BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems.	)	**Rulemaking 10-12-007 (Filed December 16, 2010)**

COMMENTS OF BEACON POWER, LLC ON THE ASSIGNED COMMISSIONER'S RULING PROPOSING STORAGE PROCUREMENT TARGETS AND MECHANISMS AND NOTICING ALL-PARTY MEETING

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COMMENTS OF BEACON POWER, LLC

Pursuant to the Rules of Practice and Procedure of the California Public Utilities Commission (the "CPUC" or the "Commission") and the June 10, 2013 Assigned Commissioner's Ruling Proposing Storage Procurement Targets and Mechanisms and Noticing All-Party Meeting (the "ACR"), Beacon Power, LLC ("Beacon Power" or the "Company"), a manufacturer and developer of a commercial-scale advanced energy storage technology that uses flywheels to provide fast accurate balancing services to the grid, is pleased to file its Comments in response to the ACR that was issued in the above-captioned matter.

The Company is appreciative of CPUC's long recognition that energy storage offers many benefits to the grid and supports the concepts of procurement targets to ensure that commercially-viable storage technologies, such as Beacon Power's flywheels, are integrated into the system. While supportive of the Commissioner's proposal generally, in its Comments Beacon Power respectfully recommends that specific requirements in the ACR be tweaked so that the proposed procurement mechanism appropriately recognizes the net benefits provided by differing energy storage

technologies, promotes the efficient procurement of a diverse supply of energy storage and encourages the deployment of energy storage by California utilities.[1]

I. ABOUT BEACON POWER AND FLYHWEEL ENERGY STORAGE

Beacon Power manufactures and currently operates an energy storage technology that uses flywheels to rapidly inject and withdraw power from the grid in order to quickly and accurately follow fast-changing dispatch control signals. Beacon Power's flywheel technology can respond nearly instantaneously to a system operator's control signal, or up to one hundred times faster than many traditional generation resources, but with no direct emissions. Beacon Power's flywheel energy storage systems are designed for a twenty (20) year life and 100,000 cycles at full depth of discharge. The ability of Beacon Power's flywheels to quickly and precisely respond to moment-by-moment system changes with its high power and high cycle capability make this technology ideally suited to provide frequency regulation to support grid reliability, and to address the short-term grid impacts that can result from integrating variable energy renewable resources.

Importantly, Beacon Power's flywheel-based energy storage technology is commercially available and currently providing frequency regulation services in multiple independent system operator markets. Specifically, Beacon Power currently owns and operates a 20-megawatt ("MW") flywheel energy storage facility in Stephentown, NY that provides frequency regulation services in the NYISO market. Its 20 MW interconnection rating and injection capability actually provides 40 MW of frequency regulation range by functioning as needed as a 20 MW source or a 20 MW load. The same source/load dynamic applies at our other projects.

[1] In its Comments, Beacon Power responds to seven of the ten questions asked by the CPUC in the ACR. However, Beacon Power reserves its right to respond to additional questions in future rounds of Comments.

Beacon Power also has a .5 MW flywheel energy storage facility in Massachusetts that provides frequency regulation services to ISO-NE. In addition, Beacon Power's latest commercial-scale facility in Pennsylvania will provide Regulation in PJM commencing in September 2013.[2] With its existing facilities in ISO-NE and NYISO, Beacon Power has accumulated over 3.5 million flywheel operating hours with its current Generation 4 design, the flywheel-based energy storage technology that Beacon Power intends to use in the development of a flywheel-based energy storage facility in California.[3]

II. RESPONSES TO QUESTIONS IN THE ACR

A. Please comment on this proposal overall, with emphasis on the proposed procurement targets and design.

Overall, Beacon Power strongly supports Commissioner Peterman's proposal, as the contemplated implementation of energy storage procurement target will provide the market with the required incentive to foster development of energy storage resources in California. However, as explained below, there are some aspects of the proposal that if implemented, would fail to attract the diverse storage technologies and applications that the Commission envisions integrating onto the California grid. To ensure that California ratepayers benefit from a robust energy storage marketplace, Beacon Power respectfully requests that the Assigned Commissioner consider the below recommendations to ensure the procurement of a diverse, commercially viable energy storage portfolio for LSEs.

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[2] Commercial operation of the first 4 MW of this facility is scheduled to begin in September 2013 with the remaining 16 MW of this facility to achieve commercial operation throughout the period from September 2013 through June 2014.

[3] In 2006, Beacon previously demonstrated a 100-kilowatt ("kW") flywheel plant at a Pacific Gas & Electric Substation in San Ramon, California, which won approval from CAISO.

1. *To encourage deployment of diverse energy storage technologies and to ensure that LSEs procure the storage for various end uses listed in the ACR, the Commission should include an 'ancillary services' category within its 'transmission bucket.'*

In creating procurement targets, it is important that the Commission provide the LSEs with a procurement framework that ensures a fair and appropriate evaluation of a variety of energy storage solutions. While the ACR recognizes three "buckets" in which LSEs must procure energy storage resources (*i.e.,* transmission, distribution and customer-sited storage systems), such a broad evaluation will preclude California utilities and other LSEs from fully considering and evaluating the net benefits of storage projects that use varying technologies and provide different end uses, products and services.

For example, included in the ACR is a list of twenty-one end uses for storage, including ancillary services. Yet, as proposed, it is unlikely that the proposed procurement mechanism would effectively compare energy storage resources and procure a diverse portfolio of technologies and applications. Specifically, a comparison of two energy storage projects interconnected to the transmission system, one which is a long-duration high-energy storage plant providing capacity and hours of energy arbitrage by cycling daily and the other which is a short duration high-power, storage plant doing many cycles within an hour that is optimal for providing ancillary services like frequency regulation, will essentially result in an "apples to oranges" comparison that will not yield a meaningful analysis of the net benefits to the transmission system, or a cost effective alternative for ratepayers.

Rather than one mechanism to compare different resources, the Commission would ensure a wider variety of uses for energy storage if LSEs were required to evaluate comparable projects (*e.g.*, high-energy, long duration projects for a portion of the

procured MWs, and high-power, short duration projects focused on the provision of ancillary services for a separate portion of the procured MWs). Under this scenario, LSEs would conduct a precise evaluation of resources necessary to resolve a particular issue.

Accordingly, for LSEs to determine the best available storage option available, Beacon Power recommends that the Commission define minimum procurement targets based on a potential set of applications or sub-buckets for storage projects. By creating application targets, such as long duration storage and ancillary services only targets, the LSE will appropriately evaluate comparable projects and promote procurement of diverse suppliers, technologies and uses.

2. *Using a reverse auction similar to the Renewable Auction Mechanism is not efficient to compare diverse storage projects with varied end uses. Accordingly, Beacon Power recommends using a targeted Request for Offers Mechanism.*

While a reverse auction may work for like-commodity renewable projects, it cannot be used to compare diverse storage projects that offer varied end uses and benefits. Specifically, comparing storage projects on a single cost metric, such as would be done through a reverse auction, is unlikely to properly value the benefits of different storage projects or to promote the diversity of technology and end uses that the California electric grid needs. In fact, an LSE could not reasonably define the standard contract terms needed for diverse technologies, as well as diverse applications, that possess different characteristics (*e.g.*, duration, cycle life, aging and degradation characteristics, response time, ramp rate, accuracy, etc.). A reverse auction is best used in circumstances where "one-contract fits all", which is not the case when evaluating and procuring energy storage.

Instead of a reverse auction, Beacon Power recommends that LSEs be required to use targeted Requests for Offers ("RFO") to procure energy storage in each of the more narrowly defined "sub-buckets" of end uses/applications. RFOs provide the most flexibility for resources to offer their capabilities and costs while also enabling flexibility for the LSE's to develop an appropriate end-use specific methodology for comparison of the resultant net benefits (and, in many cases, multiple or stacked uses/benefits) to rate payers.

As pertains to the design of the procurement mechanism, Beacon Power suggests inclusion of the following criteria:

i. *Procurement for long-term use:* The Commission should specify that projects shall provide services over the long term (20+ years). Generally, such assets allow amortization of costs over longer time periods and result in lower initial price impacts.

ii. *Utilities should be permitted to own storage projects:* Because there are multiple customer reliability benefits from storage (such as voltage support and power quality) that form the basis of traditional T&D investments that are difficult to monetize in the existing competitive markets, the Commission should allow LSEs to wholly-own energy storage projects paid for in rate base.

iii. *Establish a reasonable time for commercial operation:* The Commission should mandate an energy storage resource's commercial operation within a two-year time period. Should a

procured project fail to meet this requirement, the megawatts would be included in the next scheduled auction.

B. Comment on whether any of the projects proposed to count toward the procurement targets be excluded, or any additional projects included, and on what basis.

As delineated in her ACR, Commissioner Peterman intends to add a diverse set of technologies and approaches to providing benefits to the electricity grid, including "those storage applications and technologies that have not yet achieved widespread commercial operation."[4] To the extent that there are projects proposed that meet a service requirement of 20 years and that are available for commercial scale operations within two years (*i.e.,* the same standards that Beacon Power proposes be established for all energy storage projects), then Beacon Power would agree that those projects should count toward the procurement targets.

C. Comment on how actual operational deployment should be defined for PIER- and EPIC-funded projects potentially eligible to count toward a utility's procurement target.

If the PIER- and/or EPIC-funded projects meet the standards for all storage resources (*i.e.,* they are commercially viable for a 20-year service period and are on-line within two years), then those projects should count toward a utility's procurement target.

E.[5] Comment on whether and to what extent utilities should be permitted flexibility in procuring among the use-case "buckets" (transmission, distribution, and customer-sited) of energy storage within one auction, and whether a minimum amount in each "bucket" must be targeted.

For the market to be developed effectively and for end users to experience benefits from diverse storage technologies, it is imperative that the initial auctions follow

[4] *See* ACR at 4.

[5] At this time, Beacon Power offers no comments on Question D, but reserves its right to comment on this matter in this proceeding

a transparent process and adhere to a strict timeline. To encourage diverse technologies and end uses in this process, LSEs should be required procure a minimum amount of energy storage for each of the use-case "buckets". The Commission may choose to re-evaluate the auction process for subsequent auctions, after each utility has procured storage from each bucket to determine if more flexibility is warranted, but not for the initial auction.

F. Comment on the appropriate "off ramps" for relief from procuring up to each target and what metrics should be used to evaluate the appropriateness of the off ramps.

Requiring LSEs to procure a minimum number of MWs from diverse energy storage resources in early auctions is necessary to encourage market entry by energy storage providers, establish a baseline for bids, and ensure the continued development of energy storage technologies and the promotion of technologically diverse resources. As such, the Commission should prohibit the use of 'off-ramps' for the initial auctions.

I.[6] *Comment on how the preliminary results of the cost-effectiveness models should be applied to the question of setting procurement targets.*

As Commissioner Peterman noted in her ACR, the cost-effectiveness models developed in connection with this proceeding are preliminary and may require further refinement. Accordingly, the Commission should refrain from using these initial cost-effective analyses for evaluation of bids to meet procurement targets. First, many benefits of energy storage identified in the ACR are not adequately represented in these initial cost-effectiveness models. For example, integration of renewable energy and reduction of greenhouse gas emissions, are excluded in the cost-effectiveness analysis,

[6] At this time, Beacon Power offers no comments on Questions G or H, but reserves its right to comment on those matters in this proceeding.

thus undervaluing storage. Undervaluing storage would likely result in stunting market development, technology deployment and associated cost reduction.

Second, these initial cost-effectiveness models omit several essential characteristics of energy storage technologies. Specifically, cycle life and storage aging and degradation characteristics were not appropriately accounted for in the cost-effectiveness analysis. For example, the models incorrectly assumed that the cycle life degradation of energy storage technologies is independent of the services provided. The cycle life of each energy storage technology depends both on the technology and on the types of services provided; an energy storage device providing energy arbitrage has a very different charge-discharge profile, and therefore cycle life, from one that provides Frequency Regulation services. Not including such characteristics in the cost-effectiveness model creates unrealistic expectation of energy storage costs and can understate the net benefits available.

J. Based on the preliminary results, should the utilities set a cost cap for offers to be submitted in the 2014 auction? If yes, what should the cap be and how should the auction be structured to incorporate the cap?

Especially for the initial auction, no cost cap should be used. An important part of the procurement process and long-term use of energy storage is to allow the market to establish the price to be paid for energy storage, without an artificial cap. Using RFOs would ensure that the right storage technology is procured for a specific end use at the market costs and is providing value to the LSEs. Thus, no cap cost is necessary.

III. CONCLUSION

Beacon Power appreciates the opportunity to comment on the California PUC's energy storage initiative and looks forward to continuing to work with the Commission

and parties in this proceeding to ensure that the Commission's storage goals reach fruition.

Respectfully submitted,

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