170 kWh virtual power plant

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The Department of Energy"s (DOE) Loan Programs Office (LPO) is working to support deployment ofvirtual power plants(VPPs) in the United States to make the U.S. grid more flexible, affordable, clean, and resilient as the economy electrifies.

VPPs are at an inflection point due to market and technical factors, including increased adoption of distributed energy resources, improvements in device software and VPP platforms, and advancements in grid integration software. VPPs will be a key near-term solution to existing energy challenges, including rising costs, interconnection backlogs, peak demand increases, and distribution system congestion.

Small changes across a few mid-sized loads or hundreds, thousands, or millions of participating household DERs add up to power plant scale. By shifting when participating DERs draw power, for example, VPPs can shave demand peaks and spread energy use more evenly throughout the day. If necessary, they can shed demand from some DERs, likeflexiblecommercial and industrial loads, when the grid is especially strained. Increasingly, VPPs can call on energy sources like behind-the-meter batteries to increase electricity supply on the grid.

There are currently 30-60 GW of VPP capacity on the grid that have been operating with commercially available technology for years. These systems already have a range of capabilities, including time-shifting EV charging to avoid overloading local distribution systems and supplying homes with energy from onsitesolar-plus-storagesystems during peak hours to reduce demand on the grid.

VPPs present a near-term, low-cost way for grid operators to manage the grid and make electricity moreaffordablefor Americans.Analysis suggests that a VPP made up of residential thermostats, water heaters, EV chargers, and behind-the-meter batteries could provide peaking capacity at roughly half the net cost to a utility of alternatives (e.g., a utility-scale battery and a natural gas peaker plant).Americans who use the grid benefit from cost savings in the form of lower electricity bills, and owners of participating DERs receive further rewards for services provided to the grid.

Tripling the current capacity of VPPs--to 80-160 GW--by 2030 could address 10-20% of peak load and save on the order of $10B in annual grid costs through avoided generation buildout, delayed power infrastructure investments, and reduced operation of expensive peaker plants. Deployment at this scale is possible within the decade. DOE"s recently publishedVPP Liftoff Reportdetails the market opportunity, current challenges, and potential solutions to get there.

By lowering the cost of DER financing for consumers and supporting VPP project deployment, LPO can mitigate barriers to adoption and catalyze faster and more equitable VPP adoption.

To learn more about how LPO could support your VPP-related project, please request a no-costpre-application consultation. During the consultation, LPO will work with you to determine whether the project is eligible for financing.

To learn more about how DOE supports VPP-related projects across the research, development, demonstration, and deployment continuum, review theVPP Liftoff Reportfrom DOE''sPathways to Commercial Liftoff.

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