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Electric Storage Resource Growth and Deployment: A Tale of Two Markets

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In recent years, the California Independent System Operator (“CAISO”) and the Electric Reliability Council of Texas (“ERCOT”) have experienced rapid growth and deployment of utility-scale and distributed electric storage resources, in particular, battery electric storage systems (“BESS”). This article describes some of the significant drivers of the rapid growth of electric storage resources seen in California and Texas, as well as the market participation opportunities available to electric storage owners in both states. This article also summarizes some of the regulatory and interconnection challenges facing electric storage developers more generally, as well as recent market rule changes and regulatory developments impacting CAISO and ERCOT.

Electric Storage Resource Deployment

Electric Storage Resource Deployment in California

The increase in electric storage resource deployment in California has been driven by several factors. First, electric storage deployment in California has been encouraged by projected growth in demand for electric capacity[1] and thousands of megawatts of thermal-generator retirements.[2] Second, California legislators and regulatory bodies have diligently worked towards fostering in-state storage development, a commitment underscored by the landmark adoption of the state’s inaugural energy storage mandate in 2013.[3] Subsequent legislation has mandated that California’s three investor-owned utilities propose programs and investments to accelerate the deployment of distributed energy storage systems.[4]

Indeed, California continues to explore improvements to its storage policies. Under the direction of the California Public Utilities Commission, an Energy Storage Procurement Study was issued earlier this year “to assess the evolution of California’s energy storage industry both historically and looking forward” and made key observations and guiding recommendations “meant to highlight policy levers that will support development of a cost-effective energy storage portfolio that effectively contributes to meeting the state’s goals of electricity grid optimization, renewables integration, and greenhouse gas (GHG) emissions reductions.”[5]

California's comprehensive, state-driven strategy for the development of renewable resources, marked by extensive collaboration among the state's legislators, regulators, utilities, and the grid operator, has been instrumental in propelling the deployment of electric storage resources.[6] In particular, the transition from fossil fuels to intermittent renewable resources, ambitious decarbonization goals, and the need for flexibility and resilience of the power grid have led to CAISO needing a larger fleet of electric storage resources.

These circumstances have prompted several companies, including, but not limited to, Tesla, AES, Siemens, BMW, and Mercedes to invest in electric storage resource projects in California,[7] resulting in a massive increase in interconnection requests, often making it challenging to bring resources online in time to meet state policy and reliability needs. At this time, battery-backed solar arrays and other hybrid configurations dominate the California Independent System Operator ("CAISO")'s queue, with nearly 350 GW of requests, followed by stand-alone battery storage at 146 GW.[8]

Electric Storage Resource Deployment in Texas

The surge in electric storage resource deployment in Texas can be attributed to a confluence of factors. One significant driver is the state's substantial growth in electricity demand, with ERCOT anticipating a remarkable 30% increase in electricity consumption over the next decade.[9] The growth of electric storage resources has been further fueled by the retirement of aging power plants and the growth of cost-effective intermittent renewable generation resources (i.e., wind and solar). Electric storage resources allow for owners of such systems to "firm" the generation of solar and wind resources, thus providing reliability benefits to the grid and enabling their owners to respond effectively and quickly to high price signals in ERCOT's energy market.

Despite legislative challenges, such as the exclusion of solar, wind, and electric storage from property tax benefits, the electric storage sector in Texas remains robust. The decreasing cost of batteries and federal incentives like the Inflation Reduction Act have contributed to the economic viability of electric storage projects. The ERCOT grid, which had minimal battery power three years ago, has witnessed exponential growth, with over 3,500 megawatts operating on the grid today and a projected increase to over 10,000 megawatts by the end of 2024.[10] The urgency to address reliability concerns in ERCOT has spurred a rush to install battery projects, with a focus on achieving faster regulatory clearance. Certain developers concentrate on smaller projects under 10 MW to navigate fewer regulatory requirements. However, this approach comes with challenges, including diminishing returns and increased competition for sites in areas with volatile wholesale power prices.[11]

BESS Market Participation Constructs

Utility-scale batteries in the CAISO and ERCOT markets are each faced with a distinct slate of opportunities for monetizing the services and products they can provide in their respective competitive markets.

CAISO Market Participation

The CAISO market allows for the purchase and sale of electricity, resource adequacy (representing the potential to generate electricity when needed), and ancillary services among generators and energy suppliers to maintain safety and reliability on the power system.

BESS developers in CAISO are able to provide resource adequacy and participate in day-ahead and

real-time markets, as well as ancillary services markets to provide grid stability and regulation services.

As discussed further below, market participation options available for BESS projects in CAISO will depend, in part, on whether the BESS participates as a front-of-the-meter or behind-the-meter resource.

ERCOT Market Participation

ERCOT, which oversees approximately 90 percent of Texas's electric load, administers an "energy-only" market, which offers various incentives for generators to build and maintain generation for long-term demand needs. Market participation mechanisms utilized in ERCOT include price-capped electricity markets and investment incentives in competitive electricity markets.[12]

Batteries in Texas are also eligible to provide "Regulation Up" and "Regulation Down" ancillary services — which are services that increase or decrease generation output to maintain system frequency.

Further, new rules are currently being considered by the Public Utility Commission of Texas that would require batteries in Texas to maintain a minimum state of charge depending on the type of ancillary service provided. Under these proposed rules, batteries would be required to have the minimum state of charge they bid for the "Regulation-Up" product. This has raised concerns that such requirement, if adopted, would prevent batteries from operating at optimal flexibility to be able to adequately act as a "sponge" to immediately charge and discharge energy as needed to maintain grid stability, and therefore, that this could carry the unintended consequence of administratively limiting battery access to energy held by such batteries during an ERCOT emergency.

Despite the impact that these proposed changes may have, if they are adopted, electric storage systems are anticipated to remain an important component used to keep the ERCOT system stable.

Interconnection Issues

Interconnection Issues Facing Electric Storage Developers in FERC-Jurisdictional Markets

Significant issues that have traditionally confronted electric storage developers in other markets regulated by the Federal Energy Regulatory Commission ("FERC") (which excludes ERCOT, but includes certain parts of Texas) include: (1) issues related to co-locating a BESS with a new or existing generator and whether co-locating such BESS requires a separate interconnection request from the generator or whether it can be treated as being a part of the same interconnection request, and (2) utilizing the existing interconnection rights of a generator that is about to fully or partially retire, to facilitate interconnection of a new BESS project interconnecting behind the same point of interconnection ("POI") as the existing resource, in lieu of the BESS project submitting a new interconnection request.

It is important for owners and financiers of electric storage projects in CAISO (and in the parts of Texas located outside of ERCOT) to be aware of these issues, and associated developments.

Co-Location and Surplus Interconnection

In FERC Order No. 845, FERC established a "surplus interconnection service" process to

enable a *new interconnection customer* to use the unused portion of an existing interconnection customer's approved interconnection service through the inclusion of an additional generating facility behind a single point of interconnection. Order No. 845 did not specify when a generating facility is considered to be "existing."[13]

In FERC Order No. 2023, issued earlier this year, FERC addressed its co-location policy, changing the large generator interconnection procedures and *pro forma* large generator interconnection agreement to require transmission providers to allow projects to co-locate on a shared site behind a single POI and share a single interconnection request, thereby removing barriers for co-located resources by creating a more efficient standardized procedure for these types of configurations.[14] Order No. 2023 also enabled an *existing interconnection customer* to add a generating facility to an *existing interconnection request* under certain conditions, including as long the total amount of generation capacity in the original interconnection request is unchanged, without automatically losing their queue position because of changes to the original request.[15]

Transferring Interconnection Rights from a Generator to a BESS

The question of whether transferring interconnection rights from one facility to another, and whether this triggers the need to submit a new interconnection request with the transmission provider, will often turn on the question of how significant the change is between the existing and replacement facilities.

In CAISO, for example, "Existing Generating Units may use the repowering process for an energy storage capacity conversion to replace a portion of the project's MW capacity with energy storage but not wholly replace the existing Generating Units with energy storage and not increase approved existing project capacity at the POI."[16] CAISO's *Business Practice Manual for Generation Management* states further that "at any point in evaluating a fuel-type change, CAISO may determine that the change is substantial such that it must come in the form of a new Interconnection Request."[17] Therefore, in CAISO, a complete transfer of interconnection rights from a natural-gas-fired generator (for instance) that is retiring to a stand-alone BESS would likely constitute a non-permissible change in the electrical characteristics of the facility, but a partial transfer may be permissible.

Of note, in November 2022, FERC granted a one-time prospective waiver of similar requirements in the Midcontinent Independent System Operator, Inc.'s ("MISO") Open Access Transmission Tariff in order to allow two battery electric storage systems to use MISO's generating facility replacement process to replace existing generating facilities with the energy storage systems.[18]

FERC explained, *inter alia*, that the transfer did "not raise queue jumping concerns because the necessary transfers do not involve unaffiliated entities outside of the interconnection queue . . . ."[19]

This raises the prospect that under discrete and limited circumstances, a transfer of capacity rights from a generator to a BESS in regions other than MISO, such as CAISO, even if technically prohibited by a transmission provider's rules, may be conditionally allowed by FERC.

Locating a BESS in Front-of-the-Meter Versus Behind-the-Meter

When locating a BESS, in particular a stand-alone BESS, a key question for project developers will be whether to locate the BESS in front-of-the-meter, so that the BESS interconnects to and interfaces directly with the transmission system, or behind a customer meter. Both options come with respective

benefits and trade-offs.

One of the primary benefits of being located behind-the-meter is that it does not typically require submitting an interconnection request to the transmission utility, meaning locating a BESS behind the customer meter, depending on the region, can help the developer avoid lengthy interconnection processes, studies and more expensive upgrades that could be associated with interconnecting in front-of-the-meter. For example, as recently as August of this year, FERC granted a request by CAISO to extend the timelines for its massive Cluster 14 interconnection queue cluster and to pause its (even more massive) Cluster 15 interconnection queue cluster due to a severely impacted transmission interconnection queue.[20]

It should be noted, however, that the means of participation in the market as a behind-the-meter resource may be relatively limited. For example, a BESS locating behind-the-meter in CAISO may be limited to serving the customer's load with whom it is interconnected and selling Resource Adequacy as a Distributed Energy Resource Provider, but participating in real-time, day-ahead markets and ancillary services markets may be off-limits depending on the specific market participation model to be utilized.[21]

Another trade-off to consider is that if all, or a portion, of the output of the storage system, is sold at retail to end-use customers, the storage resource would not automatically be eligible for exempt wholesale generator status, which provides exemption from the books and recordkeeping requirements of the Public Utility Holding Company Act, without special approval from FERC.[22]

Electric Storage Resource Interconnection in ERCOT

ERCOT utilizes a fundamentally different interconnection scheme than in CAISO and other regions subject to FERC's regulations, resulting in fewer queue-congestion concerns for electric storage resources. This makes many of the approaches used in other regions to avoid queue-congestion issues largely irrelevant, including interconnecting behind-the-meter, or attempting to transfer interconnection rights from existing to new facilities. In ERCOT, using congestion data, the grid operator relies on a centralized transmission planning process to identify needed transmission upgrades not tied to specific interconnection requests.[23] In turn, interconnection customers take studies conducted by the grid operator and use them to assess their curtailment risk based on existing infrastructure.[24] Interconnection customers then decide whether or not to proceed, and if they do, they will bear the curtailment risk. In 2022, ERCOT curtailed about 9% of utility-scale solar generation and 5% of wind generation. This process also avoids costly grid updates to be borne by individual developers.

This does not mean that behind-the-meter interconnections are out of the question or have no place in ERCOT. Indeed, Texas is currently implementing a pilot program to allow behind-the-meter resources, such as storage resources, to be aggregated and sold in the ERCOT wholesale market — referred to as the Aggregate Distributed Energy Resource ("ADER") Pilot Project.[25]

Under the ADER Pilot Project, an ADER is a resource consisting of multiple individual metered sites/premises connected at the distribution system level that has the ability, in aggregate, to respond to ERCOT dispatch instructions. The ADER Pilot Project is intended to allow customers "with any combination of generation, energy storage technologies, or controllable load with the capability of 1 MW or less to participate in the ERCOT wholesale markets."[26] In turn, the ADER Pilot Project may open the door for increased behind-the-meter storage participation in the ERCOT wholesale electric markets.

Conclusion

The surge in electric storage resource deployment in CAISO, ERCOT, and other regions is being accompanied by rapidly changing market and interconnection rules, including ones recently adopted and ones being considered for implementation. The changes are presenting developers with many options to consider when planning their projects, as well as new challenges related to navigating the regulatory landscape.

Endnotes

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[14] *Improvements to Generator Interconnection Procedures and Agreements*, Order No. 2023 184 FERC ¶ 61,054, at PP 1346-1357 (2023) ("Order No. 2023").

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