Battery Demand-Charge Management Looks Promising

Part IV: The Third Tesla Energy Battery Application

By Jay Stein

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Tesla Energy’s Powerpack product is designed for large-scale commodity markets and features a capacity of 100 kilowatt-hours. Demand-charge management is one application the Powerpack is well suited for, but there many other battery products that can be used in this application as well. To reduce monthly demand charges, these batteries charge up during times of low demand and discharge during peak times, when monthly demand levels are set. Demand charges vary widely, from just a few dollars to more than $20 per kilowatt (kW)-month (kW-month is the price per kW per month). In some markets, such as California, utilities offer rates with multiple demand-charge periods that can be effectively added together to reach as much as $50 per kW-month.

Reducing demand charges requires more than a battery and power electronics. A facility also needs predictive software that knows when the building is on a trajectory to hit peak demand, as well as when it should start and stop injecting power into the electrical system. A few vendors offer such combined battery and software systems, including Stem, CODA Energy, and Green Charge Networks. And Tesla offers such systems through its partnership with EnerNOC.
Green Charge Networks’ sleek battery enclosure

Demand-charge management system vendors make it easier to install their batteries in commercial buildings by enclosing them in attractive cases.

The economics of these systems are approaching the point of acceptance in markets with high demand charges. Assuming a relatively high demand charge of about $20 per kW-month, the potential savings would be equal to about $240 per kW of battery capacity annually. In reality, a facility is not going to get all of those savings. Battery energy capacity is limited (typically one or two hours of discharge energy at full peak load) and the demand-anticipating software doesn’t work perfectly. Usually, such systems get about half the potential demand savings. There are also parasitic losses that need to be adjusted for, including battery roundtrip energy losses and inverter inefficiencies. Customers on time-of-use rates can overcome those losses and then some by buying electricity during low-priced off-peak periods and discharging it during on-peak periods. Sometimes customers make a little money this way, but such gains are tiny compared to the savings achieved via demand-charge reduction.

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Given that the installed cost of these systems runs from about $1,000 to $4,000 per kW, purchasers at the lower end of this spectrum, who manage to get about $120 per kW per year of savings, would see their systems pay for themselves in about eight years. Such economic calculations are likely to produce more-attractive results in places like California and New York, where state and local utilities collaborate to offer incentives. Realistically, the results will improve everywhere as the cost of batteries continues to decrease (see my blog posting Utilities, Cheap Batteries Won’t Hurt You. You Have Much Worse Things to Worry About. Part I: Assault and Battery for more on this subject). Also, some vendors are forging partnerships with auto manufacturers to give a second life to used electric vehicle power packs.

With its high demand charges and state incentives, California is an excellent market for demand-charge management systems. There, several battery manufacturers offer no-money-down financing. As battery prices decline, look for these vendors to expand their operations to other states.

This is the fourth installment in a five-part blog series that examines four applications for Tesla’s batteries. Part two of the series talks about how the batteries can be used in time-of-use arbitrage. Part three discusses how the Powerwall battery can be used for residential backup power. And the final installment addresses how the batteries can be used for grid-scale storage. If you’d like to share your opinions on any of these topics, please leave a comment below or send us an email.