

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

**MOTION TO INTERVENE AND COMMENTS OF THE
CALIFORNIA ENERGY STORAGE ALLIANCE**

The California Energy Storage Alliance (“CESA”) appreciates the opportunity to submit comments in response to the Federal Energy Regulatory Commission’s (“FERC’s”) Notice of Inquiry (“NOI”).¹ CESA is primarily concerned with California electricity markets and therefore limits its recommendations to those issues that directly impact organized electricity markets such as the California Independent System Operator (“CAISO”).² CESA applauds FERC’s proactive efforts to improve the ancillary services markets for energy storage, and notes that substantial progress also brings to the fore the increasing importance of long term contracting arrangements for ancillary services.³ CESA also cautions FERC not to inadvertently preclude business opportunities that allow customer-side-of-the-meter energy storage resources to offer ancillary services. CESA agrees with FERC that existing cost accounting policies must be modified to fit energy storage. This proceeding, FERC’s pay-for-performance initiative⁴ and others underway⁵

¹ *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).

² CESA generally concurs with the substance of the comments filed by Electricity Storage Association (“ESA”) on this date.

³ See, discussion at Article IV, Section 4, *infra*, p. 24.

⁴ *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, 134 FERC ¶61,124 (issued on February 17, 2011) (the “NOPR”).

⁵ *Promoting Transmission Investment Through Pricing Reform*, Docket RM11-26-000, (Notice of Inquiry) (issued on May 19, 2011)

will significantly reduce barriers to providing the full benefit that energy storage resources can bring to the grid.

I. BACKGROUND.

CESA is an industry group advocating for the rapid expansion of use of energy storage, in all of its many forms, to promote growth of renewable energy and a clean, affordable, and reliable and secure electric system. CESA is technology-neutral and supportive of all business models for deployment of energy storage resources. CESA's member companies include a diverse range of advanced energy storage technology and manufacturing companies, systems integrators, and renewable energy developers.⁶

II. COMMUNICATIONS AND CORRESPONDENCE.

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III. MOTION TO INTERVENE IN THIS PROCEEDING.

CESA is an unincorporated association, the membership of which consists of A123 Systems, Altairnano, Applied Intellectual Capital/East Penn Manufacturing Co., Inc., Beacon Power Corporation, CALMAC, Chevron Energy Solutions, Debenham Energy, Deeya Energy, Enersys, EnerVault, Exide Technologies, Fluidic Energy, General Compression, Greensmith Energy Management Systems, HDR, Inc., Ice Energy, International Battery, Inc., LightSail Energy, Inc., MEMC/SunEdison, Powergetics, Primus Power, Prudent Energy, RedFlow, RES Americas, Saft America, Inc., Samsung SDI, SANYO, Seeo, Sharp Labs of America, Silent Power, Sumitomo Electric, Suntech, SunPower, Sunverge, SustainX, Xtreme Power, and Younicos. CESA's intervention in this proceeding is in the public interest, and CESA's interests

⁶ See, <http://www.storagealliance.org>.

will not be adequately represented by any other party. CESA therefore respectfully requests that this motion to intervene be granted.

IV. COMMENTS.

The Advantages of Using Energy Storage for Ancillary Services

When commercially deployed, energy storage resources will greatly assist FERC's efforts to enhance system reliability, lower costs to ratepayers, integrate renewable resources, reduce CO₂ greenhouse gas emissions and increase regional generation capacity. Because energy storage resources respond more effectively to system imbalances than slower-ramping generation resources, their deployment on the grid can lower the overall amount of ancillary services that are needed to maintain system reliability.

A widely quoted study commissioned by the California Energy Commission in 2010 concluded that a 30-50 MW energy storage resource could provide more ancillary services than a 100 MW combustion turbine.⁷ Energy storage resources can also reduce costs by displacing relatively high cost traditional generators. Existing fossil-fueled generators can then run at full capacity, improving their energy efficiency, lowering their operating costs and reducing emissions.

Unlike generators that consume fossil fuel, energy storage resources recycle existing power, thereby lowering its operating costs to provide ancillary services and benefiting the environment by producing zero direct CO₂ greenhouse gas, particulates, and other air emissions. A study by KEMA concluded that a 20MW flywheel energy storage system emits 56% less CO₂ than a natural gas-fueled power plant providing regulation service and 26% less emissions than a pumped hydro power plant.⁸ An earlier study done by KEMA concluded 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 variable renewable energy resources.

⁷ "Research Evaluation of Wind Generation, Solar Generation, and Storage Impact on the California Grid," Study by KEMA, Inc., commissioned by the California Energy Commission funded via Public Interest Energy Research Program (PIER) page 6, June, 2010.

⁸ KEMA, Emissions Comparison for a 20 MW Flywheel-based Frequency Regulation Power Plant, May 18, 2007.

There are a number of energy storage providers that are either operational or developing facilities in those RTO/ISO regions that have implemented market reforms and removed barriers to the participation of storage resources in the ancillary services marketplace. (See Figure 1.) The number of energy storage projects will increase once, as hoped, FERC mandates that RTOs/ISOs implement the compensation reforms that FERC proposed in its Frequency Regulation Compensation NOPR.⁹ Energy storage projects for variable renewable energy resource in Hawaii have been adopted 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
<i>Total</i>		<i>124 MW</i>		

A. Ancillary Services and the Avista Policy.

Recently, Western System Power Pool (“WSPP”) asked FERC 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.¹⁰ FERC rejected WSPP’s proposed Tariff Amendment stating its need to do so, but encouraged the submission of proposals that would address FERC’s concerns yet “foster entry into ancillary services markets.”¹¹ FERC should consider allowing third-party sellers to demonstrate a lack of market power based on alternative market power mitigation measures as detailed below.

⁹ See NOPR at 10-27.

¹⁰ *Western Sys. Power Pool*, 134 FERC ¶ 61,169 (2011) at 24.

¹¹ *NOI* at P 24.

1. **Market Power Studies.**

CESA supports elimination of the requirement that third-party sellers prove they lack market power in order to sell ancillary services to transmission 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 or the transmission provider's OATT cost-based rate plus a new resource margin. FERC should require all parties selling ancillary services to report to FERC on an individual unit basis data that identifies the quantity of energy, capacity and ancillary services sales of the unit, including the total quantity of purchases it makes for each type of ancillary service so that the total market size can be determined.

FERC Request: *Is information on individual generating unit frequency regulation, spinning and non-spinning reserve capability publicly available?*

Neither current nor historical data pertaining to frequency regulation, spinning and non-spinning reserve capability of individual generating units in the non-ISO/RTO markets is easily available to sellers of ancillary services.

FERC Request: *If the Commission retains the requirement of a formal market power study as described in Order No. 888 and Ocean Vista for third party provision of ancillary services to transmission providers, what specific information and tools would be useful to the development of these studies?*

FERC should require all parties selling ancillary services to report to FERC on an individual unit basis (generating or non-generating) data that states the quantity of energy, capacity and the ancillary services sales of the unit.

FERC Request: *What are some of the ways/vehicles that the information above can be made publicly available, e.g., Commission reporting requirement or voluntary posting?*

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.

FERC Request: *If commercial sensitivity is an issue, is there an appropriate time lag for making information available?*

The CAISO currently posts bid and market clearing data on a 30-day to 6-month time lag. CESA supports requiring the shortest lag time possible and urges FERC to limit the lag to not more than 30 days.

2. De Minimis Threshold.

CESA supports an amount of *de minimis* market presence that would justify a grant of market based-rate authority as a means of determining whether an entity has market power. A threshold of 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. FERC has approved ISO New England's Alternative Technologies Regulation Pilot Program, finding that limiting the size of the pilot program to 10% of the total market size is small enough.

Because a threshold of 10% may result in a threshold capacity value for some markets that is too small. It may be appropriate to base *de minimis* on a capacity floor of 10 MW in markets where the 10% capacity threshold results in a value less than 10 MW. This would maintain the usefulness of a *de minimis* threshold by allowing some small entities to be presumed to lack market power in small markets, 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 energy storage resource is modified.

FERC Request: *Would it be appropriate to vary the threshold across different balancing authority areas and/or different regions?*

CESA is primarily concerned with organized markets, such as the CAISO. However, CESA advocates for permitting RTO/ISO's the flexibility to accommodate their own circumstances within the parameters set by FERC.

FERC Request: *Should entities that receive authorization to provide ancillary services at market-based rates based on a de minimis presence be subject to a periodic filing requirement and/or a "change in status" filing requirement to ensure that they continue to meet the threshold?*

CESA supports maintaining authorization until the nameplate capacity size of the resource is modified to prevent burdensome reporting requirements.

3. *Alternative Mitigation to Permit Rate Flexibility.*

CESA supports alternative mitigation measures to determine rates for third-party market-based ancillary services instead of requiring formal market power studies from the sellers of ancillary services to transmission providers. The current restriction on third-party sales should not apply in cases where the purchasing transmission provider voluntarily commits to not pass through the price of non-cost based third party purchases that exceed its OATT rates to its wholesale and native load retail customers.

FERC Request: *As another alternative, we seek comment on an explicit price-cap for third-party sales to utilities to serve their OATT ancillary service obligations based on the purchasing utility's Commission-approved OATT rate plus an adder?*

CESA supports a new resource margin “adder” to the OATT-based cost cap as an appropriate vehicle for ensuring a level playing field when evaluating the fixed costs for new market entry. However, if the transmission provider has voluntarily committed to not pass through the price of non-cost based third party purchases, the adder should be included in the determining when the non-cost based purchases exceed the OATT rates.

FERC Request: *We also seek comment on whether the WSPP Agreement is an adequate vehicle for implementing a cost-based rate cap for ancillary service rates. If such a cap were established, should provision of all ancillary services made under the WSPP Agreement that remain at or below such cost-justified rate caps be considered just and reasonable, with no further mitigation measures needed? We seek comment on the following issues with respect to setting a cost-cap in the WSPP Agreement: How would such a cost cap be determined? Should such a cap for ancillary services be subject to the same requirements as the “up to” cap for power and energy in the current WSPP Agreement? Alternatively, could an experimental cap be based on the average ancillary service cost of all OATT sellers participating in the WSPP Agreement? Would it be sufficient to base an experimental cap on the costs of a “representative sample” of OATT sellers participating in the WSPP Agreement? How would a “representative sample” be determined? Should the cap include a new resource margin as described above? If yes, how would an appropriate adder be determined? Should a market monitor be established to oversee provision of ancillary service under the WSPP*

Agreement? Should this proposal be structured as a temporary pilot program, as were the original WSPP service schedules for market-based sales of energy and capacity?

Shifting from requiring proof of the absence of market power to requiring procurement through competitive processes should be broadened by eliminating the *Avista* restriction on sales of ancillary services entirely.

a. Competitive Solutions

CESA strongly supports competitive solicitations to foster robust competitive markets. Market-based sales by a third-party supplier should not be prohibited to satisfy the purchasing utilities own OATT requirements to offer ancillary services to its customers when services are procured through competitive requests for proposals.

In today's organized 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.¹² Suppliers are thus incited to offer their services at the most cost-effective rate possible. Load Serving Entities ("LSEs") are required to conduct competitive Requests for Proposals ("RFPs") for procurement of energy, capacity and ancillary services. Once a state regulatory agency approves the LSE's RFP, a bidder is chosen. A competitive solicitation should be presumed to mitigate market power. Third-party suppliers who participate in a competitive solicitation should be exempt from all further market power studies.

b. Price Caps.

CESA supports using a price cap mechanism similar to the 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 the cost-justified rate caps should be considered just and reasonable with no need for additional mitigation measures. Such a cap for ancillary services should be subject to the same "up to" cap that the WSPP agreement has for power and energy. CESA also supports a waiver of the current third-party sales restriction in those cases where the purchasing transmission provider voluntarily

¹² As noted in the CAISO's recent, *Discussion and Scoping Paper on Renewable Integration, Phase 2*, April 5, 2011: "As a general matter the ISO strongly prefers solutions that result in more economic bids and fewer self-schedules, because that is how the market as a whole receives the greatest benefits from the economic dispatch and unit commitment algorithms used in the market software." (p. 18).

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.

It will be difficult, however, to compare costs of service of new energy storage resources 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 services. Conventional generation resources may under-state their true costs to provide ancillary services, because those resources are allocating a greater proportion of their costs to energy or capacity sales. 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. FERC must also ensure that cost-based schedules for ancillary services are submitted on a comparable basis and account for resource performance.

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

Benefits of Speed and Accuracy for Regulation Service

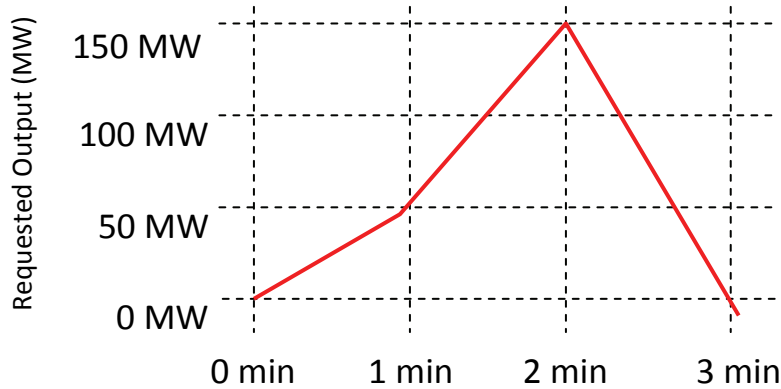
Using fast-ramping resources to provide regulation will result in improved operational and economic efficiency of the transmission system and lower costs to consumers in the organized wholesale energy markets.¹³ A transmission provider’s ability to correct ACE is a function of both the amount of capacity in MWs available to respond to an RTO/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 regulation. 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

¹³ *Id.* at P 2.

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



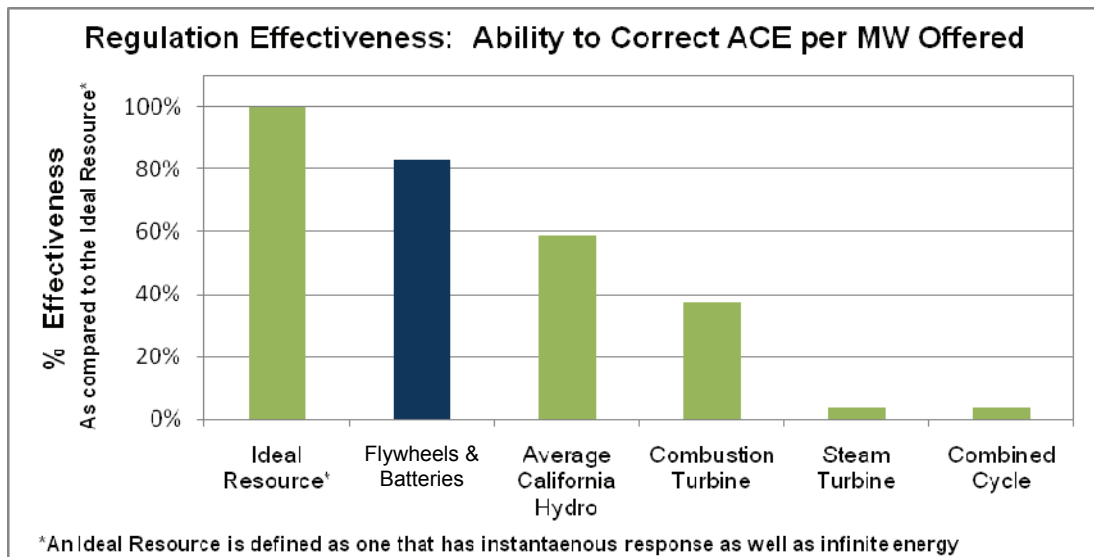
Signal Ramp Rate (MW/min)	50	100	-150
Total capacity required to meet signal with 20%/min Ramp Rate	250 MW	500 MW	750 MW
Total capacity required to meet signal with 40%/min Ramp Rate	125 MW	250 MW	375 MW

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 study, which determined that fast responding energy storage resources could reduce CAISO

procurement of Regulation by as much as 40%¹⁴ because the sooner the CAISO can correct the ACE, the less amount of total regulation is needed. The study 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.)

Figure 4



Another way to consider the benefits of procuring regulation from fast-ramping energy 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 energy storage resources 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

¹⁴ 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.

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 energy 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 RTO/ISO balancing area. 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.

A123 analyzed ACE correction and determined that even with limited energy duration capabilities, new energy storage resources 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.¹⁵ 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.

¹⁵ 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

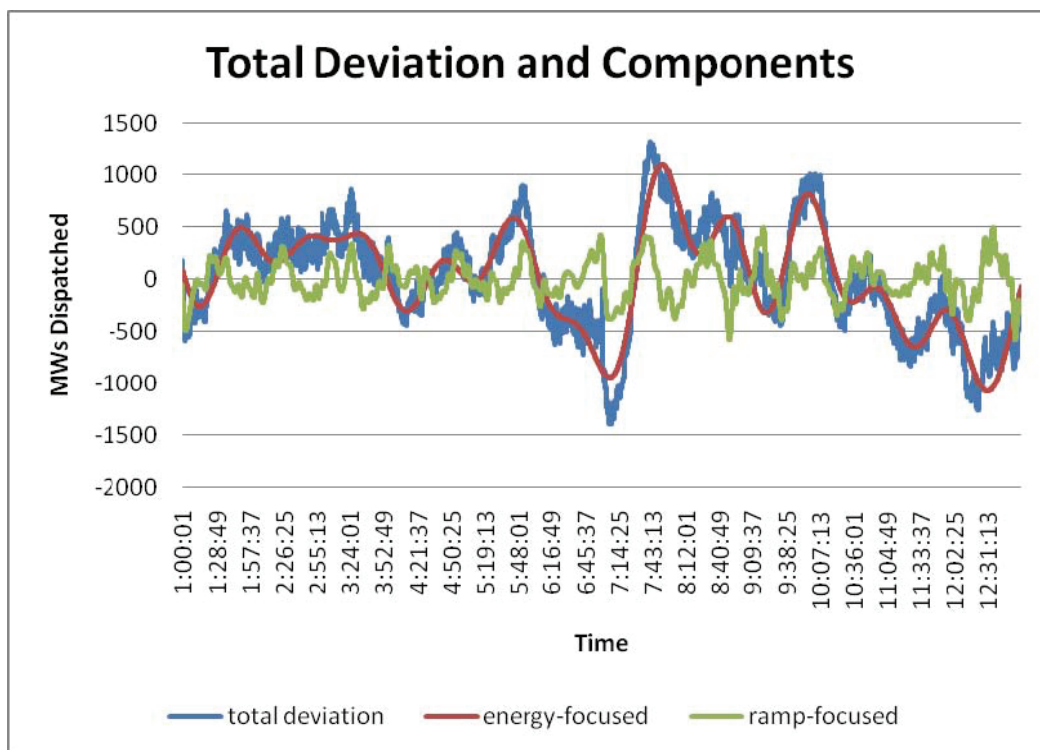


Figure 5: Graph of system total deviation (blue), split into ramp (green) and energy (red) components, showing twelve hours from a thirty-day data set. Due to the frequent zero crossings of the ramp signal, a limited energy storage device can follow the signal completely and contribute significantly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

Further examination of the 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 energy storage resource was built to provide the system’s complete frequency regulation requirements, the 610 MW storage resource 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, an energy storage resource 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.

FERC Request: 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?¹⁶

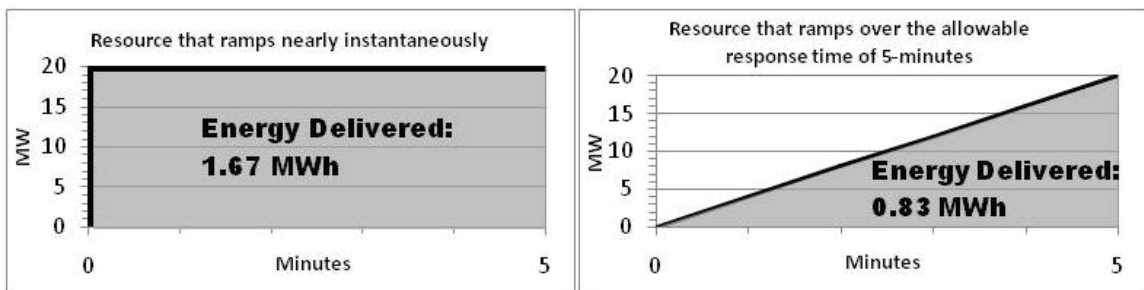
CESA strongly supports allowing transmission customers that self-supply frequency regulation services to determine the amount of capacity they procure based on the third party resource's performance capability. Allowing transmission customers the flexibility to meet their frequency regulation requirements from technology that responds more quickly and accurately is critical to the advancement of energy storage resources.

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 generation 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.

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.)

¹⁶ *Id.* at P 22.b

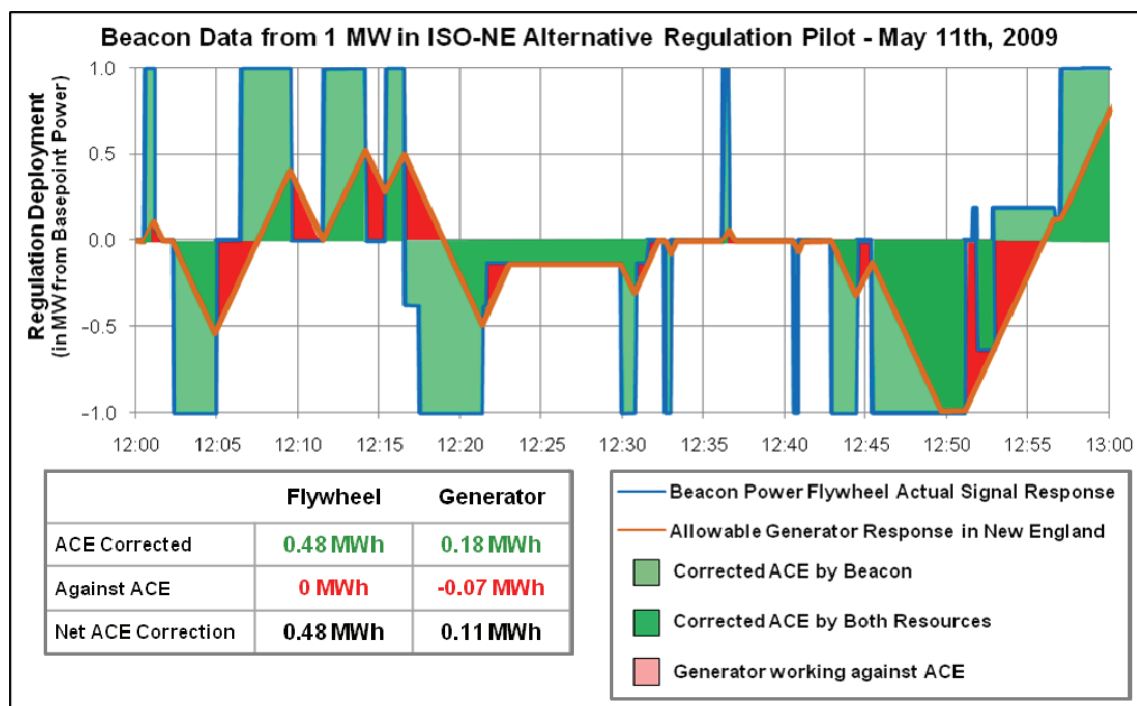
Figure 6



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. 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.¹⁷

¹⁷ 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 re-balance 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 energy storage resources.

CESA 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 provider's ability to manage its ACE. The amount of capacity the transmission customer is required to self-supply should therefore 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 balancing 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), CESA recommends that each transmission provider determine the average number of times its ACE changes direction per hour and then use that number to calculate the average interval between ACE direction changes.¹⁸

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

¹⁸ A minimum threshold or dead band can be employed to eliminate "noise."

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 could then be used to determine the amount of capacity required to be self-supplied.

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

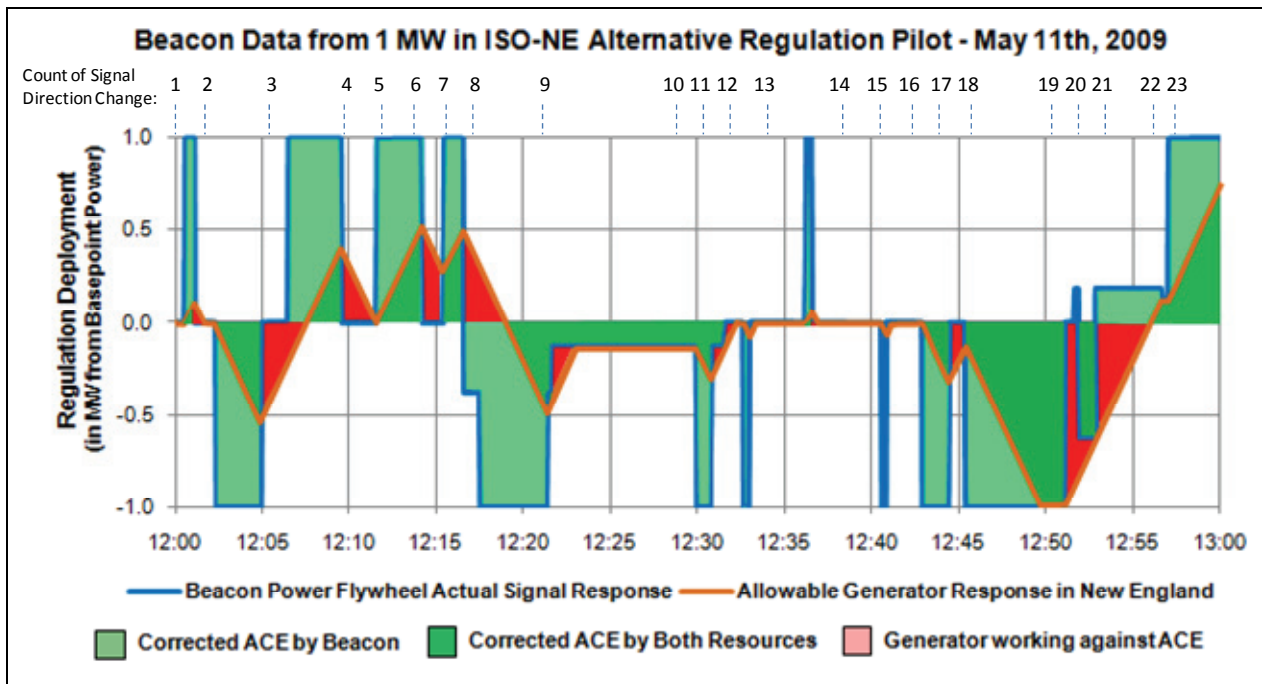


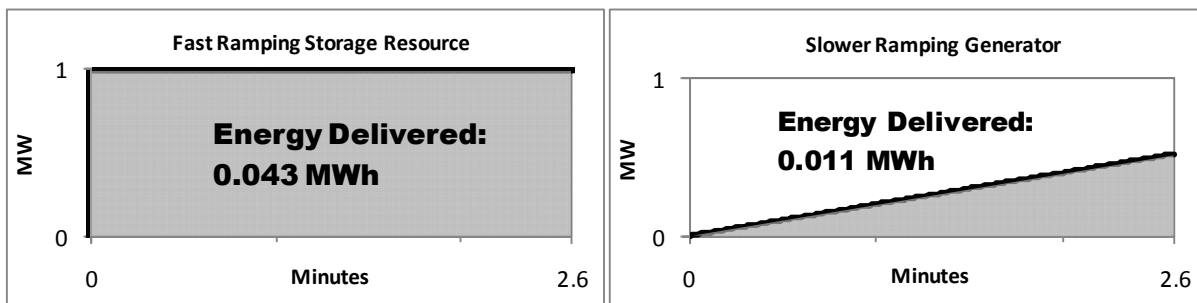
Table 1. Data from the ISO-NE Example shown in Figures 7 and 8.

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: Ramping Generator) (Fast Slow)	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-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 0.2 MW/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.

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-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.

FERC should 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 foregoing information should greatly assist transmission customers in determining the amount of capacity it must self-supply based on its resource ramp-rate. Transmission providers should update their schedules each time the ramp-rate of its resource mix materially changes.

If FERC decides not to mandate the proposed capacity calculation method and changes to a 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).

FERC Request: 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?¹⁹

CESA 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, 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, CESA recommends that FERC provide specific guidance on the cost-based data to be included in both transmission providers and third-party seller's regulation schedules to ensure costs are evaluated on a comparable ("apples-to-apples") basis. FERC should require that the transmission provider's

¹⁹ NOI at P 22.a

Schedule 3 (and Schedule 10, if applicable) and the third- party seller's 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 (\$/MW²/min).

CESA's recommended schedule changes would clearly identify the individual regulation costs of each resource based on its 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. CESA also recommends 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.

5. *Alternative Proposal for Advancing the Participation of Energy Storage.*

Even if FERC were to implement each of the reforms recommended by CESA, there remains challenges for third-party storage owners to provide service because even where markets exist, new energy storage resources must rely solely on the revenues earned in the ancillary services markets to finance their facilities. This is not true of conventional generators, which are able to finance their projects based on their power purchase agreements 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. A traditional generator's ability to sell energy and capacity subsidizes its ability provide ancillary services.

Without a method of achieving revenue certainty, it is difficult for energy storage providers to obtain project financing. Many of the first commercial-scale energy storage projects

are being financed by loans and grants from the Department of Energy and state agencies. One mechanism would be to allow transmission providers that own/and or contract with energy storage resources that are solely providing ancillary services to recover their costs as a wholesale transmission facility subject to FERC jurisdiction. Dividing regulation and frequency response service into two supply categories could do this as was done with reactive supply and voltage control service.²⁰

NERC has noted that reactive power can be supplied by both transmission facilities and generation resources.²¹ 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 provide the services 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 resources or that contract with third-party energy storage providers to recover their costs as a wholesale transmission facility subject to FERC jurisdiction. This is appropriate because the energy storage resources do not generate electricity and operate only to improve the reliability of transmission service.

These advanced energy storage resources 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

²⁰ See FERC Order 888, at 209.

²¹ NERC Comments on RM95-8-000, August 4, 2005, p. 28.

greater grid flexibility.²² As previously discussed, fast response energy storage resources 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 energy storage resources, as transmission should spur investment in these resources because owners will have access to incentive-based rates that they would otherwise not have access to if the resources were classified as generation. This flexibility can provide sellers of energy storage resources the revenue certainty they need to make their resources available to the grid.

As FERC continues to make steady progress with its energy-storage related inquiries and rulemaking proceedings, it becomes steadily more apparent that gaining the full benefit of third-party supply of ancillary services will need to be addressed by long-term contracting mechanisms. Discussion of this reality is most often framed in terms of capacity payments, particularly in academic analyses thus far,²³ but that approach does not fully deal with the revenue certainty that is needed to promote large-scale investment in energy storage facilities. CESA recommend that FERC squarely address the use of long-term supply contracts to provide needed certainty to spur increased investment in energy storage resource to provide third-party ancillary services as “the next thing.”

FERC Request: *Whether transmission providers could compensate the frequency regulation resources they procure based on the principles proposed in the Frequency Regulation NOPR, and seek to include such costs in their Schedule 3 rates. Whether the goals of the Frequency Regulation NOPR can be extended to regions outside the organized wholesale energy markets.*

FERC may be informed by the Renewables Integration Market and Product Review stakeholder process at the CAISO, which is considering how to compare and compensate regulation resources of varying speeds.²⁴

²² See, footnote Number 5, *infra*. CESA plans to comment soon on FERC’s Transmission Investment NOI.

²³ See, e.g., *An Overview of Ancillary Services in an Open Market Environment*, Proceedings of the 15th Mediterranean Conference on Control & Automation, July 27, 2007.

²⁴ http://www.caiso.com/Documents/StrawProposal-RenewablesIntegrationMarketVision_RoadmapDay-ofMarket.pdf

B. Accounting and Reporting Requirements for Energy Storage Resources.

FERC Request: *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.*²⁵

Response

FERC's accounting requirements do not include specific accounting parameters or functional classification for new energy storage resources. It is thus 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 energy storage resources. Several modifications and additions to FERC's accounting requirements are necessary to facilitate cost of service or other rate policies for new energy storage resources.

FERC's existing accounting requirements classify utility plant costs under the following accounts: (1) Intangible; (2) Steam; (3) Nuclear; (4) Hydraulic; (5) Other Production; (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 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 energy storage resources is difficult or impossible for owners of energy storage resources to report and a cost determination challenge for regulators.

FERC Request: *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*

²⁵ *Id.* at P 25

*over distance but as a replacement for a transmission service from elsewhere to that point on the system.*²⁶

Response

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

FERC recognizes distinction between when energy storage is helping to move electricity over distance versus using energy storage to defer transmission can be made based on how the asset operates. When an energy storage resource is set to respond to a transmission contingency, and the capability of the unit is not otherwise committed under contracts or energy through markets, the resource should be viewed as dedicated to transmission service and be included in transmission rates. If an energy storage resource were scheduled in advance to provide energy to serve load, or was responding to pricing or demand levels, the resource would be serving as a substitute for transmission service.

There may be conditions and functions where an energy storage resource'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 an energy storage resource that could provide that function. That resource would have a different design or configuration from an energy storage resource that was designed to run for the entire peak period. Identification of suitable locations and cost-effectiveness of each instance would necessarily be site-specific. However, without guidance from FERC that the regulatory obstacle to even classifying the proposed energy storage resource transmission can be removed for certain categories of functions, this type of transmission investment will be unlikely to be considered by transmission planners that do not want to take the additional risk of having the energy storage resource fail to qualify as a transmission asset.

²⁶ *Id.* at P 26

Proposed Accounting and Reporting for Comment.

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,²⁷ 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.²⁸*

Response

New plant and equipment accounts should be created for energy storage, and argues that there should be a broad definition of energy storage that defines energy storage without limitation. New energy storage plant and equipment accounts should be created for energy storage resources, to match 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;

²⁷ 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.

²⁸ P 37.a

- 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 list of existing plant and equipment accounts, 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: energy storage resource, storage equipment connections, charging equipment, miscellaneous equipment, switching equipment, and ventilating equipment.

b. FERC Request: *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.*²⁹

Response

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

²⁹ NOI at P 37.b

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.
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.

The following three changes to the general instructions of the system of accounts should also be made to capture energy storage plant costs.

1. A description of the Other Production plant function should be added in the Electric Plant Instructions and should explicitly include energy storage resources 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 energy storage resources 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 energy storage resources that provide distribution services.

c. **FERC Request:** *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.*³⁰

Response.

A new functional classification should be created for energy storage resources. The benefits of creating a new energy storage plant function are that the new classification can be designed to best address the unique characteristics of energy storage resources. The new energy storage resource plant function could be called “Electric Storage” and the description and associated accounts should include the information listed in the answer to 1a, above

d. **FERC Request:** *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.*³¹

³⁰ *Id. at P 37.c*

³¹ *Id. at P 37.d*

Response.

A new energy storage resource 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 energy storage resource is serving multiple purposes. To allocate at detailed level storage equipment and operating costs to the appropriate function, A new schedule should 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, energy storage resource owners would identify the function of the energy storage resources along with the operating costs and characteristics as described in more detail in the response to 5c, below.

No changes to existing accounts or schedules need to be made to energy storage track revenues the appropriate function. 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 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 resource involved with the transactions.

2. Cost of Power Used in Storage Operations

a. FERC Request: *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?*³²

Response

A new account for power purchased and stored for resale from energy storage operations, should be created 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

³² *Id.* at P 44.a

purchases and exchanges of electricity, which are organized on a company level. A second benefit of having a separate account for power purchased for energy 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.

A 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 “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. FERC Request: *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.*³³

Response

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, but in a newly created account entitled “Power Purchased for Storage Operations.”³⁴ Energy lost in conversion is *not* purchased as part of station power load, but is

³³ *Id.* at P 44.b

³⁴ *See* Response in 2a, above.

instead netted at wholesale, pursuant to the tariffs approved by FERC in NYISO, the Midwest ISO and PJM.³⁵

c. FERC Request: *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?*³⁶

Response

Power purchased to initially attain a state of charge may be accounted for as a base charge and included as a component cost of energy storage resources and equipment. If power purchased to initially attain a state charge is to be accounted for under plant and equipment accounts, then it should be recorded under the new “Electric Storage Equipment” account (consistent with 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, it should be recorded under the new “Power Purchased for Storage Operations,” account (consistent with the response to 2a and 2b above).

d. FERC Request: *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.*³⁷

Response

Power purchased to sustain a state of charge should not be recorded as an expense in Account 555 – Purchased Power. Instead, a new account called “Power Purchased for Storage

³⁵ 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).

³⁶ *NOI at P 44.c*

³⁷ *Id. at P 44.d*

Operations” should be created for power purchased to sustain a state of charge consistent with response to 2a and 2b, above.

e. **FERC Request:** *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?*³⁸

Response

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. 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 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. **Revenues From Providing Energy Storage Services**

a. **FERC Request:** *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.*³⁹

Response

Existing revenue accounts are sufficient to capture potential revenue from new energy storage resources, so 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

³⁸ *Id.* at P 44.e

³⁹ *Id.* at P 47.a

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

b. FERC Request: *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?*⁴⁰

Response

Recording revenues from energy storage operations in one account, for example Account 456, Other Electric Revenues, would not sufficiently address revenue transparency issues. Revenue from energy 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 energy 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. Account 456, Other Electric Revenues would be the right account. The Account instructions would then need to be revised to explicitly include the revenues derived from energy storage operations.

⁴⁰ *Id.* at P 47.b

c. **FERC Request:** *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?*⁴¹

Response

Existing revenue accounts are sufficient to capture potential revenue from new energy storage resources and 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?*⁴²

Response

Existing O&M expense accounts are not sufficient to capture costs associated with energy storage operations. Energy storage resources do not fit neatly into the existing operations and maintenance expense accounts because energy storage resources include unique expenses such as electricity purchased to charge storage devices and maintenance and replacement of energy 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 energy storage operations and maintenance expense accounts to capture energy storage plant costs.

Some energy storage resources have lower initial costs and higher operations and maintenance expenses from equipment replacements, while other energy storage resources 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.

⁴¹ *Id.* at P 47.c

⁴² *Id.* at P 49.a

b. **FERC Request:** *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.*⁴³

Response

Four new energy storage operations and maintenance expense accounts should be created for energy storage resources, 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 energy storage resource, 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 energy 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. **FERC Request:** *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?*⁴⁴

Response

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 energy storage resource to provide services simultaneously under cost- and market-based rate recovery constructs. With direct utility ownership of a storage resource, the accounting provisions should also provide a utility with the flexibility to contract for energy storage services. A third party storage provider could then agree to deliver discrete services to multiple customers. If procured through competitive solicitations, the contract price would accurately represent the portion of an asset attributable to the service. Since the third party would provide

⁴³ *Id. at P 49.b*

⁴⁴ *Id. at P 49.c*

assurances that all contracted service could be simultaneously delivered from its resource, and since each service is separately priced, the contract mechanism would provide sufficient transparency to prevent cross-subsidization between cost- and rate-based models. FERC could consider creating a new account within the Uniform system of Accounts in which “ancillary revenue from storage otherwise treated as a transmission asset,” would be recorded. Current accounts are sufficient to track the revenue to the transmission provider, the local distribution company, and any wholesale customer.

d. FERC Request: *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?*⁴⁵

Response

There may be circumstances in which joint ownership or contracted rights for a single resource 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 an energy storage facility by independent companies that propose to use their 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. The determinant as to how costs are treated should pertain to what services each owner provides when using the resource.

⁴⁵ *Id.* at P 49.d

5. **Form Nos. 1 and 1-F**

a. **FERC Request:** *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?*⁴⁶

Response

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 energy storage resources, 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. **FERC Request:** *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.*⁴⁷

Response

A 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

⁴⁶ *Id.* at P 50.a

⁴⁷ *Id.* at P 50.b

“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. **FERC Request:** *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.*⁴⁸

Response

A change to existing schedules to report the financial and non-financial and non-financial data of storage operations is the following schedules should be 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, above.

⁴⁸ *Id.* at P 50.c

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 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 CESA 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 energy storage resources. This new schedule be used for plant level details for all energy storage resources 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, MWhs of power purchased, 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 energy storage, MWhs of power sold for resale, and functional classification of the energy storage resource. These items should be reported separately for each function the energy storage resource is performing, to provide for transparent reporting of this data.

d. **FERC Request:** *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?*⁴⁹

Response

The same financial and non-financial 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 energy storage resources.

V. CONCLUSION

The issues in this proceeding, FERC's initiatives addressing pay-for-performance⁵⁰ should make considerable progress in allowing energy storage resources to fund and construct facilities to offer fast, reliable, cost-effective and clean energy storage. CESA looks forward to continuing to work with FERC to ensure that appropriate rules are in place to develop a competitive ancillary services marketplace.

Respectfully submitted,



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⁴⁹ *Id.* at P 50.d

⁵⁰ *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, 134 FERC ¶61,124 (issued on February 17, 2011) (the "NOPR").

CERTIFICATE OF SERVICE

I hereby certify that I have this day served a copy of *Motion to Intervene and Comments of the California Energy Storage Alliance* on all parties of record in proceedings *RM11-24/AD10-13* by serving an electronic copy on their email addresses of record and by mailing a properly addressed copy by first-class mail with postage prepaid to each party for whom an email address is not available.

Executed on August 22, 2011, at Woodland Hills, California.



Michelle Dangott

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