

Between the lines

As big battery installations proliferate across the United States, electric vehicle charging could provide a game changing solution

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Applications & Installations

AI for energy storage

Athena, a battery services software package developed by Stem – is able to think fast enough, and wide enough, to coordinate distributed batteries with the near instant changing demand requirements of the power grid. The tool's greatest strength is that it creates a "many winner" situation for businesses, utilities and Stem.

A battery alone is just hardware, and hardware alone doesn't solve the complex problems that we need to address with energy storage, according to Jeff Olson, Director of Business Development & Strategic Partnerships at storage services provider Stem Inc.

This is where we learn what Stem's Athena software really is. After input of large volumes of historical data, followed by projections of the future – weather, energy production and use, a live stream of reality is pumped in. The Past, Present and Future – integrated in inter-tangled algorithms programmed to react to the economic market signals pushed by electric utilities and local conditions.

Hive mind

This mind, able to reach across many locations at once, is the perfect tool for a utility that doesn't wish to deal with hundreds of partners – but can absolutely benefit from distributed storage. And right here is Stem – a thinking system that is quite conscious of the power grid that it sits atop, tying together local businesses and large utilities, while generating more revenue and stability for everyone involved.

As recently as this summer, Stem had 440 customers installed, and another 420 in process. Half of the systems in this pipeline are about 750 kW, with the average system around 1 MW. Hourly durations range from 1.5 to 4 hours, depending on where the system is installed.

Larsh Johnson, Stem's Chief Technology Officer, noted that in 2017, Athena was called on over 600 times to dispatch in day-ahead and real-time (five-minute) responses to the California wholesale market. These events, some of which occurred during this summer's heatwaves in Southern California, give Stem the chance to make distributed revenue for their systems when California requests demand response reactions from its customers the day before. Stem then shares this revenue with the owners of the storage systems, revenue that small business owners would not otherwise have access to.

Technically speaking, this is Stem's core competency and what customers are really paying for – leveraging the hardware to go beyond simple demand charges. For other battery installations, the main economic benefit is demand charge management. And it is this value stream that drives much of the project's economics – but if you can make more from your hardware, why wouldn't you?

The right data

Olson notes that one of the most important aspects of his work these days is educating partners – solar developers in particular – on the right questions to ask, and the right data to collect. Stem sees that almost every customer's needs are different as described by their load profiles, and adding solar power to a Stem system helps to magnify the returns.

The developer needs to collect three basic inputs – 15-minute interval data from the utility, data from solar power production, and a copy of the customer's utility bill. Once this is communi-

cated to Stem, an optimized system size will be proposed – making sure the battery and solar power are not too large to waste hardware, but big enough to meet the goals of all parties involved.

Market development has a long way to come. Right now, Hawaii and California are the main markets, while Massachusetts sales are expanding and the state has a structure in place for great growth, with Texas and Illinois seen as up and coming. The company has running hardware in all those states minus Illinois, as well as Arizona and New York.

The nature of Stem's technology is that they first need to find a market where their services will be appreciated and paid for by local utilities, then find customers within that region. Once Stem has that foothold, utilities tend to appreciate that the platform absolutely makes the grid stronger. And as Stem's network gets larger, its value to the utility increases.

For instance, in Southern California the utility contracted with Stem to go after specific substations, because it knew where the support was needed. Once these substations were found, Stem's sales team fanned out into the surrounding region and deployed their hardware.

Johnson describes the process as follows: "As a partner of the utilities we're able to offer use of these assets, and we feel that as the utilities can observe – and feel comfortable with – the more they'll be able to trust these items on the grid with their responsibility."

Stem is selling intelligence. They're selling a service that makes your hardware worth more money. They're tying together layers of reality that in prior times (and in most places of reality still) were disconnected. They're waking up our power grid by combining new cost effective energy storage with increasingly fast network connections and aggressively evolving machine learning – artificial intelligence when you're being humble – techniques.

John Weaver



Photo: Stem