

Calif. Energy Storage Juiced By New Federal Guidelines



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Law360, New York (December 19, 2013, 6:36 PM ET) -- New requirements by the California Public Utilities Commission ("CPUC") and Federal Energy Regulatory Commission enhance opportunities for energy storage technologies to play a larger role with California's, and the nation's, electrical grid. Energy storage offers numerous potential benefits, including facilitating the integration of intermittent renewable resources such as wind and solar power, performing a variety of ancillary services critical to grid reliability and stability, and allowing energy to be accumulated when demand is low for use during peak periods or emergencies. Nonetheless, many advanced energy storage technologies remain in the nascent stage, leaving questions about their cost-effectiveness and financeability.

CPUC Approves Pioneering Energy Storage Mandates

In a landmark decision on Feb. 13, 2013, the CPUC required the procurement of at least 50 megawatts ("MW") of energy storage resources to meet long-term electricity supply requirements in the Los Angeles area.[1] In another significant shift, on Oct. 17, 2013, the CPUC issued a decision requiring the state's three large investor-owned utilities ("IOUs") to procure a combined 1,325 MW of energy storage by the end of 2020, the first such mandate in the United States.[2] Specifically, each investor-owned utility must meet the following increasingly stringent targets:

Energy Storage Procurement Targets (in MW)¹

Storage Grid Domain Point of Interconnection	2014	2016	2018	2020	Total
Southern California Edison					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
Subtotal SCE	90	120	160	210	580
Pacific Gas and Electric					
Transmission	50	65	85	110	310
Distribution	30	40	50	65	185
Customer	10	15	25	35	85
Subtotal PG&E	90	120	160	210	580
San Diego Gas & Electric					
Transmission	10	15	22	33	80
Distribution	7	10	15	23	55
Customer	3	5	8	14	30
Subtotal SDG&E	20	30	45	70	165
Total - all 3 utilities	200	270	365	490	1,325

The first procurement cycle, including the first competitive solicitation, will occur on Dec. 1, 2014. Additional procurement cycles will be held in 2016, 2018 and 2020. The CPUC decision directs each IOU, on or before March 1, 2014, and biennially thereafter in 2016, 2018 and 2020, to file a procurement application containing proposals for energy storage procurement. The procurement applications are to contain updated procurement capacity targets and detailed descriptions of how each IOU intends to procure resources (e.g., specifying the structure of any request for offers ["RFO"]) or related processes.

The decision requires procured energy storage to be “cost-effective” without defining how cost-effectiveness will be measured. Several cost-effectiveness models were developed during the storage proceedings, but the CPUC declined to adopt any as the exclusive methodology. Instead, the CPUC will continue to develop procedures for evaluating the cost-effectiveness of storage resources.

The capacity targets refer to storage that is either pending contract, under contract, or installed after the end of each cycle. Southern California Edison ("SCE") has included an energy storage component of at least 50 MW in its 2013 local capacity requirements RFO, which was authorized pursuant to CPUC Decision 13-02-015.

For each procurement cycle, the investor-owned utilities must meet targets in each of three grid domains based on where the storage is connected to the grid: transmission-connected, distribution-connected and customer-side.

Examples of energy storage technologies for each of these domains includes the following:

- Transmission storage: Hydroelectric pumped storage, compressed air energy storage, flywheels and batteries either co-located with generation, sited alone to provide ancillary services or load following or used to enhance reliability through voltage support.

- Distribution storage: Batteries and flywheels deployed at substations or near distributed generation sources, such as solar photovoltaic systems.
- Customer storage: Most commonly, batteries and thermal energy storage. Thermal energy storage can include making ice during off-peak hours for later use in cooling during time of peak electrical use. In the future, plug-in electric vehicles may be able to return electricity to the grid when not in use.

Eligible Projects

- Energy storage encompasses a variety of technologies, including batteries, flywheels, thermal energy storage and hydroelectric pumped storage. Storage systems can be co-located with generation or placed locally on the distribution grid.
- Eligible projects are those that conform with Cal. Pub. Util. Code § 2835(a), including mechanical, chemical, or thermal systems that will: (1) reduce greenhouse gas emissions; (2) reduce demand for peak electrical generation; (3) defer or substitute an investment in generation, transmission or distribution assets; or (4) improve the reliable operation of the electrical grid.
- Hydroelectric pumped-storage projects of greater than 50 MW will not count toward the target.
- Storage projects currently planned will count toward targets, provided the project: (1) assists in grid optimization, integration of renewable energy, or reduction of greenhouse gas emissions; (2) is under contract or installed after Jan. 1, 2010; and (3) is operational no later than the end of 2024.
- Existing CPUC programs, such as the Self-Generation Incentive Program and Permanent Load Shifting program, will count toward the customer storage target.

Procurement Flexibility

Up to 80 percent of the MWs of a target may be shifted between the transmission and distribution ("T&D") domains. No shifting is allowed between T&D and the customer-side domain.

A utility may defer up to 80 percent of its target to later procurement periods if the utility shows that it cannot procure enough operationally or economically viable projects to meet the target. As a result, the utilities may postpone a large portion of their procurement obligations to later procurement periods as the relevant technology matures and becomes cheaper. If a utility exceeds its target in one cycle, the utility may reduce the next cycle's target by the excess amount.

Utility-Owned Storage

- A utility may not own more than 50 percent of the storage projects proposed to count toward the MW target.
- Utility-owned storage systems must go through a competitive solicitation process.

- Procurement mechanism for transmission and distribution projects.
- Solicitations are recommended, but not required, to be in the form of an RFO.
- There is no requirement for a standard contract; each power purchase agreement can be negotiated individually.
- All contracts are contingent on CPUC approval.

Other Entities

- Electric Service Providers ("ESPs") and Community Choice Aggregators ("CCAs") must also procure energy storage. An ESP is a non-utility entity that offers service to customers within the service territory of an electric utility; a CCA is a local government or group of governments that separately procures electricity for its residents but uses utility infrastructure.
- ESPs and CCAs must meet 1 percent of the 2020 annual peak load with a requirement for project installation by the end of 2024.

Commercial Questions Remain In Contracting For Storage Technology

A number of questions remain about how the new procurement targets will be implemented in practice. The investor-owned utilities are in the process of developing pro forma contracts for energy storage procurement. However, issues unique to energy storage technologies likely will require novel approaches and may impact how storage projects are valued relative to traditional generation.

One of the key differences has to do with a project's auxiliary load. Unlike traditional power projects, which can generally rely on their own generation for their auxiliary load, energy storage projects do not generate their own power and typically must rely on grid-supplied energy. This presents two issues.

First, the differences in the cost between using internal generation and purchasing electricity from the grid (which will almost always be higher than the cost of generation) can put storage technologies at a disadvantage relative to traditional generation. Second, the price of grid-purchased energy is subject to change, which makes valuing storage technologies more difficult. For certain technologies, such as for batteries, the auxiliary load can be a significant amount of energy relative to the output of the project, so this can be a significant commercial issue. Energy storage providers could argue that charging energy storage projects for auxiliary load at grid prices is unfair compared to a traditional gas tolling agreement, in which the costs of the gas used to generate electricity used for the auxiliary load are not typically passed through to the project.

Another key difference between traditional power purchase agreements and energy storage agreements is that utilities are responsible for providing charging energy to the storage project. Energy storage agreements must consider how to penalize or reward storage projects that are less or more efficient than what the parties initially anticipated. In addition, contracts must address performance degradation of energy storage units over their lifetime. There are many different kinds of degradation that must be considered over the life of a project, including the nominal capacity of the project (expressed in MW), the total storage capacity of the project (expressed in MWh) and the storage efficiency of the project (expressed as a percentage of the charging energy).

Finally, one of the biggest challenges facing energy storage technologies is the cost of storage technology. As with other new technologies, the costs of energy storage projects have the potential to

decline steeply in the coming years if the industry scales up. State regulators and utilities must balance the desire to obtain cost savings with the need to deploy these technologies now so that these cost savings can be achieved. Given how quickly the pricing can change and the length of the procurement cycles, the CPUC may be asked to approve contracts with pricing that exceeds what is then available in the market. Utilities will have to consider this dynamic carefully as they decide whether to defer their procurement obligations.

FERC Rulings Open Opportunities For Storage Technologies

The CPUC's storage requirements coincides with recent decisions by FERC aimed at removing regulatory barriers and spurring growth of energy storage resources.

On Nov. 22, 2013, by order 792,[3] FERC added storage to the category of resources eligible to interconnect to the power grid under the Small Generator Interconnection Procedures. In doing so, FERC clarified how storage resources can connect to the grid, helping to reduce an existing area of regulatory uncertainty. Order 792 also allows storage to participate in FERC's fast track interconnection process, reducing the cost, time, and regulatory burden of interconnection for energy storage technologies.

FERC has recently taken steps to eliminate barriers to storage resources in the provision of so-called "ancillary services." In the electricity context, ancillary services include frequency regulation and other grid support functions that ensure generation and load remain constantly balanced. Some storage technologies, like batteries and flywheels, which have fast and accurate operational capabilities, may be able to perform certain ancillary services with greater efficacy per MW than traditional generation resources. Prior to these steps, because market rules are generally based on the operational characteristics of traditional generators, some storage resources may have been undercompensated for providing ancillary services.

With order 755,[4] FERC requires organized wholesale markets to reform their ancillary service market rules to compensate frequency regulation providers for actual performance, helping to ensure that quicker and more accurate storage resources will be duly compensated. Similarly, in order 784,[5] FERC requires interstate transmission utilities to reform procurement rules to account for the speed and accuracy of ancillary service resources. Order 784 also eliminates a requirement that potential ancillary service providers conduct a market power study demonstrating a lack of market power in order to obtain market-based rate approval from FERC. This change is significant because, according to FERC, the prior requirement essentially prohibited sales of ancillary services to public utility transmission providers outside of organized wholesale markets. Together, orders 755 and 784 facilitate the competitiveness of storage resources with traditional generators in the provision of certain ancillary services.

Other ongoing proceedings suggest that eliminating barriers to storage is among FERC's policy priorities. FERC has opened a proceeding "to consider how current centralized capacity market rules and structures are supporting the procurement and retention of resources necessary to meet future reliability and operational needs." [6] Among other things, FERC is considering whether storage is permitted to participate in any of the centralized capacity markets. Certain storage resources are operationally comparable to generation and demand-side resources that are permitted to bid as capacity. Additionally, FERC is evaluating the design of market rules that account for the differing operational characteristics of capacity resources, as it did in the ancillary services context. For example, if the organized capacity markets incentivized flexible capacity (as opposed to megawatts of capacity), that would tend to benefit fast and accurate storage resources. Some stakeholders have emphasized that adequate flexible capacity can help stabilize the grid with the increasing penetration of variable wind and solar resources, a function that certain storage resources could perform.

FERC's recent policy changes and potential future actions may reduce federal regulatory barriers, helping to make energy storage more competitive relative to traditional resources. In this way, FERC

may facilitate the CPUC's and other state-level efforts to increase the procurement of energy storage technologies.

Financing Barriers to New Storage Technologies May Require Governmental Incentives to Jumpstart Investment

Despite the potential benefits of increasing energy storage's footprint on the electrical grid, some new energy storage technologies may struggle to attract financing absent governmental incentives. Even if new storage technology can be demonstrated on a small scale or over the short term, financiers may be unwilling to shoulder the risk of a new technology scaling up, continuing to perform reliably, or remaining profitable over the long term. This chicken-and-egg problem — where financiers prefer to wait until a technology is demonstrated on a commercial scale over the long term, while new technologies often need significant financing to move out of the development stage — can limit the advancement and commercial application of new technologies in the energy space, whether battery storage or otherwise.

Governmental incentives can help jumpstart investment in new technologies. A myriad of government funding sources, from American Recovery and Reinvestment Act ("ARRA") grants to state incentive programs (e.g., the California Energy Commission's Self Generation Incentive Program), have attempted to bridge the gap of energy storage project financing. For example, ARRA's stimulus funding allocated \$185 million to develop energy storage projects, which in turn attracted \$585 million in industry cost-share.[7] Utilities may also be willing to accept some of the risk of a new technology as part of a power purchase agreement, which effectively spreads the risk to the utility's ratepayers.

Ultimately, while incentives can come in many varieties, the net effect is to shift some level of risk from the financing party to the taxpayers or ratepayers. For such programs to be cost effective, the need for financing incentives should diminish over time. Governmental policies that encourage energy storage procurement (or eliminate barriers to energy storage procurement) may also reduce the need for financing incentives by increasing the competitiveness of new energy storage technologies over time.

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[1] Rulemaking 12-03-014, Order Instituting Rulemaking to Integrate and Refine Procurement Policies and Consider Long-Term Procurement Plans, Decision 13-02-015, February 13, 2013.

[2] Rulemaking 10-12-007, Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the

Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems, Decision 13-10-040, October 17, 2013. Assembly Bill 2514 directed the CPUC to evaluate establishing a procurement program for energy storage.

[3] 145 FERC ¶ 61,159.

[4] 137 FERC ¶ 61,064 (October 20, 2011).

[5] 144 FERC ¶ 61,056 (July 18, 2013).

[6] Centralized Capacity Market Design Elements, Commission Staff Report, AD13-7-000 (August 23, 2013).

[7] See U.S. Department of Energy, Progress in Grid Energy Storage, Imre Gyuk, Program Manager Energy Storage Research, EAC 03–06-12, available at: <http://energy.gov/sites/prod/files/Presentation%20to%20the%20EAC%20-%20Progress%20in%20Grid%20Energy%20Storage%20-%20Imre%20Gyuk.pdf>.

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