

**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.

R.10-12-007
(Filed December 16, 2010)

**COMMENTS OF BRIGHTSOURCE ENERGY ON THE ASSIGNED
COMMISSIONER'S RULING PROPOSING STORAGE PROCUREMENT TARGETS
AND MECHANISMS AND ALL-PARTY NOTICING**

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BrightSource Energy, Inc. (“BrightSource”) appreciates the opportunity to provide these comments, pursuant to the schedule set forth in the June 10, 2013 Assigned Commissioner Ruling Proposing Storage Procurement Targets and Mechanisms and Noticing All-Party Meeting (“ACR”).¹ BrightSource is developer and technology supplier of concentrating solar thermal power (“CSP”) facilities that integrate thermal energy storage systems, providing flexible, dispatchable renewable energy.

INTRODUCTION

BrightSource very much appreciates the extensive work by the California Public Utilities Commission (the “Commission” or “CPUC”) in this proceeding, leading up to the ACR. We fully support the intent of the ACR, and believe that storage should form an important, integral part of California’s future electric system that will help the State achieve its energy and environmental goals. Storage technologies will improve energy infrastructure utilization, including generation and transmission assets; enable further deployment of renewable energy

¹ “Assigned Commissioner’s Ruling Proposing Storage Procurement Targets and Mechanisms and Noticing All-Party Meeting,” Docket No. R.10.12.007 (June 10, 2013) (hereinafter “ACR”).

resources while maintaining a reliable and cost-effective energy system; and further progress towards significant reductions in statewide greenhouse gas (“GHG”) emissions. The permanent closure of San Onofre Nuclear Generating Station (“SONGS”) highlights the need for the mass deployment of low-carbon power supply and reliability solutions.

The ACR provides several reasons for the State to adopt storage procurement targets, including “market barriers hindering broader adoption.”² Current wholesale market products and pricing rules, as well as resource procurement processes in California do not yet fully reflect the *long-term* benefits that storage resources could provide to power system operations in the context of the State’s energy and environmental policy goals. This results, in part, because conventional, fossil fuel-based resources are presumed to provide the core capabilities to meet operational and reliability needs over the next three to five years. This presumption inhibits the transition to a carbon-free portfolio of energy and reliability resources. Energy storage resources can provide similar capabilities to incumbent resources, but with potentially lower system-wide GHG emissions and higher utilization of the most cost-effective resources – both generation and transmission assets. The proposed storage procurement targets and mechanisms would serve well as an interim measure to stimulate storage technology development and reduce supply costs, so that storage can achieve its promise and meet the growing opportunity for the incorporation of storage into a reliable, cost-effective and lower GHG emitting system in subsequent years, especially beyond 2020.

The Commission should continue its Least Cost, Best Fit (“LCBF”) approach to resource procurement, accounting for all of a resource’s costs and benefits to a utility portfolio. It is particularly important that LCBF be applied on a portfolio basis, so that the overall cost of the

² See ACR at 3.

energy supply to ratepayers is paramount, rather than the cost of individual components. Comprehensive LCBF valuation can be challenging, but it should remain the ultimate goal, as the cost-causation principles implicit in LCBF should ultimately help control costs. The storage procurement targets are an important interim measure on the way to integrated procurement processes, based on portfolio-wide LCBF analyses.

ANSWERS TO SPECIFIC QUESTIONS STATED IN THE ACR

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

The ACR proposal will advance development and maturation of storage resources that can provide value to grid by optimizing operations, integrating renewables while avoiding GHG emissions. The proposal also recognizes that the current inadequacy of planning and procurement frameworks in valuing these attributes and capabilities is cause for policy initiatives.

BrightSource's specific comments on procurement targets and program design are as follows:

- 1) The program targets are based on procurement capacity in terms of megawatts ("MW"). This provides the utilities with flexibility to procure storage resources with varying capabilities, including in terms of energy capacity (MWh), ramp rates, cycle times and round trip efficiencies, among others, that best fit their portfolios, have the potential to reduce total cost of service and increase infrastructure utilization. BrightSource supports utility procurement flexibility; however, the Commission should ensure that the Commission's cost-effectiveness

methodologies and/or utilities' net value methodologies create incentives for reliability and lowest ratepayer cost of service, and do not create unintended biases resulting in procurement concentrations. For example, inadequate benefits quantification methodologies would likely result in procurement of storage resources with lower energy capacity and lower upfront capital costs, but higher ultimate costs for ratepayers. The Final Decision should incorporate routine review of evaluation methodologies and procurement results, enabling course corrections to maintain alignment of procurement with ratepayer interests. The Commission should also explore implementation of on-going operating performance measures of storage resource portfolios, rather than regulatory compliance based solely on procured or installed megawatt nameplate capacities.

- 2) A procurement process based on the Renewable Auction Method ("RAM") program is not appropriate for storage resources at this time. The RAM approach is suited for procurement of homogenous, commoditized energy products. The storage resources contemplated in the ACR are varied by technology, application, capabilities, charging source, capital and operating costs, useful life, and benefit streams, among other differences. Appropriate recognition of these differences will require tailored evaluation methodologies to appropriately consider all the relevant costs and benefits of a storage resource in operation; these differences will also necessitate tailored contracts. A RAM-like storage market could be expected to have the adverse effect of discouraging the deployment of more complex, higher value resources, delaying their implementation and cost reduction, thereby undermining one of the principle purposes of the procurement

targets identified in the ACR. BrightSource recommends that procurement targets are achieved through a combination of appropriate forums, such as all-source energy storage Request-for-Offer (“RFO”) solicitations and bilateral negotiations as well as Renewables Portfolio Standard (“RPS”) procurement.

- 3) A transparent, consistent system-wide cost-effectiveness methodology is essential. Established data on certain benefit streams of storage resources does not exist. In some cases, technologies are still new with exact capabilities yet proven, and the demand for certain services is also uncertain. The cost-effectiveness phase of this proceeding was not comprehensive with regard to storage technologies, and technologies that were excluded could be disadvantaged as a result in the procurement process. BrightSource recommends that the Commission consider procedures by which the use of calibrated academic, national laboratory and professional third-party research can supplement cost-effectiveness evaluation of particular technologies, especially those not evaluated in the cost-effectiveness phase of the proceeding. For example, the National Renewable Energy Laboratory (“NREL”) recently issued a study of total production cost benefits in the Western Electric Coordinating Council area (“WECC”) of CSP with thermal energy storage deployed in California energy markets; the study was calibrated against the CPUC-CAISO Long Term Procurement Planning (“LTPP”) modeling results.^{3,4} The development of CPUC

³ Denholm, P., Wan, Y-H., Hummon, M., and M. Mehos, “An Analysis of Concentrating Solar Power with Thermal Energy Storage in a California 33% Renewable Scenario,” National Renewable Energy Laboratory, Technical Report, NREL/TP-6A20-58186, Mar. 2013.

⁴ The 2010-2011 CAISO LTPP database was utilized in the NREL study. Phase 2 of the study will include an

procedures is needed in order to incorporate this type of third-party research; this will reduce burdens on bidders, utilities and Energy Division staff seeking affirmation of comprehensive cost-effectiveness findings.

- 4) Long-term contracts, of sufficient length to allow for amortization of capital costs, are fundamental to the implementation of any significant energy investments.

The Commission has recognized this in the context of RPS procurement and in the on-going proceeding regarding long-term resource adequacy. To ensure that a diversity of storage technologies is deployed to gain in-system operating experience for the long-term benefit of California ratepayers, minimum contract duration requirements should be compulsory. This approach would also mitigate procurement practices oriented toward minimum compliance with targets, rather than maximum ratepayer benefit.

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.

BrightSource agrees that pre-existing storage projects under contract with a utility, such as those proposed in the ACR and others to be identified before a Final Decision, should count toward the procurement targets, provided that:

- 1) these projects reach commercial operation, and
- 2) future contracts for similar project types will be eligible to count toward procurement targets.

Disallowing pre-existing projects would send the wrong signal to early-adopting utilities and serve to delay deployment of storage resources, thereby frustrating the intention of the ACR.

update to reflect the 2013 LTPP database.

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.

BrightSource has no opening comments on this topic.

d. Comment on how any utility's procurement that exceeds a target in one year should be addressed and considered for future procurement targets.

BrightSource supports utility procurement flexibility to achieve MW targets. Rigid MW targets may lead to less efficient and cost-effective procurement of storage resources, specifically because some projects with non-modular technology or interconnection commitments may not easily scale down in size to meet a utility's single year constraints.

One potential approach to single year over-procurement would be to reduce the final year procurement target, i.e., 2020, according to the ACR proposal. However, the final year procurement target would be revised upwards for any project failures from earlier procurement cycles.

e. 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.

BrightSource supports utility procurement flexibility to achieve MW targets; however, the Commission should elaborate on the intended purpose of the proposed use-case "bucket" distinctions. To foster technology and market diversity, some categorizing of procurement, along with minimum procurement thresholds, is appropriate. The current proposed use-case

“buckets” may be appropriate if the intent is to increase parties’ experience with deploying and operating storage, specifically utility customers (for Customer-Sited), Load Serving Entities (for Distribution-Sited) and the California Independent System Operator (for Transmission-Sited).

Besides encouraging learning by a variety of parties, the use of “buckets” should avoid over concentrations in procurement of technologies and/or market applications. There is a delicate balance the utilization of “buckets” because procurement should migrate to the most cost-effective technologies and applications. However, cost-effectiveness and net value methodologies will inevitably be imperfect and evolve over time. “Buckets” can mitigate over concentrations resulting from structural deficiencies in LCBF evaluation. Nevertheless, within the currently proposed “buckets,” there is no mechanism to prevent the over concentrations described, which could also be as sub-optimal as over concentrations between buckets. Therefore, the “bucket” structuring must be thoughtful and purposeful.

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.

See BrightSource’s comments above in a.3) regarding the use of cost-effectiveness models developed in this proceeding. If cost-effectiveness models are utilized for the purpose of “off ramps,” BrightSource’s stated concern would apply – that incomplete cost-effectiveness methodologies and models may result in sub-optimal storage resource portfolios.

g. Comment on how this proposal may be coordinated with Renewable Portfolio Standard procurement plans, as set out in Public Utilities Code section 2837.

The proposed storage procurement program needs to be coordinated with multiple Commission processes, including LTPP, Resource Adequacy (“RA”) and, especially RPS. The

ACR provides few allusions to coordination between the proposal and RPS.⁵ BrightSource believes this is a critical element to successful implementation of a storage procurement program.

BrightSource offers the following points and recommendations regarding RPS coordination:

- 1) If a utility procures an RPS contract that incorporates storage capacity into the project, then the storage capacity (not total project capacity, if different) should count against storage procurement targets. In other words, it should be acceptable for qualifying RPS procurement to contribute toward storage procurement targets. Renewable resources integrated with storage can provide RPS-eligible energy, may be configured to increase the delivery of carbon-free electricity to load (compared to stand alone storage systems), can increase generation and transmission infrastructure utilization, and, most importantly, may increase a project's net value (or reduce its net cost), including any portfolio-wide benefits resulting from the storage component. The storage cost-effectiveness should be evaluated based on the capabilities, and any limitations, of the storage when co-located with the renewable energy project.

- 2) The integration of RPS and storage procurement should not be artificially prohibited by policy structures as it may not result in the highest portfolio net value. In the case of concentrating solar power with thermal energy storage ("CSP+TES") plants, the incorporation of storage is synergistic with the fundamental equipment used to generate power (i.e., the power block). The

⁵ See ACR at 21.

energy collection system (the solar field and receiver) as well as the electricity generator (a steam turbine generator) exist regardless of the incorporation of storage. The addition of storage tanks and heat exchangers (for conversion of heat in a medium, like molten salt, into high temperature steam) is an incremental capital cost. The thermal energy storage in a CSP+TES plant may also be very competitive with other forms of storage, but cannot easily be separated, either technically or contractually, from the renewable facility without potentially reducing the portfolio benefits of the storage and RPS integrated resource.

- 3) The utilities' proposed RPS procurement plans for a 2014 RFO should include an approach to receive, process and evaluate offers that incorporate storage capacity.
- 4) The fruitful efforts of the cost-effectiveness phase of this proceeding should be incorporated into the LCBF analysis for RPS resources. For instance, contract-specific and portfolio-wide benefits of a renewable resource integrated with storage due to flexible delivery characteristics must be recognized. In addition, if certain storage use cases are proven cost-effective based in part on the ability to integrate renewables, then this highlights that integration costs in the LCBF calculation should be non-zero.
- 5) The ACR proposes significant storage capacity on distribution and transmission systems. Proposed storage projects will need to secure interconnection rights to reach commercial operation. Non-storage project developers currently face major challenges and potential delays in completing the interconnection process. New applicants for interconnection will face similar, if not more severe issues,

especially if seeking eligibility status for Resource Adequacy programs. In the most recent CAISO published interconnection queue, only two stand-alone storage projects had filed for interconnection requests. Given that most of the interconnection queue is currently populated by proposed renewable generation projects, the most likely avenue for near-term interconnection of storage capacity, particularly on the transmission system, is through co-location with renewable energy projects. Ultimately, the deployment of storage resources on California's electric grid, both co-located with renewable projects and independently sited, could reduce transmission and distribution system costs, if interconnection processes properly recognize the technical attributes and value of storage resources. This set of circumstances calls for tight coordination of RPS with a storage procurement program.

- h. Comment on the options presented for ESPs and CCAs to either a) be required to procure an equivalent amount of storage projects commensurate with the load they serve or b) have their customers assessed the costs of the IOU procurement of energy storage projects through a cost allocation mechanism.***

BrightSource has no opening comments on this topic.

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

See BrightSource's comments above in a.3) regarding the use of cost-effectiveness models developed in this proceeding. If cost-effectiveness models are utilized for the purpose of setting procurement targets, BrightSource's stated concern with these models would apply.

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?

An absolute cost cap is rarely appropriate; the net value of procurement is the key factor. The likely variety of storage resource offerings would render an absolute cost cap on a single metric discriminatory. A net value minimum (or as it may be, a net cost maximum) may be more appropriate, either on a single contract or procurement portfolio basis. However, a single metric, such as dollar per megawatt or dollar per megawatt-hour, will not uniformly appropriate across all storage applications, due to the varied use cases. An absolute cost cap could therefore lead to procurement that is not ultimately least cost to ratepayers.

CONCLUSION

BrightSource applauds the efforts of Commissioner Peterman, as well as the work of Commission staff, leading to this ACR on energy storage. The implementation of procurement targets, arising from the ACR, will stimulate the deployment of storage technology. BrightSource urges the Commission to ensure that its policies appropriately account for the costs and benefits of the variety of storage resources available to California, with particular note to the following:

- Procurement processes based on RAM are not appropriate due to the diversity of energy storage resources, use cases and necessary contract structures;
- Appropriate bucket structures, robust bid evaluation methodologies and minimum contract requirements are needed to ensure that a diversity of resources is deployed;

- A transparent methodology for the evaluation of cost-effectiveness for all energy storage resources is necessary; and
- Coordination with the LTPP, RA and RPS proceedings is critical to providing market certainty and portfolio-wide, least-cost, best fit procurement that meets reliability needs and serves California's environmental objectives.

Respectfully submitted,

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