Cost-Based Compensation for Storage Facilities Providing Reactive Power Service

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The dramatic growth expected in utility-scale battery storage facilities raises unique questions regarding whether and how they should be compensated for providing reactive power and voltage control service ("reactive power service").

This article analyzes current market rules and Federal Energy Regulatory Commission ("FERC") precedent regarding reactive power service compensation for storage facilities across the RTOs and ISOs, identifies challenges storage resources may face when attempting to receive cost-based compensation for reactive power service over the coming months and years, and outlines possible changes to consider with respect to FERC reactive power cost-allocation methodologies and RTO and ISO rules to address unique issues that storage resources present.

Background

Reactive power service helps maintain proper voltage levels on the transmission system to support system reliability. Either special transmission facilities or generating resources can provide reactive power. Transmission owners can receive cost recovery for the first category through basic transmission service rates while generating resources can receive payment for the second category through a separate ancillary service unbundled from basic transmission service. See Chehalis Power Generating, L.P., 123 FERC ¶ 61,038, at P 2 (2008).

FERC has recognized that voltage support from a storage facility constitutes a FERC-jurisdictional service, and that storage resources can provide ancillary services - including reactive power - at both cost- and market-based rates (subject to certain guidelines/principles). W. Grid Dev., LLC, 130 FERC ¶ 61,056, at P 55 (2010); Utilization of Electric Storage Resources for Multiple Services When Receiving Cost-Based Recovery, 158 FERC ¶ 61,051, at P 1 (2017) (Storage Policy Statement). The extent to which and how transmission providers compensate storage resources for providing reactive power service is likely to become an important and challenging issue.

Wholesale Markets that Provide Reactive Power Service Compensation Subject to Individualized Cost-of-Service Rate Filings

Midcontinent Independent System Operator ("MISO") and PJM Interconnection ("PJM") allow both generating and storage resources capable of providing reactive power service to seek cost-based compensation. For example, FERC recently accepted changes to the MISO Tariff which provide that an "Electric Storage Resource . . . may collect charges associated with its Reactive Supply and Voltage Control from Generation or Other Sources Service capability under this Schedule 2" as long as the storage resource is "not compensated for transmission service and is grouped with other generation resources as Reactive Power Resources." See Midcontinent Indep. Sys. Operator, Inc., 169 FERC ¶ 61,137, at P 183 (2019). Similarly, Schedule 2 in the PJM Tariff enables "generation facilities and non-generation resources" to receive cost-based revenues for reactive power. See also PJM Interconnection, L.L.C., 169 FERC ¶ 61,049, at P 92 (2019) (finding that PJM's tariff provisions ensure "that Energy Storage Resources are eligible to provide all capacity, energy, and ancillary services that they are technically capable of providing.")

Determining Compensation in MISO and PJM

Generating resources seeking reactive power service compensation in MISO and PJM must submit rate filings for FERC acceptance. Such filings typically follow a FERC-approved cost-methodology developed in American Electric Power Service Corp., 80 FERC ¶ 63,006 (1997), aff’d, 88 FERC ¶ 61,141 (1999). The "AEP methodology," as it is referred to, "generally reflects the costs associated with four groups of plant investments including the generator-exciter, generator step-up transformers (GSU), accessory equipment and any remaining production plant investment," using an allocation factor in an attempt to distinguish real from reactive power production. See Chehalis at P 3.

Storage devices, however, might not fit within the AEP methodology. Whereas (as described above) the AEP methodology focuses on distinguishing components’ functions between real and reactive power production, storage resources do not generate real or reactive power, even though they can inject real and reactive power onto the grid. Those seeking to recover cost-based compensation for providing reactive power service from a storage resource may need to propose a different allocation method. For example, one possible alternative is a methodology that would allocate the costs of equipment proportionally among (but not limited to) the following functions: (1) production or absorption of reactive power, (2) storage or absorption of electricity, and (3) injection of electricity onto the grid.

Because FERC has yet to articulate a reactive service cost-allocation approach specifically tailored to storage resources, developers may need to take the lead in proposing a different cost-allocation methodology. FERC may wait for the issue to come up in a storage reactive power filing and use that proceeding as a vehicle to establish precedent for a future methodology (as it did in AEP).

Wholesale Markets with Pre-Set Reactive Power Service Rates

ISO New England ("ISO-NE")

ISO-NE allows storage resources to qualify as Qualified Non-Generator Reactive Resources, which must provide dynamic reactive power voltage support. ISO-NE uses a pre-set rate for Qualified Non-Generator Reactive Resources that multiplies the reactive power output by baseline capacity cost,
The circumstances and issues discussed above may need to be considered on a case-by-case basis when calculating or proposing compensation for reactive power service. Market participants may want to ask NYISO to reevaluate the different approaches for generating and storage resources.

New York ISO (“NYISO”)

NYISO allows non-generators “capable of providing the ISO with Reactive Power on a dynamic basis, that [are] energized and under the operational control of the ISO” to provide reactive power service.

NYISO compensates such resources (called Qualified Non-Generator Voltage Support Resources) by multiplying the reactive power output (measured in megavolt-amperes reactive or “MVARs”) of the resource by a fixed payment, currently $2,853.50 per MVAR per hour.

NYISO’s rules also allow generating resources—but not non-generating resources, including storage—to receive compensation for lost opportunity costs when directed to reduce real power output to absorb or produce reactive power. Instead, NYISO will reimburse a storage resource for the cost of energy it consumes to energize converters and other equipment necessary to provide reactive power service. Market participants may want to ask NYISO to reevaluate the different approaches for generating and storage resources.

Southwest Power Pool, Inc. (“SPP”)

Although acknowledging that non-generating resources (e.g., storage) can provide reactive power service, SPP’s tariff only allows “Qualified Generators” to receive compensation. The rate of compensation for reactive power in SPP is $2.26 per qualifying MVAR per hour. This discrepancy is arguably unduly discriminatory and should be reevaluated. SPP also does not allow generators or storage resources to receive compensation for lost opportunity costs or for the cost of energy consumed or produced at SPP’s direction to maintain voltage control levels.

Storage Facilities Providing Reactive Power Service in California ISO (“CAISO”)

CAISO does not compensate synchronous or asynchronous resources (including storage) for their reactive supply capabilities but may require a unit to absorb or produce reactive power outside of the standard power factor range to maintain proper voltage control levels. Although FERC does not require transmission providers to pay resources for reactive power capability a grid operator requires for interconnection, a transmission provider still should provide compensation for resources when asked to produce or absorb reactive power outside that range. See Order No. 2003 at P 546; Order No. 2003-A at P 415.

While CAISO does have a mechanism to pay resources for reactive power dispatched outside the standard range required by the Tariff, the mechanism only awards lost opportunity costs if the resource “limits Energy output to enable reactive energy production” to comply with the ISO’s instruction. This approach potentially fails to take into account the specific circumstances of a storage resource, which might be required to absorb energy (possibly in conjunction with limiting energy output) to assist in controlling voltage levels at the direction of the ISO. CAISO’s approach may also fail to adequately consider the cost to a storage resource of energy consumed for voltage control purposes since it focuses strictly on lost opportunity costs. Market participants may want to ask CAISO to clarify how it would treat lost opportunity costs for storage.

Hybrid Resources

Theoretically, a storage unit could provide reactive power service as part of a single “hybrid” resource that includes multiple technologies, such as storage plus solar or wind, but grid operators are still developing rules to facilitate such operation.

To determine compensation for a storage unit that is part of a single “hybrid” resource, reactive capability and output might be determined by either: (i) modeling the components of the hybrid separately or (ii) modeling the hybrid as a single resource. Modeling the storage and generation components as a single resource could result in limiting anticipated reactive power capability and/or output, because if variable generation components produce output at the maximum capacity of the grid connection point, the storage component may not be physically capable of producing as much (or any) power without violating the shared maximum facility output of the two components.

Moreover, in markets that provide reactive compensation subject to individualized cost-of-service rate filings (i.e., PJM & MISO), the method for allocating the costs of the storage versus the generating components of the hybrid resource between real and reactive power production may differ (see discussion on PJM & MISO allocation method above).

Each of these circumstances may need to be considered on a case-by-case basis when calculating or proposing compensation for reactive power service from a hybrid resource.

Conclusion

The circumstances and issues discussed above may need to be considered on a case-by-case basis when calculating or proposing compensation for reactive service, or in determining whether existing tariff provisions concerning compensation for reactive power service are appropriately tailored to the unique circumstances involving battery storage resources.
Please contact Dan Simon (dsimon@clarkhill.com), Omar Bustami (obustami@clarkhill.com), or another attorney at Clark Hill, if you have questions related to your storage or generating resource’s ability to be compensated for reactive power service, or any other questions related to the content of this article.