California State University Dominguez Hills

Location
Carson, California

Facility Type
State University Campus Buildings

Applications
Solar + Storage, Energy Cost Reduction, Demand Response

Commercial Operation Date
December 2017

Energy Storage System Size
1 MW, 4.2 MWh with a 1.5 MW solar system added in 2020

Annual Estimated Savings
$70,000

Energy Storage Delivers Cost Savings + Sustainability to Campus

Founded in 1960, California State University Dominguez Hills (CSUDH) is part of the 23-campus CSU system. Located in the South Bay region of Los Angeles County, the campus serves nearly 15,000 undergraduate and graduate students. A core tenet of the university's mission is to make sustainable environmental, social and economic practices a way of life. And, the Campus as a Living Lab for Sustainability initiative explores and applies sustainability concepts and theories to educate students and make the campus more sustainable.

Over his nine years at CSUDH, Kenneth Seeton, central plant manager and energy manager, launched several projects designed to reduce energy consumption and costs, including LED lighting and HVAC upgrades. Seeton also initiated an energy storage strategy, and he participates in a demand response (DR) program. All these measures ease demand on the utility grid, helping to reduce the need to build new peaker plants.

Challenge

Seeton recognized that to continue reducing his operational costs while progressing on sustainability goals – such as shifting systems from natural gas to electricity to lower the university's carbon footprint – he needed to add intelligent energy storage to the campus.

Solution

After a thorough evaluation of multiple providers, Seeton selected Stem. Stem's Athena™, the world's first artificial intelligence (AI) for energy storage. This system enables organizations to optimize energy use by automatically switching between battery power, onsite generation and grid power.

"Once "This partnership has enabled us to control energy costs, decrease our greenhouse gas footprint, and support demand response as a Virtual Power Plant to help reduce the number of new peaker plants that have to be built. As of today, our energy storage system enables the campus to intelligently deliver up to 1,000 kW of load reductions. We're extremely pleased with the reliability of our energy storage system, which is critical to reducing our energy costs and meeting our sustainability goals. We just passed the two-year mark, and the data shows we're running strong and stable and still getting better."

Kenneth Seeton
Central Plant Manager / Energy Manager at CSUDH

stem | Energy Superintelligence™

CSUDH CALIFORNIA STATE UNIVERSITY DOMINGUEZ HILLS

In December 2017, a 1 MW, 4.2 MWh storage system went into production. Thanks to the vendor's participation in SCE's Local Capacity Requirements (LCR) procurement program, some of the university's costs are offset by the ability to provide capacity to SCE and the grid when needed. In 2018, CSUDH became one of the first universities to participate in an innovative load-relief initiative that combines the LCR program and CPower's DR program.

The CSUDH batteries reduce demand from the grid throughout the day and automatically provide far better grid relief via automated load reductions than what was possible with manual adjustments. The campus now also acts as a Virtual Power Plant, flexibly providing approximately 400 kW of load reduction during a DR event. When combined with the energy storage system, the campus can intelligently deliver up to 1,400 kW of load reductions.

"We created a unique demand response system that uses smart controls to generate far more cost savings than we could achieve with battery storage alone," said Seeton. "Our peak demand savings in 2019 was nearly $70,000, and we expect equally strong numbers for 2020."

Results

CSUDH is now participating in the Clean Energy Optimization Pilot, a first-of-its-kind collaboration between SCE and the University of California and California State University on performance-based greenhouse gas reduction. The energy storage solution will enable Seeton to adjust the load from SCE to the batteries to lower demand and costs during the peak 4 p.m. to 9 p.m. time period. Importantly, during the summer 2020 heat wave and rolling brown-outs, intelligent energy storage enabled the university to automatically participate in the California Public Utility Commission's DRprogram by reducing the university's load by a megawatt for 4 hours as requested. And by adjusting the advanced controls, Seeton was able add another 500KW to 800KW above and beyond this.

The Athena platform continually learns and adapts over time, performing thousands of calculations, forecasting simulations, and split-second decisions to optimize battery use. By monitoring CSUDH's load curve, the solution can determine how much load it can discharge while still being able to manage demand peaks. Visual dashboards have also been crucial in enabling Seeton to demonstrate the benefits of the Stem energy storage system to university officials, other campuses, and visitors from around the world, including a Chinese delegation that toured the CSUDH facility.

The solution has also helped Seeton manage other sustainability project challenges. For example, when the campus converted from gas to electric chillers, SCE informed Seeton that his campus could not exceed 3 MW of demand; otherwise, the sensors that monitor electric usage would be overloaded and could melt, requiring costly and time-consuming repairs. By taking advantage of the batteries to shift demand, Seeton was able to stay below 3 MW throughout the conversion, even when the new chillers were being commissioned and were sometimes over-run or out of sequence.

Without energy storage, Seeton would have had to create a much more complicated and expensive transition plan. Instead, he simply checked the Athena dashboard regularly and set thresholds, so he would receive alerts if the load was too high. He could then adjust the temperature of the chillers, turn down some fans, or take other appropriate action so he could remain under the 3 MW cap.

Seeton offered this advice to other university campuses: "Just do it. You can't just sit back and wait for the money for large projects. I did a lot of small things in the beginning – adding energy efficiency to one classroom at a time if that was all the money I had – and this created a track record of success that led to bigger projects, such as a new energy storage system. Just be sure to measure everything. Early on I adopted metering and analytics because you can't fix what you can't measure, and you can't demonstrate success without data."