that this new account could be called "Power Purchased for Storage Operations" and should be included in the new "Electric Storage" function described in the responses to 1a and 1c above. The plant level details of the volumes of power purchased could be listed in a new "Storage Plant Statistics" schedule (as described in 5c, below), in a similar fashion as the "Energy Used for Pumping" (line 10) is itemized in the existing Form No. 1 Pumped Storage Generating Plant Statistics schedule (page 408). This new line could be called

[25] *Id. at* P 44.a

"Power Purchased for Storage Operations." The plant level details of the cost of power purchased could be listed in the new "Storage Plant Statistics" schedule, in a new line titled "Cost of Power Purchased for Storage Operations."

b. <u>FERC Request</u>: ***Should power purchased that will not be sold for resale but will instead be consumed during the provision of services such as frequency regulation be accounted for in Account 555, or a different existing O&M expense account? Please elaborate. Also, should new accounts be created or, alternatively, should existing accounts be revised? We welcome examples of new or existing accounts and instructions that could be created or revised, respectively, to account for power purchased for use in storage operations.***[26]

<u>Response</u>

ESA recommends that power purchased that will not be sold for resale but will instead be consumed during the provision of services (such as frequency regulation) should not be recorded in Account 555 - Purchased Power, and instead in a newly created account entitled "Power Purchased for Storage Operations".[27] ESA respectfully clarifies that energy lost in conversion is *not* purchased as part of station power load, but is instead netted at wholesale, pursuant to the tariffs approved by FERC in NYISO, the Midwest ISO and PJM.[28]

c. <u>FERC Request</u>: ***We also seek comment on whether power purchased to initially attain a state charge should be accounted for as a base charge and included as a component cost of energy storage plant and equipment. Are there any alternative methods to account for power purchased to initially attain a state of charge?***[29]

<u>Response</u>

ESA recommends that power purchased to initially attain a state charge may be accounted for as a base charge and included as a component cost of energy storage plant and equipment. If power purchased to initially attain a state charge is to be accounted for under plant

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[26] *Id. at* P 44.b
[27] *See* ESA's Response in 2a, above.
[28] New York Independent System Operator, Inc., 127 FERC ¶ 61,135 (May 15, 2009); Midwest Independent Transmission System Operator, 129 FERC ¶ 61,303 (December 31, 2009); PJM Interconnection, LLC, 132 FERC ¶ 61,203 (September 3, 2010).
[29] *NOI at* P 44.c

and equipment accounts, then it should be recorded under the new “Electric Storage Equipment” account (per the response to 1a and 1c above).

Alternatively, power purchased to initially attain a state charge may be accounted for as an O&M expense. If power purchased to initially attain a state charge is to be accounted for under O&M accounts, then ESA recommends that it should be recorded under the new “Power Purchased for Storage Operations,” account (per the response to 2a and 2b above).

d. <u>FERC Request</u>: *Should power purchased to sustain a particular state of charge be recorded as an expense in Account 555, a different existing O&M expense account, or should a new expense account be created? Please explain in detail and, if applicable, provide examples of existing and new accounts that could be used and related account instructions.*[30]

<u>Response</u>

ESA recommends that power purchased to sustain a particular state of charge should not be recorded as an expense in Account 555 – Purchased Power. Instead, a new account called “Power Purchased for Storage Operations” should be created for power purchased to sustain a particular state of charge (per the response to 2a and 2b above).

e. <u>FERC Request</u>: *How should the cost of fuel, or other direct costs, incurred to internally generate power for use in energy storage operations be accounted? What expense accounts should be used to account for the costs?*[31]

<u>Response</u>

ESA recommends that the cost of fuel incurred to internally generate power for use in energy storage operations should be accounted for in a new “Storage Fuel” account. ESA also recommends that other direct costs incurred to internally generate power for use in energy storage operations should be accounted for in the appropriate new Storage O&M accounts, described in response to 4b, below. The benefit of having a separate set of accounts for the costs

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[30] *Id. at* P 44.d
[31] *Id. at* P 44.e

of fuel and other direct costs for storage operations is to keep storage operating costs listed in one place in the storage O&M cost accounts.

3. <u>Revenues From Providing Energy Storage Services</u>

a. <u>FERC Request</u>: ***Are existing revenue accounts sufficient to capture potential revenues associated with storage operations or should new accounts be created? If the existing accounts are used, would the instructions to the accounts need to be revised? We welcome examples of revisions to the account instructions, if any, that may be needed to account for revenues from storage operations. Also, if applicable provide examples of new revenue accounts and instructions that could be created.***[32]

<u>Response</u>

ESA recommends that existing revenue accounts are sufficient to capture potential revenue from new electric storage technologies and as such no new revenue accounts are required. Existing revenue accounts are based on sales of electricity and other products and services and are based on customer (for electricity) and type of product or service (if not electricity). The electricity sold can be accounted for in existing operating revenues accounts (440-457.2). The FERC Form No. 1 Electric Operating Revenues form (page 300) is sufficient to capture revenues from storage operations. The FERC Form No. 1 Purchases and Sales of Ancillary Services form (page 398) is sufficient to capture volumes sold and revenues from such sales.

To allocate at a detailed level storage revenues to the appropriate function, ESA believes no changes to existing accounts or schedules need to be made. The Form No. 1 schedules Sales of Electricity by Rate Schedule (page 304) and Sales for Resale – Account 447 (page 310) each require the Rate Schedule associated with the sale. The Rate Schedule listed for each sale will identify the function of the asset that completed the sales. For Purchase and Sales of Ancillary

[32] *Id. at* P 47.a

Services (page 398), a footnote may be entered for each type of ancillary service purchased or sold that would identify the function of the asset involved with the transactions.

b. <u>FERC Request</u>: ***Would recording revenues from storage operations in one account, for example Account 456, Other Electric Revenues, sufficiently address revenue transparency issues? How would this accounting impact transparency as it relates to the development and monitoring of cost-based rates? If the Commission were to require revenues derived from storage operations to be accounted for in one account, what account should be used, why should it be used, and would the instructions of the account need to be revised?***[33]

<u>Response</u>

ESA recommends that recording revenues from storage operations in one account, for example Account 456, Other Electric Revenues, would not sufficiently address revenue transparency issues. Revenue from storage operations may be from various products and services, for example Energy or Ancillary Services, and best separated into the appropriate, existing accounts. Recording revenues from storage operations in one account would reduce transparency as it relates to the development and monitoring of cost-based rates, because revenues from services under rate recovery constructs or tariffs would be combined in one account, making it impossible to distinguish.

If the Commission were to require revenues derived from storage operations to be accounted for in one account, ESA recommends that Account 456, Other Electric Revenues would be the best account. The Account instructions would then need to be revised to explicitly include the revenues derived from storage operations.

c. <u>FERC Request</u>: ***Should new revenue accounts be created to record revenues from storage operations? Are there examples of accounts and account instructions that could be created to record the revenues?***[34]

<u>Response</u>

[33] *Id. at* P 47.b
[34] *Id. at* P 47.c

ESA recommends that existing revenue accounts are sufficient to capture potential revenue from new electric storage technologies and as such no new revenue accounts are required.

4. Operation and Maintenance Expenses

a. FERC Request: ***Are existing O&M expense accounts sufficient to capture costs associated with storage operations? Are there any revisions to existing accounts or account instructions that would be required to account for O&M expenses of storage operations?***[35]

Response

ESA recommends that existing O&M expense accounts are not sufficient to capture costs associated with storage operations. Electric storage technologies do not fit neatly into the existing operations and maintenance expense accounts because electric storage technologies include unique expenses such as electricity purchased to charge storage devices and maintenance and replacement of storage equipment. Because electric storage technologies may be classified as production, as transmission, or as distribution, depending on the circumstances, it is necessary to create new storage operations and maintenance expense accounts to capture storage plant costs.

Different electric storage technologies have different operating cost structures. Some storage technologies have lower initial costs and higher operations and maintenance expenses from equipment replacements, while other storage technologies have higher initial costs and relatively lower operations and maintenance expenses. Therefore, it is important to properly capture these expenses for cost-of-service rate purposes.

ESA recommends that new storage operations and maintenance expense accounts be created, as detailed in the response to 4b below.

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[35] *Id. at* P 49.a

b. <u>FERC Request</u>: *Should new O&M expense accounts be created? If so, provide examples of new accounts and account instructions that could be created to account for O&M expenses of storage operations.*[36]

<u>Response</u>

To capture costs associated with storage operations, ESA recommends creating four new storage operations and maintenance expense accounts for storage assets, which should be included in the new "Electric Storage" function described in the responses to 1a and 1c above. The first new O&M account could be called "Power Purchased for Storage Operations" and should include the power purchased to operate the storage device, as described in the responses to 2a, 2b, 2c, and 2d above. The next new O&M account could be called "Storage Fuel", as described in the response to 2e above. The other two new storage operations and maintenance expense accounts could be called "Operation of Electric Storage Equipment" and "Maintenance of Electric Storage Equipment" and should include the operation and maintenance associated with the new "Electric Storage Equipment" plant and equipment account described in the responses to 1a and 1c above.

c. <u>FERC Request</u>: *What accounting issues may arise due to the use of a single storage resource to provide services simultaneously under cost- and market-based rate recovery constructs? Are there options on how these issues may be addressed?*[37]

<u>Response</u>

With appropriate functional classifications and accounts, as described in the responses above, and accurate reporting of costs, there should be no accounting issues from the use of a single storage resource to provide services simultaneously under cost- and market-based rate recovery constructs.

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[36] *Id. at* P 49.b
[37] *Id. at* P 49.c

In addition, direct utility ownership in a storage asset, the accounting provisions should also provide a utility with the flexibility to contract for storage services. A third party storage 7provider could then agree to deliver discrete services to multiple customers. If procured through solicitations as described earlier in these comments, the contract price would accurately represent the portion of an asset attributable to that service. Since the third party would provide assurances that all contracted service could be simultaneously delivered from its asset(s), and since each service is separately priced, the contract mechanism would provide sufficient transparency to prevent cross-subsidization between cost- and rate-based constructs.

d. <u>FERC Request</u>: ***What accounting issues may arise due to the joint ownership of a storage facility by separate independent companies that propose to use their respective ownership shares of the facility to each provide a different jurisdictional service (e.g., wholesale sales of electricity and transmission voltage support) under cost- and market-based rate recovery mechanisms? Are there options on how these issues may be addressed?***[38]

<u>Response</u>

ESA expects that situations will arise where joint ownership or contracted rights for a single facility allows for separate companies to make use of one facility to provide different services. With appropriate functional classifications and accounts, as described in the responses above, and accurate reporting of costs, there should be no accounting issues due to the joint ownership of a storage facility by separate independent companies that propose to use their respective ownership shares of the facility to each provide a different jurisdictional service under cost- and market-based rate recovery mechanisms. Each owner should account for their costs under the appropriate account, in the same manner as is done for the joint ownership or the contracting for fractions of either transmission or generation. Moreover, the determinant as to how costs are treated should pertain to what services each owner provides when using the

[38] *Id. at* P 49.d

facility. It is essential that there be no obstacles to the use of a single storage asset for multiple purposes.

5. Form Nos. 1 and 1-F

a. <u>FERC Request</u>: ***Should the Form Nos. 1 and 1-F be amended to provide the detailed information required to monitor energy storage operations and develop cost-of-service rates?***[39]

<u>Response</u>

ESA recommends that the Form Nos. 1 and 1-F should be amended to provide the detailed information required to monitor energy storage operations and develop cost-of-service rates. To develop and monitor cost-based rates, regulators need access to financial data, such as capital and operating costs of relevant land, equipment, and labor, as well as non-financial data, such as volumes sold. For electric storage technologies, cost data that relate to their unique equipment and processes, which are separate from those for traditional production plants and transmission and distribution assets, are required. For non-financial data, volumes of ancillary services provided and electricity produced are required. There are several changes to the FERC Form Nos. 1 and 1-F needed to accurately capture these financial and non-financial data, as are described in the responses to 5b and 5c, below.

b. <u>FERC Request</u>: ***We welcome examples of new schedules that could be created or existing schedules that could be revised to report the costs of energy storage plant and equipment and O&M expenses. To provide for transparent reporting of costs included in the accounts, it may be helpful if such schedules included the following, among other possible items: (1) primary plant accounts and amounts included and reported in the general utility plant accounts 101, 103, 106 and 107 for energy storage plant by function; and (2) expense accounts and amounts included and reported in the general O&M expense accounts 401 and 402 for storage operations by function.***[40]

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[39] *Id. at* P 50.a
[40] *Id. at* P 50.b

Response

ESA recommends that one change to existing schedules to report the plant and equipment and O&M expenses of storage operations is the following existing schedules should be modified to account for the new "Electric Storage" functional classification. The schedules considered in this section include primary plant accounts 300-399 and O&M expense accounts 500-599, 900-949, which are those included in the primary plant accounts and amounts included and reported in the general utility plant accounts 101, 103, 106 and 107 for energy storage plant by function and the expense accounts and amounts included and reported in the general O&M expense accounts 401 and 402.

Table 2

Form	**Schedule Name**	**Page #**	**Account #**
1	Electric Plant in Service	204-207	300-399
1	Electric Operation and Maintenance Expenses	320-323	500-599, 900-949
1	Distribution of Salaries and Wages	354-355	920
1-F	Electric Operation and Maintenance Expense	21	500-599, 900-949
1-F	Utility Plant Data	24	300-399

c. <u>FERC Request</u>: ***We also welcome examples of new schedules that could be created or existing schedules that could be revised to report the financial and non-financial data of storage operations. To provide for transparent reporting of this data, it may be helpful if such schedules included the following types of financial and non-financial operational data, among other possible items: (1) name and location of energy storage plant; (2) Megawatt hours (MWhs) of power purchased, generated or received in exchange transactions for storage, MWhs of power delivered to the grid to support production, transmission, or distribution operations, MWhs of power lost during conversion, storage and discharge of energy by function, and MWhs of power sold for resale; (3) cost of power purchased for storage operations, fuel costs for storage operations associated with self-generated power, and other costs associated with self-generated power; and (4) revenues from energy storage operations by service provided and revenues from stored energy sold for resale.***[41]

Response

ESA recommends that one change to existing schedules to report the financial and non-financial and non-financial data of storage operations is the following schedules should be

[41] *Id. at* P 50.c

modified to account for the new "Electric Storage" functional classification. The schedules considered in this section include the accounts not listed above in response to 5b.

Table 3

Form	Schedule Name	Page #	Account #
1	Accumulated Provision for Depreciation of Electric Utility Plant	219	108
1	Materials and Supplies	227	151-164
1	Depreciation and Amortization of Electric Plant	336-337	403-405
1	Research, Development and Demonstration Activities	352	188
1	Electric Energy Account	401a	447, 555
1	Plant Statistics	402-411	N/A

A second change to existing schedules to report financial and non-financial data that ESA recommends is to include the new "Power Purchased for Storage Operations" Account (described in the responses to 2a, 2b, 2c, and 2d above) in the schedule titled Amounts Included in ISO/RTO Settlement Statements (found on FERC Form No. 1 page 397 and Form 1-F page 30), which currently includes Net Energy Purchases (Account 555).

A third change to existing schedules to report financial and non-financial data that ESA recommends is to add a new schedule called "Storage Plant Statistics" to the existing set of schedules for Plant Statistics - Steam-Electric Generating Plant Statistics (FERC Form No. 1, page 402), Hydroelectric Generating Plant Statistics (page 406), Pumped Storage Generating Plant Statistics (page 408), (Small) Generating Plant Statistics (page 410), and Transmission Line Statistics (page 422) because these existing schedules are not sufficient to account for the plant level details associated with electric storage technologies. ESA recommends that this new schedule be used for plant level details for all storage devices reported in the Form No. 1. This new schedule should include the following items: name of plant, year of original construction, installed capacity nameplate rating, total plant cost ($), total plant cost ($/MW of installed capacity), operation expenses (excluding power and fuel purchases), cost of power purchases, cost of fuel purchases, type of fuel purchased, maintenance expenses, Megawatt hours (MWhs) of power purchased, Megawatt hours (MWhs) of power lost during conversion, storage and discharge, MWhs of power delivered to the grid, MWhs of power purchased, generated or received in exchange transactions for storage, MWhs of power sold for resale, and functional classification of the storage plant. ESA recommends that these items be reported separately for each function the storage device is performing, to provide for transparent reporting of this data.

d. <u>FERC Request</u>: *Should the same financial and nonfinancial data of energy storage assets and operations required to be reported in Form Nos. 1 and 1-F also be reported to the Commission in the Form No. 3-Q? If not, what information on storage assets and operations should be included in the Form 3-Q?*[42]

<u>Response</u>

ESA recommends that the same financial and nonfinancial data that are currently reported in the Form No. 3-Q, including 1) Balance Sheet, Income, and Cash Flows, 2) equipment and O&M expenses, and 3) revenues, should be included in the Form No. 3-Q for energy storage assets. Similar changes to the schedules in Form Nos. 1 and 1-F described in the responses above should be made to Form 3-Q to account for storage devices.

IV. CONCLUSION

ESA appreciates the opportunity to provide comments in this proceeding. ESA commends FERC for its pro-active approach to ensure that ancillary services markets are open to competition from storage resources and result in just and reasonable rates for the services provided. The issues in this proceeding, taken together with FERC's initiatives pertaining to pay for performance[43] will allow energy storage technologies to fund and construct facilities to offer fast, reliable, cost effective and environmentally-friendly energy storage. ESA looks forward to

[42] *Id. at* P 50.d
[43] *Frequency Regulation Compensation in the Organized Wholesale Power Markets,* 134 FERC ¶61,124 (issued on February 17, 2011) (the "NOPR").

continuing to work with FERC to ensure that appropriate rules are in place to develop a competitive ancillary services marketplace nationwide.

Respectfully submitted,

THE ELECTRICITY ASSOCIATION
By its attorney,

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Aquion Energy

Beacon Power Corporation

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S&C Electric Company

Saft America Inc.

SustainX

Xtreme Power

Dated: August 22, 2011

CERTIFICATE OF SERVICE

I, Patricia A. Muse, hereby certify that the foregoing Comments of Electricity Storage Association was served via electronic mail.

Dated in Boston, MA this 22nd day of August 2011.

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