

# Xtreme Power Catches Up With the Big Players in Grid Storage

The startup raises \$5.7 million and brings its portfolio of storage to 77 megawatts.

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Battery-based grid-scale energy storage may be a tough market to crack, but we're seeing green shoots emerge in some key spots where it makes sense today.

Amongst big battery suppliers like General Electric, Johnson Controls, Saft, LG, Panasonic, Samsung and the bankrupt (and now Chinese-owned) A123, a few startups are standing out in terms of the scale of their real-world deployments -- and one of those is Austin, Texas-based Xtreme Power.

Xtreme has been on a bit of a roll lately. In December, customer Duke Energy turned on its 36-megawatt, 24-megawatt-hour Xtreme energy storage system at its Notrees wind farm in Texas, bringing the startup's total commissioned grid battery base to 77 megawatts. That's closing in on such big energy storage players as AES Energy Storage, which has installed more than 100 megawatts around the globe, or BYD, which last year built the world's largest installation, a 36 megawatt-hour grid-scale lithium-ion battery, and has plans for more in China. Xtreme also expanded projects in Hawaii and Alaska, and launched a new battery for frequency regulation, a fast-reacting, high-value type of grid energy service, for mid-Atlantic grid operator PJM. This month brings more news for Xtreme, including a capital charge-up.

This week, the company raised \$5.7 million of a planned \$10 million financing from investors including SAIL Capital Partners, Bessemer Venture Partners, Dow Chemical, Fluor, Dominion Power, Spring Ventures, BP and Posco. Founded in 2004, Xtreme has previously raised more than \$50 million from investors.

Also this week, Xtreme announced an interesting project with Samsung SDI, the lithium-ion battery arm of the South Korean electronics giant. The plan is for a 1-megawatt, 1-megawatt-hour battery storage system at Lubbock, Texas' Reese Technology Center. The DOE stimulus grant-funded project is being done in partnership with the Center for the Commercialization of Electric Technologies (CCET), and will be run by the South Plains Electric Cooperative (SPEC), a rural co-op with a lot of wind power it wants to manage.

In this case, Xtreme won't be supplying its unusual solid-state battery technology to the partnership. Rather, it's connecting Samsung's lithium manganese oxide battery to its battery management system -- the software, controls and integration platform Xtreme has built to manage that energy storage capacity for the grid.

Xtreme calls its platform Xtreme Active Control Technology, or XACT, and it uses it both for its own battery deployments and as a platform to support others' batteries and grid systems.

In June, it announced a similar deal to integrate XACT with GE's Durathon grid-scale batteries, though the two haven't announced any projects yet.

Battery management systems are emerging as a key subsector of grid-scale energy storage technology, and Xtreme is far from the only contender in the field. Beyond the BMS technology being built by the big battery vendors themselves, we've seen grid-centric companies such as ABB and S&C Electric and startups like Greensmith and Stem that are working on grid-scale battery management.

### *Technical, Regulatory and Market Challenges for Grid Batteries*

As for how batteries and grid integration software can fit into the way grid power is managed today, a 2011 Duke study of the Notrees project (PDF) lays out the business case in great detail. The report includes graphs of how the batteries can serve regulation up-down purposes -- a term of art for fast-reacting resources to keep the grid stable -- as well as smooth out ramp rates of wind power and other services that aren't as easy to classify in terms of power market value.

The Electric Power Research Institute (EPRI) has published some detailed reports on just how complicated the energy storage cost-benefit equations can be, given all the different regulatory structures they can fit into. But there's little doubt that intermittent energy resources -- wind and solar, in other words -- are a key driver for storage. Right now, grid operators balance out wind and solar's ups and downs, when they have to, with existing grid resources, via peak generation resources like gas turbines, though demand response, or managing customer power use en masse, can also help.

Of course, batteries bring their own challenges to the grid, including the complex task of balancing battery concerns (cycle life, depth of discharge, etc.) against the different ways that utilities (or customers) will want to put them to use. Different technologies, such as sodium sulfur batteries, flow batteries and even fuel cells, each offer distinct advantages and disadvantages on this front, compared to the lithium-ion contenders seeking to scale up their laptop and electric vehicle-scale battery arrays to the container (or even warehouse)-sized scale needed to back up the grid.

Xtreme's battery chemistry has promised to match lithium-ion's energy density and other technical strengths, while overcoming some of its key challenges. Those include lithium-ion chemistries' thermal management challenges, that is, keeping them from catching on fire -- Xtreme says its solid material-based batteries can be shot full of holes without catching fire. Of course, the company is also dealing with a fire that destroyed its 10-megawatt battery on Hawaii's Oahu Island last year, and the ongoing investigation into its cause.