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Berkeley Lab Comments - 23-ERDD-01 Virtual Power Plants and Demand Flexibility Research Gaps

Please see comments attached.

Additional submitted attachment is included below.

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August 1st, 2023

Jonah Steinbuck
California Energy Commission
715 P Street
Sacramento, California 95814

Re: Lawrence Berkeley National Laboratory Comments on Workshop on Virtual Power Plants and Demand Flexibility: Identifying R&D Needs

Dear Director Steinbuck,

On Tuesday, July 18, 2023, Commission staff hosted a Workshop on Virtual Power Plants and Demand Flexibility: Identifying R&D Needs. Berkeley Lab is pleased to present our comments in response to the aforementioned workshop. See Comments below:

In response to the following two questions:
What are the technical and market barriers to implementing VPP programs, and your suggestions for overcoming these barriers?

What performance metrics should be used to measure the technical and economic effectiveness of a VPP program?

> There are a growing number of Virtual Power Plant (VPP) providers with various technology capabilities, targeted customers, and business models, which can be time-consuming for CCAs and other potential adopters to evaluate and match with their needs. Given this information, there is a research need to create a standardized framework and metrics to categorize and evaluate VPP solutions to streamline the evaluation and adoption process.
>
> Existing VPP programs are not well-aligned with the balance between aggregated performance versus individual customers' performance, especially concerning the aggregation of sub-building systems such as battery storage or electric vehicles. The challenge is how to address the trade-off between the aggregated VPP performance and the benefits to individual customers. Technically, a hybrid control framework should be considered to encourage customers into the VPP program to receive dual benefits from retail and wholesale markets. Data integration and interoperability between building systems and VPP participating subsystems (storage and EV, etc) should be included for future R&D too.

How can load shifting programs be expanded to increase customer participation and provide grid benefits?

> Customers' interests in load shifting programs include (1) easy "plug-and-play" technology, (2) minimal impact on their building operation and comfort, (3) utility bill

savings that have a short term payback period, carbon footprint reduction, and (4) robust performance and risk free.

What are common practices for <u>energy measurement and verification?</u>

A common practice in energy measurement and verification is the use of a baseline model. Currently, a single baseline model is adopted by all customers. However, this model's performance varies with respect to customer load profiles. Customers' continued participation can be compromised by under-estimated/awarded performance. The question arises: how can we adapt different baseline models for each cluster of customers based on their load patterns, choosing the best baseline model and revisiting it each season? A few years ago, California ISO and Nexant conducted a baseline accuracy assessment study.* Despite this, we still have not implemented various baseline model options to bolster customer confidence in their performance. Moreover, there is a lack of benchmarking work available for customers to compare against their peers or to gain preliminary insights into potential issues with their underperforming demand flexibility.

The use of AMI data analytics for identifying VPP/DF resources can make the participation of VPP/DF programs more cost effective. So the question is, what additional data should be collected along with the AMI data to target the most cost effective VPP/DF resources? Can we leverage existing or past automated demand response participants to explore the potential of the use of AMI data analytics of their historical performance?

* California ISO, Nexant. *California ISO Baseline Accuracy Assessment*. 2017. https://www.caiso.com/Documents/CaliforniaISOBaselineAccuracyAssessmentNexant.pdf.

As a general comment, Berkeley Lab notes:

Before work on VPPs is initiated, an analysis should be conducted of what VPPs could do that the Load Management Standards (LMS) standards cannot do, and how VPPs could be designed so that they supplement rather than conflict with customers using highly dynamic prices as their primary coordination mechanism. This could help the CEC implement VPP efforts which do not detract from the success of the LMS, and also it could help fill in any gaps around what the LMS can do.

Further, it may be beneficial to clarify the State's goals around dynamic pricing for load shaping and supply-side DERs for reliability and resilience. It will be important to acknowledge that VPPs and dynamic pricing may have significant overlap in terms of resources being tapped. One possible solution could be to explore bifurcation as a background measure.

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Berkeley Lab appreciates the opportunity to provide these comments in response to the Workshop on Virtual Power Plants and Demand Flexibility.

The following individuals contributed comments: Jingjing Liu, Rongxin Yin, and Bruce Nordman.

Sincerely,
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