BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

Order Instituting Rulemaking Regarding Policies, Procedures and Rules for Development of Distribution Resources Plans Pursuant to Public Utilities Code Section 769.	R.14-08-013 Filed August 14, 2014

COMMENTS OF ENERVAULT CORPORATION, IMERGY POWER SYSTEMS, INC., PRIMUS POWER, UNIENERGY TECHNOLOGIES, LLC, AND ZBB ENERGY CORPORATION IN RESPONSE TO ORDER INSTITUTING RULEMAKING

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EnerVault Corporation ("EnerVault"), Imergy Power Systems, Inc. ("Imergy"), Primus Power ("Primus"), UniEnergy Technologies, LLC ("UET") and ZBB Energy Corporation ("ZBB" and, collectively, the "Joint LDES Parties") hereby submit these responses to questions posed in the Order Instituting Rulemaking in this proceeding ("OIR"). The Joint LDES Parties are pleased to see the Commission's commitment to incorporating distributed resources ("DERs") -- defined by AB 327 to include energy storage resources -- into the planning and operation of the California investor-owned utilities' ("IOUs") electric distribution systems. Our comments begin by providing some background on the membership of the Joint LDES Parties and the member companies' interests in this proceeding. We then respond to several of the OIR questions. We appreciate the opportunity to provide feedback on this important OIR.

I. Background on Long Duration Energy Storage Companies and Interests in the OIR

The Joint LDES Parties are comprised of five long duration energy storage companies. We define "long duration" to mean energy storage resources that are capable of either continuously charging for at least three hours in duration, or continuously discharging for at least three hours in

duration. The Joint LDES Parties believe that long duration energy storage ("LDES") solutions are critical to meeting California's pressing reliability, Resource Adequacy, flexible ramping and renewable resource integration needs in a manner that is consistent with the state's greenhouse gas reduction goals. California's need for long duration energy storage resources should be taken carefully into account in the IOUs' distribution resource planning process.

EnerVault is an innovative manufacturer of megawatt-hour energy storage systems that are inherently safe, reliable and cost-effective for long duration, grid-scale applications. Headquartered in the Silicon Valley, EnerVault brings innovative Redox Flow Battery technology to solve grid reliability challenges and expand grid operational flexibility. EnerVault understands the importance of energy storage within the distribution planning process. EnerVault believes long duration, grid-scale energy storage is an essential part of a robust and resilient storage strategy to meet California's unique needs. As a California manufacturer, EnerVault is committed to efficiency and surety within the state's energy market.

Imergy, headquartered in Silicon Valley, is a leading innovator in cost-effective energy storage products for applications around the world. Imergy's main product offering, the Energy Storage Platform, is a proprietary, scalable, low-cost, redox flow battery, combined with power electronics and controls and mounted in self-contained transportable containers, ranging from 2.5 kW up to 250kW. Imergy is developing the Energy Storage Platform for both small- and medium-scale (in particular, mobile telecom) and large-scale, grid-connected, dispatchable energy storage solutions, which it seeks to make available in the California energy markets in the near future.

Primus is a leader in low-cost, grid-scale energy storage solutions with a scalable, distributed, multi-hour flow battery system that economically serves multiple storage applications. With 15 patented innovations in chemistry, cell design and system engineering, Primus'

EnergyPod® products offer exceptional power density, reliability and portability at industry-low prices.

UET produces and delivers large-scale energy storage systems for utility and grid, micro-grid, commercial and industrial, and other applications of value. UET's core technology is an advanced vanadium flow battery. The Uni.System™ is safe, operationally flexible, reliable, long-life, and cost-effective. UET has a 67,000 sq. ft. engineering and manufacturing facility scaling up to produce 100MW annually, a sales force based in California, and ongoing energy storage project efforts in California. UET believes it is very important that the distribution planning needs of California be met as much as possible by renewables supported by energy storage resources which are capital-efficient and sized to meet the market's needs.

ZBB designs, develops, and manufactures advanced energy storage, power electronic systems, and engineered custom and semi-custom products targeted at the growing global need for distributed renewable energy, energy efficiency, power quality, and grid modernization. ZBB has deployed systems up to 2MWh and has multiple grid connected systems in California. ZBB is a strong believer that the energy storage needs of the market will require discharge times of 3 hours or longer.

II. Responses to OIR Questions

1. ***What specific criteria should the Commission consider to guide the IOUs' development of DRPs, including what characteristics, requirements and specifications are necessary to enable a distribution grid that is at once reliable, safe, resilient, cost-efficient, open to distributed energy resources, and enables the achievement of California's energy and climate goals?***

Distribution resource planning must incorporate energy storage as a critical instrument to reduce the need for new distribution and generation assets and to integrate renewable resources. We

agree with the More Than Smart white paper attached to the OIR at Appendix B, which asserts that the new analytical framework for the distribution planning process must examine "the expected outputs, duration and operational times" of various DER technologies.[1] We also concur with the More Than Smart report's recommendation that "[a]s a foundation, customers should transparently see the benefits and costs related to a more distributed system including their choices in the context of related system upgrades and operational expense."[2] This report correctly assesses urgent grid needs, including overgeneration and, the need for flexible ramping capacity and the importance of a holistic, systems-level approach to address these grid-level issues.[3] Long duration energy storage resources address these growing concerns, and enhance the Commission's worthy goal of providing a distribution grid "that is at once reliable, safe, resilient, cost-efficient, open to distributed energy resources, and enables the achievement of California's energy and climate goals."[4]

In terms of reliability, LDES resources are better able to address the grid's increasingly-critical ramping needs, i.e. the three-hour period oft-described as the "duck's neck" on CAISO's "duck chart."[5] Long duration storage resources achieve the grid's reliability needs more cost-effectively than do shorter-duration resources, because they reduce the costs associated with aggregation of multiple shorter-duration resources needed to meet the grid's storage and flexible ramping needs. For example, a recent study by Energy + Environmental Economics titled "Valuing Energy Storage as a Flexible Resource" (the "Final Phase 1 E3 Report") compares the value of short and long-duration energy storage resources, and notes that while shorter-duration energy

[1] OIR Appendix B at 21 (Greentech Leadership Group, Resnick Institute, "More Than Smart A Framework to Make the Distribution Grid More Open, Efficient and Resilient").
[2] *Id.*
[3] *Id.*
[4] *See* OIR at 6.
[5] *See* CAISO, "What the Duck Curve Tells Us About Managing A Green Grid", *available at*: http://www.caiso.com/Documents/FlexibleResourcesHelpRenewables_FastFacts.pdf.

storage resources can be serially dispatched to provide the same duration as one longer-duration battery, this is "unlikely to be the least-cost solution" owing to costs associated with inverters, power electronics, as well as integration and grid management costs, that are potentially borne by the utilities and the grid operator.[6]

LDES resources are also better suited to addressing California's climate goals because they reduce the need to fire up conventional fossil-based generation sources, since they can address both the evening ramp and ongoing evening demand.[7] For these reasons, "the expected outputs, duration and operational times" of various DER technologies,[8] the role of energy storage, and, in particular, long duration energy storage, are important criteria that should be included in the Commission's evaluation of the IOUs' Distribution Resource Plan Proposals ("DRPs").

In addition, in developing the criteria by which to evaluate the DRPs, the Commission must address several additional questions, such as:

- what are the optimal specifications for distribution deferrals at various voltages?
- what sort of longevity should those deferral assets guarantee?
- how should the cost-effectiveness of distribution-related procurement be assessed?
- how should the greenhouse gas impact of distribution-related procurement be assessed?

In order to properly guide the development of the DRPs and the integration of DERs onto the distribution grid, the Commission may need to develop new metrics to be used for comparative

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[6] Energy + Environmental Economics, "Valuing Energy Storage as a Flexible Resource: Final Phase 1 Report for Consideration in CPUC A. 14-02-006" (June 19, 2014), *available at*: https://ethree.com/documents/E3_Storage_Valuation_Final_Phase_1.pdf.
[7] *Id.* at 20.
[8] OIR Appendix B at 21 (Greentech Leadership Group, Resnick Institute, "More Than Smart A Framework to Make the Distribution Grid More Open, Efficient and Resilient").

evaluation. We look forward to working with the Commission to develop these questions and metrics in this proceeding.

5. ***What specific considerations and methods should be considered to support the integration of DERs into IOU distribution planning and operations?***

Energy storage resources are clearly critical to integrating DERs into distribution planning and operations. The Commission should carefully consider to what extent the DRPs facilitate and enhance the adoption of DERs. For example, the Final Phase 1 E3 Report demonstrates how long duration energy storage resources are better able to address overgeneration and thereby reduce curtailment of renewable resources.[9] This function is critical to enabling the state to meet its RPS and AB 32 goals, while simultaneously addressing crucial grid reliability functions. The Commission should also consider the cost-effectiveness of energy storage resources. As discussed above, LDES resources reduce costs associated with serial deployment of shorter-duration energy storage resources that might otherwise be socialized onto ratepayers, such as grid management and integration costs.[10]

7. ***What types of benefits should be considered when quantifying the value of DER integration in distribution system planning and operations?***

As discussed in our responses to questions 1 and 5 above and for the reasons set forth therein, the duration of energy storage resources should be considered when quantifying the value of DER integration in distribution planning and operations. In addition, the ability of resources to meet California's greenhouse gas emissions and RPS goals is a vital benefit that must be considered. Long duration energy storage resources provide these important benefits by reducing curtailment of renewable energy and preventing the need for fossil-based generation. Other benefits that should be considered in the context of DER integration include: the ability to provide

[9] Final Phase 1 E3 Report at 17-20, Figures 12, 13.
[10] Final Phase 1 E3 Report at 22.

flexible ramping, voltage regulation, frequency regulation, distribution asset deferral, peak-shaving, energy arbitrage and other services. Energy storage resources are essential to integrating DER into the distribution system, and the full range of benefits associated with such resources must be considered in the Commission's evaluation of the DRPs.

8. What criteria and inputs should be considered in the development of scenarios and/or guidelines to test the specific DER integration strategies proposed in the DRPs?

As discussed in our responses to questions 1 and 5 above and for the reasons set forth therein, the greenhouse gas impact, including the ability to prevent the need for startups of fossil generation resources, should be considered in the development of scenarios and guidelines to test the IOUs' DER integration strategies as proposed in their DRPs. In addition, the costs associated with the integration of DERs should be considered in the development of these scenarios and guidelines, including the power management, grid management and integration costs outlined in our response to question 5 above. Cost-effectiveness evaluations of DER integration strategies must include consideration of the full range of benefits (see our response to question 7 above) as well as the costs associated with various means of achieving such integration.

10. Should the DRPs include specific measures or projects that serve to demonstrate how specific types of DER can be integrated into distribution planning and operation? If so, what are some examples that IOUs should consider?

Yes, the DRPs should include the use of long duration energy storage resources to demonstrate how DERs can be integrated into distribution planning and operations. The Joint LDES Parties invite the IOUs to consider the various types of flow battery technologies that their member companies provide. Please see Section I above for more information on these technologies, which we believe address many of California's critical DER integration, greenhouse gas mitigation and reliability needs.

III. Conclusion

The Joint LDES Parties greatly appreciate this opportunity to provide comments on the OIR. The Commission should be commended for initiating this rulemaking and recognizing the critical importance of integrating DERs into the distribution resource planning process. As discussed in these comments, long duration energy storage resources are vital to addressing California's reliability, renewable resource integration and flexible ramping needs. LDES resources more effectively reduce renewables curtailment, reduce costs and reduce the need for additional greenhouse gas emissions. These long duration energy storage resources should be an essential element of the IOUs DRPs. We look forward to continued involvement in this proceeding going forward.

Respectfullysubmitted,

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