Utilization in the Organized Markets of Electric Storage Resources as Transmission Assets Compensated Through Transmission Rates, for Grid Support Services Compensated in Other Ways, and for Multiple Services

AD16-25-000

Pre-Technical Conference Comments of Tom Kaslow, FirstLight Power Resources, Inc.

The Commission's November 9, 2016 Technical Conference is scheduled to consider the utilization of electric storage resources as transmission assets compensated through transmission rates, for grid support services compensated in other ways, and for hybrid compensation. While new storage or other generation resource technology may introduce new resource characteristics (e.g., modular design), the grid support services required to assure reliable electric transmission system operation remain largely the same.

Executive Summary

FirstLight Power Resources, Inc. ("FirstLight") wishes to offer the following key observations on the topic of considering certain electric storage resources as transmission assets compensated through transmission rates.

- All existing and new electric storage resources can be operated in a way that "mimic(s) a wholesale transmission function", but this single aspect of service does not warrant compensation as a transmission asset.[1] All electric storage resources should participate on a level playing field in the wholesale competitive market.[2]
- Pumped storage and other electric storage resources do provide very fast response performance as both dispatchable load and generation and often perform beyond the level compensated in energy and ancillary service markets. To the extent further effort is needed to address the compensation of transmission support or other premium value, FirstLight would encourage the Commission to expand its focus to include compensation to existing and new electric storage resources.
- In organized markets, such as ISO New England ("ISO-NE"), all resource types including electric storage resources provide transmission support and wholesale market services and, with a very limited exception, are exclusively compensated

[1] Commission Order in Western Grid (Docket No. EL10-19-000) dated January 21, 2010 at paragraph 43.

[2] In the January 21, 2010 Western Grid Order (Docket No. EL10-19-000), the electric storage resource was permitted to be considered as transmission equipment by virtue of limiting its use for "(1) mitigating normal transmission overload; (2) addressing transmission line trips; (3) responding to transmission lines taken off for maintenance; and/or (4) reacting to voltage dips on transmission line segments" (paragraph 4) and assurance that the resource would not participate in capacity or ancillary service markets, or, in most instances, the energy market (where incidental energy market revenues from ISO activation solely for transmission reliability purposes would be passed through to transmission ratepayers). Yet, electric storage resources that rely on competitive wholesale market revenues provide all of the above, both transmission support services and capacity, energy and ancillary services.

through the wholesale market. The exception is a small amount of compensation for reactive power capability under Schedule 2 of the ISO-NE Open Access Transmission Tariff (OATT).[3]

- The market operations task of bidding electric storage resources, including existing pumped storage resources, is complicated and requires the resource owner to forecast future period prices to manage its own state of charge both to avoid depleting limited energy before the highest energy clearing price opportunities and providing adequate storage space for low energy clearing price charging opportunities. The bottom line is all electric storage resources, not just new electric storage technologies, face these challenges.

- It would not be appropriate to permit some storage resources (whether based on technology, size or vintage distinctions) to get transmission rate-based revenue security for their investments while that same treatment undermines the Forward Capacity Market and other market revenues upon which other electric storage devices. The Commission has previously recognized these concerns and discouraged New England from relying on Reliability Must Run (RMR) agreements and has approved Minimum Offer Price Rule (MOPR) mitigation of subsidized resources seeking to sell capacity into the Forward Capacity Market at below competitive market levels.[4]

Discussion

Prior to answering the question of whether and to what extent any new electric storage resources might receive rate-based compensation through transmission rates, FirstLight believes it is first important to understand what grid support services are provided by all resources under existing organized market tariffs today and the mechanisms used to compensate them. Without establishing the baseline of existing compensation mechanisms, it is difficult to assess what may or may not be incrementally needed and whether any contemplated compensation approach might adversely affect the compensation mechanisms upon which all other resources rely. Since FirstLight operates two pumped storage facilities in the ISO-NE market and has extensive experience with that organized market, the following background discussion is based on the ISO-NE tariff provisions though the general concepts likely apply in most organized markets.[5]

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[3] Schedule 2 of the ISO-NE OATT compensates the reactive capability that can be provided without affecting real power output and make-whole payments for energy market costs incurred, including lost opportunity cost, in the provision of voltage control services.

[4] The Commission has previously ruled that the proliferation of RMR Agreements "is not in the best interest of the competitive market as they affect other suppliers participating in this market" finding that "RMR contracts suppress market-clearing prices, increase uplift payments, and make it difficult for new generators to profitably enter the market." (FERC Order in ER03-563-000 at paragraphs 29 & 31)

[5] FirstLight owns and operates the approximately 1168MW Northfield Mountain Pumped Storage facility in Northfield, Massachusetts and the approximately 29MW Rocky River facility in New Milford, Connecticut.

Assuring reliability on the transmission system starts with forward planning processes to evaluate the set of loads, resources and transmission equipment connecting them to assure that reasonably possible load and contingency conditions can be addressed without exceeding thermal loading limits, high and low-voltage limits, degrading interface limits or causing instable system operation. As a practical matter, the total system operates as a single machine and all resources (generation, including storage, imports and demand resources) connected to the system provide grid support services and, in all cases, their interconnection can either avoid the need for new transmission equipment or cause the need for new transmission equipment.

As an example, locating a new generation resource (including a new storage resource) inside an import constrained area can obviate the need for additional transmission to support load inside the import-constrained area by reducing energy import needs or provide incremental local voltage support and control.[6] Similarly, locating additional price-sensitive load (including electric storage) inside an export-constrained area can improve transmission operation by reducing constrained transmission line loading or the ability to decrease voltage to stay within limits. Certain generators designated as critical to maintaining Interface Reliability Operating Limits (IROLs) support the ability to achieve higher interface limits that would require additional transmission infrastructure absence their presence. In all cases, the grid support services of existing generation (including electric storage) and demand resources are relied upon in the transmission planning evaluation to avoid thermal overloads, manage voltage levels within limits, maintain interface limits and evaluate system stability under various conditions and contingencies. New resources are included in the analysis and then relied upon in similar fashion beginning with the year they first obtain a Capacity Supply Obligation (CSO) in the Forward Capacity Auction.

As a result, through a combination of Interconnection Agreements and CSOs, all new grid-connected resources (including electric storage) commit to provide the transmission support services. For generation (including electric storage), this includes subjecting the resource to energy dispatch to avoid thermal overloads, automatic voltage regulation to permit the ISO-NE to control system voltages and governor control to provide primary frequency response to arrest frequency declines. The select generation resources that are found to be critical to the ability to operate certain interfaces at higher levels (IROL critical resources) face increased CIP cybersecurity impact requirements and the attendant incremental costs, yet are not yet compensated for these additional capital and operation and maintenance costs.

Given that the forward looking transmission plan relies on all the components of the single machine to satisfy the reliability requirements, resource requests to get out of the obligation to sell or offer their capacity into the Forward Capacity Market occurs through retirement bids subject to ISO-NE reliability review. With one exception (a payment to the

[6] The now retired Salem Harbor station in Salem, Massachusetts served a crucial role in meeting Northeast Massachusetts (NEMA) transmission reliability needs and the new Footprint Power combined cycle units at the same location likely helps NEMA avoid additional new transmission.

resource's retirement bid level or short term cost of service reliability agreement to defer retirement where retirement would otherwise leave a gap in the transmission plan that could not be addressed in the Forward Capacity Auction lead time), the only compensation for grid support services on the planning horizon occurs through the Forward Capacity Market.

On a day-to-day basis, ISO-NE must still plan the operation of the resources to assure the system can be reliably operated to meet steady state and contingency conditions in the next operating day. Much of this occurs through the day-ahead energy market. Under the current day-ahead energy market which does not currently co-optimize energy and operating reserve scheduling, sufficient operable capability to meet anticipated energy and operating reserve needs occurs in the first step of the day ahead clearing process, the unit commitment step. The second step clears energy supply and demand bids and sets the day-ahead energy market Locational Marginal Prices (LMPs) for energy. This decoupled solution process does not provide any valuation nor compensation of operating reserves in the day-ahead market (though ISO-NE has plans to develop and implement a co-optimized day ahead energy and operating reserve market to address those shortfalls; currently not scheduled to occur prior to 2021). During the interim, the only compensation for advance commitments of resources to supply operating reserves occurs through the Forward Reserve Market. As a result, in advance of the operating day, all resources (including electric storage) today rely exclusively on the competitive market prices for energy in the day-ahead energy market and for compensation of operating reserves through the Forward Reserve Market.

In real-time system operation, all resources sold as capacity (i.e., having a CSO) are required to offer their resources for ISO-NE dispatch. The ISO-NE does co-optimize energy and operating reserve and operates a Regulation market recently redesigned to better reflect very fast moving electric storage resources in compliance with FERC Order No. 755. When the system runs short of supply, including periods where the resources are ramp-constrained, the real-time energy market Locational Marginal Prices (RT LMP) will go up to higher price levels. In periods or locations where the generation supply is surplus to the demand and export capability, RT LMPs drop, sometimes to negative price levels.

Beginning in March 2017, rules to permit improved electric storage resource charging dispatch will be implemented.[7] These rules will reflect the physical characteristics of electric storage resource charging in energy bids and real-time dispatch and provide a real-time opportunity to capture the opportunity to charge electric storage at low (and possibly negative) energy prices.

While there may be opportunities to improve the compensation for all storage resource technologies and vintages, it is critical that all such resources be treated similarly. That is certainly the objective of the market rules and tariff provisions in the ISO-NE market.

[7] The Commission approved these Dispatchable Asset Related Demand changes in Docket No. ER16-954-000,001.

Furthermore, as the above discussion and the attached Appendix A illustrate, it is not clear what unique distinction for certain new storage resources warrants such different transmission rate-based treatment when all electric storage provides similar grid support services. Providing an incentive to get more stable and potentially higher transmission rate-based compensation by virtue of narrowing an electric storage resources services to only "(1) mitigating normal transmission overload; (2) addressing transmission line trips; (3) responding to transmission lines taken off for maintenance; and/or (4) reacting to voltage dips on transmission line segments" of an RTO system when other valuable services can be provided with the same equipment operated as a market resource does not seem to be in the consumer interest.[8]

There are certainly improvements that can be made to compensation of grid support services for all storage (and other resources). While Schedule 2 to the ISO-NE OATT provides reactive power compensation and Schedule 16 provides compensation to resources committing to provide black start service, it is not clear that either of those rates covers all of the costs of providing such service, but, at least in the case of black start service, service provision is voluntary and a valid competitive market choice is to simply not offer service where it is insufficiently compensatory. Further, all electric storage, including pumped storage, provides very fast ramping. Existing energy and ancillary service markets do provide some compensation, but electric storage often exceeds the performance level valued in those markets.

In other areas, emerging cybersecurity requirements are creating new services, or at least new costs for resources uniquely contributing to system operability. This exists today with the designations of certain generators as IROL critical, penalizing a resource that makes higher interface limits possible by increasing their cybersecurity impact status from low impact to medium impact. FirstLight would encourage the Commission to expand its focus to opportunities for improvement of compensation to new and existing electric storage resources for such instances.

[8] Commission January 21, 2010 Order in Western Grid (Docket No. EL10-19-000) at paragraph 4.

Appendix A - Matrix of Grid Support Services and Related ISO New England Compensation

Transmission Support	**Battery & other new storage**	**Pumped Storage**	**Generation**	**Demand Resource**	**Compensation Mechanism**
Planning Horizon					
Prevent Thermal Overload					Forward Capacity Market
Maintain & Control Voltage					Schedule 2 (OATT)
Primary Frequency Response					No compensation
Support higher Interface Reliability Operating Limit (IROL)					Cost burden from medium vs low impact CIP cybersecurity for IROL critical
Day Ahead Operating Plan					
Energy	 Pay to charge Paid to supply	 Pay to pump Paid to generate			Day Ahead Energy Market Locational Marginal Price (DA LMP)
Operating Reserve					No day-ahead compensation. Forward Reserve Market for some of requirement.
Real-Time Operation					
Energy - general					Paid to supply Pay to consume
Energy - ramp-constrained					High Real-Time LMP (RT LMP)
Energy - surplus					Low or negative RT LMP
Operating Reserve					Real-Time Operating Reserve Price
Regulation (AGC)					Regulation Clearing Price

 Provided by all resources under current provisions.

 Provided by certain resources based on electrical location and size of resource.

 Physical capability may exist but not accessible by RTO due to communication or control limitations.