

# Xtreme Power Proposal: SCE Living Pilot

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## Product Overview

Xtreme Power supplies real-time power management and energy storage systems that enable a more sustainable, cost-effective and reliable electric grid. Xtreme Power's fully integrated energy storage systems ensure its customers get the right technology for their needs at an economical price.

No single battery chemistry is best suited for every application — Xtreme Power delivers premier battery technologies from its world class partners and pairs it with sophisticated power electronics and the real-time controls of its proprietary Xtreme Active Control Technology™ (XACT™) to deliver proven, reliable and efficient energy storage systems that meet the challenges of today's, and tomorrow's, electric grids. Xtreme Power offers products with unmatched flexibility, performance, and control.

## Flexibility

Xtreme Power has the ability to size an energy storage system within 100 kW of the required power and 40 kWh of the required energy of the customer's application. This flexibility allows Xtreme Power to deliver its customers an Energy Storage System (ESS) optimized for performance and economics. In addition, Xtreme Power intelligently selects a battery from its suite of available energy storage technologies to provide cost effective solutions for durations anywhere from 10 minutes to 6 hours. The modular DC Block design employed in Xtreme Power's products also enables customers to expand the energy capacity of their ESS at a later date should the requirements of the application change. See photo below for a picture of two DC Block enclosures.



## Proven Performance

Xtreme Power is an established and experienced leader in the energy storage industry with over 350,000 hours of integrated energy storage system field operation and greater than 22 GWh charged and discharged across its 77 MW of grid scale installations. As the industry expert in system integration and controls, Xtreme Power specializes not only in ensuring the battery energy storage source seamlessly operates

with the Power Conversion System, but also that the entire integrated system responds to and communicates with the grid and other external inputs as required by the customer. In addition, by working directly with suppliers, all engineering team members have comprehensive knowledge of the battery energy storage technology and Power Conditioning Systems (PCS) systems controls used in each ESS. As a result, Xtreme Power has unmatched capability of ensuring the entire system meets or exceeds customer performance requirements.



## Industry Leading Controls

Recognizing that no one battery technology is right for every application, Xtreme Power developed XACT — a flexible and robust control platform capable of seamlessly integrating any battery technology with a variety of Power Conversion Systems (PCS) to command, monitor, and operate energy storage systems of any combination of power and duration. The XACT platform was fully developed in-house and rigorously tested by Xtreme Power’s team of software, power electronics, and control engineers. With unmatched speed and flexibility, the XACT platform is capable of delivering a full response in less than 50 milliseconds, integrating multiple technologies, and providing multiple applications simultaneously including all shown below:

XACT Available Control Modes	
Inertial Frequency Response	Frequency Regulation
Droop Frequency Response	Responsive Reserves
AGC Response	Scheduled Charge/Discharge
Ramp Control	Black Start
Curtailment Capture	Time Shift
Peak Load Management	Renewable Firming
Power Factor Correction	Voltage Support

Furthermore, should any problems arise or performance criteria change, Xtreme Power is well positioned to troubleshoot or refine the control algorithms to meet customer needs by utilizing its Operations Center that remotely monitors each Xtreme Power ESS in the field in real time, 24 hours a day, 7 days a week.

## Product Portfolio

Each Xtreme Power ESS combines the real-time controls of the XACT platform, and high performance PCS with safe and efficient batteries from leading manufacturers. The modular and flexible design of Xtreme Power’s energy storage systems enables optimization of both power and energy within the same standard enclosure design. This provides customers with highly customizable products and minimizes the time and expenses associated with new product development and design. A rendering of a typical Xtreme Power product design is shown in the figure below. Xtreme Power offers four different product lines of integrated energy storage systems to meet the needs of any application and any customer. For the SCE Living Pilot Project, Xtreme Power recommends its PEAK product line to meet the requirements and alleviate the impact of SONGS retirement.



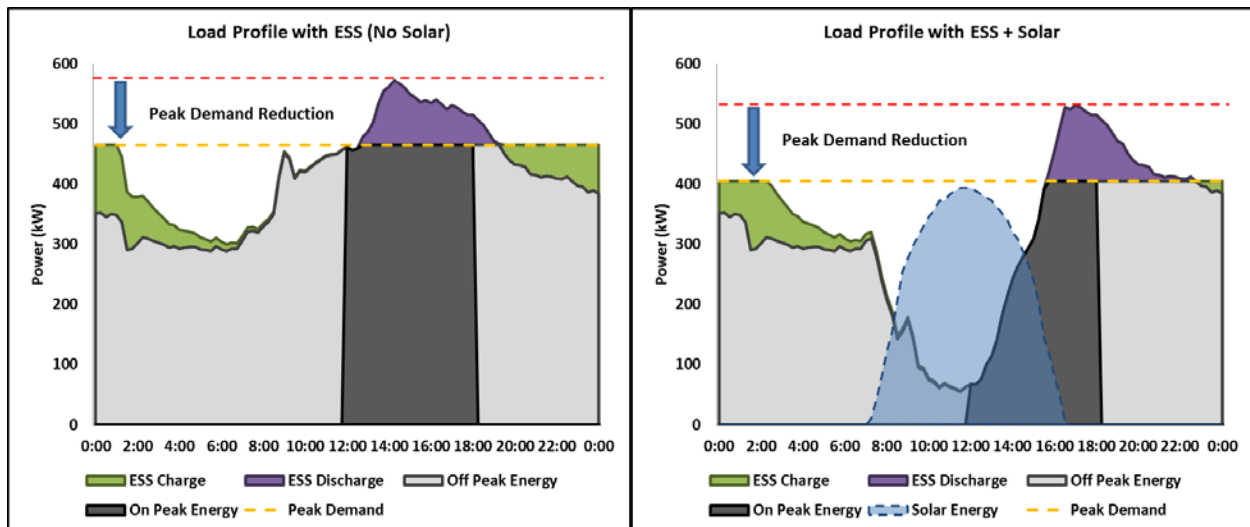
## PEAK Series ESS

Xtreme Power's PEAK Series are power management and energy storage systems designed to address multiple customer needs, such as delivering power during peak demand, improving reliability and energy delivery for T&D infrastructure and shifting energy to when it's needed most. With a typical range of durations of 2 hours to 4 hours at its rated nameplate capacity, the PEAK Series ESS is ideally suited to shift large quantities of energy or reduce peak demand for utilities or electrical consumers, helping to overcome grid challenges and cut electricity costs.

Xtreme Power's PEAK Series ESS product line can provide any of the control modes outlined in the XACT Available Control Modes table to help support the SCE grid. Moreover, the flexibility of the XACT platform enables the ESS to meet the pilot's telemetry requirements of 4 seconds or 5 minutes and allows for the system response to be triggered by a variety of options including commands sent via ISO or utility SCADA, market input signals, and direct grid measurements of frequency and/or voltage.

### Illustrative PEAK Application Example

The figures below illustrate a 200 kW, 4 hour PEAK Series ESS providing a typical peak shaving application of for a commercial load with and without solar PV installed behind the meter. The light grey and dark grey areas depict the off peak and on peak energy consumption respectively while red dashed line and orange dashed line represents the original and reduced peak demand.



The PEAK ESS discharges (purple area) to reduce the peak demand to the target maximum peak demand and charges (green area) during off peak hours while ensuring the total net load of consumption plus charging power does not exceed the target peak demand.

With the addition of behind the meter solar PV, the net load profile peak becomes more pronounced and the ESS is actually able to shave more kilowatts of demand with the ESS same capacity. Note, however, that the PEAK Series ESS also has the capability to instantly discharge to offset sudden drops in PV output which could otherwise potentially result in a new peak demand if not properly mitigated.