

**EPRI Energy Storage Webinar**  
**Presentation to the PC 44/PPRAC Work Group**  
**Presented by Ben Kaun**  
**August 15, 2017**

Participating organizations (based on WebEx log and Q&A): Clean Choice Energy; Choptank Electric; Exelon; FirstEnergy; Greenwill; Invenergy; Kent Conservation & Preservation Alliance; MD Clean Energy; MD Energy Agency; MD Department of General Services; MD Power Plant Research Program; MD Public Service Commission; MD Sun; PJM; Pepco; Pepco Holdings; Regulatory Assistance Project; Sunverge; University of Maryland Energy Innovation Institute

Note: This document summarizes the Q&A conversation that accompanied Mr. Kaun's formal presentation.

*Pete Dunbar – What is the status of efforts to recycle/reuse lithium ion batteries?*

EPRI is still researching this issue; however, unlike lead batteries, the materials of lithium ion batteries cannot be used to create the next generation of batteries because they are difficult to reuse and the materials have low residual value and life.

*Center for Renewable Integration – Regarding the valuation tool set, is this the same approach as the work EPRI did in 2013 for the California Public Utilities Commission (CPUC)? If not, how is it different?*

Yes, the valuation tool set is the same for value estimation. That said, there have been upgrades to the tool since 2013 and the tool has been made public. Real-world use of the tool is currently not common, as utilities have in-house models that provide the outputs needed for valuation. EPRI is working to share the research methodologies it has developed for incorporation in commercial tools that may be used by utilities and businesses in the future.

*What assumptions do you make on battery control (in terms of commercial)?*

EPRI mainly deals with utilities, but on the commercial side, the valuation does have considerations for conditions such as causing local capacity violations due to increased loads.

*Janet Lewis, Kent Conservation & Preservation Alliance – Are there any real case studies?*

Most case studies are not publicly available, leaving the implementation challenges unknown. However, EPRI will look into this further.

*First Energy – Can you discuss the use of batteries at Aliso Canyon and detail how many batteries are deployed in the U.S., as well as the total capacity?*

Aliso Canyon is notable, as the CPUC issued an emergency directive for 100 MW of energy storage to meet the 2017 summer peak due to low gas storage levels. The CPUC turned a decision around quickly, and the batteries were built within a short period of time. In total, 70-

MW, 4-hour duration batteries were commissioned within a few short months from the time the emergency directive was issued, thus serving as a quick, near-term peaking solution.

While EPRI did not have exact numbers for the level of battery storage in the U.S., it estimated that there were hundreds of MW deployed throughout the country, with several hundred occurring in the last year or so. The majority of battery projects are large-scale; however, there is growth in the customer side and for the use of transmission and distribution solutions.

*Describe the secondary market for batteries, as well as auto batteries and feeding back to the grid.*

There are issues with secondary market for batteries, including refurbishment, repurposing, and reintegration.

*Serj Berelson, Sunverge – Are you applying value-stacking to behind-the-meter storage?*

Yes, we are thinking about how to quantify/monetize values both to the system and to customers. [Serj and Ben agreed to follow-up offline.]

*What are the predominant business models that you're seeing; e.g., PJM for frequency response?*

It's still early in the commercial space. What I'm observing is a lot of commercial experimenting. Aliso Canyon is a Resource Adequacy model, which could be through a merchant contract or a utility. On the customer side, we're seeing customer programs (rebates to customers in return for certain control of energy storage to support grid services). On the flip side, utilities may own storage and contract back to customers. APS is an example of a utility pursuing storage as a non-wires alternative. EPRI has no stance on what type is the best.