

**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

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Rulemaking 10-12-007  
(Filed June 10, 2013)

**GRAVITY POWER, LLC**

**OPENING COMMENTS TO CONSIDER THE ADOPTION OF PROCUREMENT  
TARGETS FOR VIABLE AND COST-EFFECTIVE ENERGY STORAGE SYSTEMS**

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Dated: July 3, 2013

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Rulemaking 10-12-007  
(Filed December 16, 2010)

**GRAVITY POWER, LLC  
OPENING COMMENTS TO CONSIDER THE ADOPTION OF PROCUREMENT  
TARGETS FOR VIABLE AND COST-EFFECTIVE ENERGY STORAGE SYSTEMS**

Based in Goleta, California, as a developer of novel energy storage technology, Gravity Power, LLC submits the following written comments to the California Public Utilities Commission toward the Subject Rulemaking pursuant to Assembly Bill 2514 to Consider the Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems:

- a. Please comment on this proposal overall, with emphasis on the proposed procurement targets and design.
  - Gravity Power strongly supports this action of the CPUC announced June 10, 2013 to encourage energy storage (ES) procurement targets pursuant to AB2514.
  - We believe this is an excellent framework to allow ES technology providers to bid into what will be an established and sizable future commercial energy storage market as the various technologies seek to become viable and cost effective over time. This is a critical aspect of enabling emerging ES technologies to attract the critical investment support required to achieve commercial readiness and to remove many of the barriers to market entry as listed by the CPUC.

- Gravity Power is concerned that new technology early projects will cost more on a \$/kW and \$/kWh basis than subsequent larger scale projects. It may be necessary to support smaller less commercially viable projects to progress the technology to larger economically superior projects. The CPUC should consider the ultimate potential of competing project technologies.
  - We are concerned that dividing the market into transmission, distribution and customer areas is constricting and may not result in the optimal selection of projects. It may be better to let market dynamics make this selection based on price. At the same time it may make sense to differentiate between ancillary services with storage of less than 30 minutes and storage of more than 30 minutes more typically 4 to 8 hours and more.
  - The target description and the intention to conduct auctions every two years effectively eliminate large storage projects. The CPUC should seriously consider an additional 3000 MW of large project procurement.
- 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.
- Gravity Power is developing a bulk electricity storage system called the Gravity Power Module (GPM), which hydraulically lifts a large mechanical piston housed in an underground power shaft.
  - The GPM system uses a Francis type pump/turbine and motor/generator identical to those used in “classical” pumped storage hydro
  - Citing Pub. Util. Code § 2835(a)(2)(B), the CPUC rulemaking says that for Reverse Auction Eligibility, all third-party owned energy storage resources as defined by law, except for pumped hydrological resources, would be eligible to bid into the energy storage reverse auctions.
  - Gravity Power believes that the CPUC’s intent is that “classical” pumped storage hydro is a mature technology and doesn’t face the same market barriers as newer technologies.

- Gravity Power’s concern is that its newly patented GPM technology could be excluded from the Reverse Auction procurement process if it is classified as “classical” pumped storage hydro.
  - The GPM differs from classical “pumped hydrological resources” in many ways:
    - It raises and lowers a piston rather than water to store energy
    - It can be sited anywhere a big hole in the ground can be excavated
    - 1600 MW of 4 hour storage can be constructed on less than 3 acres
    - It has a slightly better round trip efficiency
    - It has a sealed water circuit and thus consumes no water
    - It has a shorter construction period running 3 to 5 years for 4 hour projects between 40 MW and 1600 MW making it possible to add large quantities of storage to the California system in a relatively short period of time
    - It has no risk of dams breaking
    - It costs less than “classical” pumped storage hydro (and costs less than gas turbines for peaking, intermediate power and wind and solar backup)
  - A big hurdle for the GPM technology is that one has never been built. However, a large EPC firm in Germany called Hochtief has said that they will construct the system with customary liquidated damages. We are talking with large US based EPC firms to obtain similar commitments.
  - Francis type pump/turbine and motor/generator manufacturers like Andritz, Voith and Alstom have shown enthusiasm regarding the supply of such equipment for our projects
  - With the support of deep pocket EPC contractors and rotating machinery manufacturers, we have a financeable system.
  - We ask that the procurement targets proposed in the “Adoption of Procurement Targets for Viable and Cost-Effective Energy Storage Systems” include Gravity Power’s GPM technology.
- 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.

- Gravity Power believes PIER- and EPIC- funded projects should be counted toward a utility's ES procurement target once performance tests have been completed. We also believe that the project costs eligible for recovery in the ES procurement process for PIER- and EPIC-funded projects be limited to those not already covered through state- or federally-funded support.
- d. Comment on how any utility's procurement that exceeds a target in one year should be addressed and considered for future procurement targets.
- Given the general goals of the CPUC's rulemaking and AB2514, we would recommend future procurement targets remain the same in out years. That said, we would appreciate seeing any utility procure ES capacity above and beyond procurement targets for any particular year or auction period.
- 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.
- Gravity Power expects a utility to examine their transmission, distribution and customer-sited system needs and to recommend use-case "buckets" for energy storage that best-fit their systems and their related reliability and costs. Some flexibility should be provided. While it may be desirable to demand some early rigid targets to force the testing of a variety of ES technologies, we feel that in the 2016 procurement and beyond it will be best to let the market establish the bucket quantities meaning that the utility will need flexibility select the low cost options.
  - Gravity Power is concerned that if a portion or all of the distribution storage may be utility owned it will create a preference on the part of the utility to support distribution storage over the alternatives. Gravity Power suggests that whatever

utility ownership opportunity is provided for distribution is also allowed for transmission and customer-sited systems.

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.

- In general, Gravity Power feels utilities should contract for ES projects where natural gas supply is available and simple cycle natural gas turbines could replace the ES capacity procured, should the ES projects not work (schedule, technology and cost considerations). Specifically, in the case of our GPM technology, our construction period is short for many MW of ES capacity; but there will be sufficient visibility to off-ramp to gas turbines if things did not go well in terms of schedule, cost or technology.
- It would also be helpful if the power sale/purchase agreement had relief in it if the project is late. Some of the new technology projects could run into unexpected issues that could be solved with more time.

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

- This proposal and the RPS procurement plans set out to establish an estimated required installed capacity for both ES and generation from renewable energy generation resources respectively, by 2020. As time passes, it may be the actual ES required exceeds that which is laid out in the ES procurements here; this could occur for a variety of reasons, not the least of which is a higher degree of renewable integration than is required by the RPS. As already stated, our recommendation is the ES procurement targets for the utilities not decrease regardless of a utility procuring

- more ES than required in any year or the progress made toward achieving the RPS procurement plans.
- Gravity Power supports ES capacity being added to renewable energy generation in the RPS calculation.
- 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.
- As stated in the Rulemaking, the CPUC’s regulatory authority over ESPs and CCAs is limited. As further stated, AB2514 requires ES procurement targets for ESPs and CCAs as load-serving entities, therefore we believe these entities should provide their recommendation as to a) and/or b) above such that they comply with AB2514 and additional ES market opportunities are created.
- i. Comment on how the preliminary results of the cost-effectiveness models should be applied to the question of setting procurement targets.
- Clearly, the utilities will need to have viable and cost-effective ES available to them to achieve the procurement targets in the timeframe laid out. Analyses using independent tools such as EPRI’s newly announced ES valuation tool, which models ES systems participating in various ES markets, should be brought to bear. We believe several challenges exist for ES developers striving to meet these metrics. It is for this reason, among others, Gravity Power wishes to ensure its GPM technology, with rapid deployment of hundreds of MW of cost-effective ES possible within the rulemaking period, is not excluded as a classical “pumped hydrological resource.”

- 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?
- Gravity Power believes for the 2014 auction, the first in the series of auctions under this CPUC Rulemaking, a cost cap should not exist. Rather, utilities should be provided incentives to pursue CPUC imposed procurement targets. The CPUC should reserve the right to approve the implementation of the procurement plan.

Respectfully Submitted,

/s/Thomas Mason

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