

Aquarium of the Pacific reduces energy consumption, carbon footprint with Siemens Demand Flow[®]

Building Technologies

Long Beach, California – The Aquarium of the Pacific is Southern California's largest aquarium and home to more than 11,000 animals representing the aquatic life and ecosystems of the Pacific Ocean. Every year, an average of 1.5 million people visits the aquarium there in Southern California.

A LEED Platinum facility, the Aquarium of the Pacific is committed to expanding its exhibits and educational facilities without increasing its carbon footprint, and is involved in many conservation and sustainability efforts, including registering the museum's greenhouse gas emissions inventory with the California Climate Action Registry to be the first museum in the United States to earn the status of a Climate Action Leader™ from the State of California.

As part of its sustainability and conservation goals, the Aquarium of the Pacific worked with Siemens Industry, Inc., to reduce energy consumption in the central chilled water plant.

Client Objectives

With one existing LEED Platinum building and a second LEED Platinum building on its way, the Aquarium facilities looked for opportunities to reduce energy usage as part of an overall sustainable strategy. As it was adding a 2,700 square foot building and its necessary life support systems for the animals, the Aquarium's goal was to expand the facility but not increase its overall electrical consumption. The Aquarium established several complementary goals when it engaged Siemens for the energy optimization project in its central plant:

- Reduce their annual energy consumption by 850,000 kWh per year to reduce costs and minimize the Aquarium's impact on the electrical grid
- Protect critical life safety and animal support systems
- Advance the Aquarium's sustainable practices by limiting its carbon footprint Throughout the duration of the energy optimization project, the critical nature of the Aquarium's facilities became a unique consideration for Siemens, because the Aquarium is home to more than 11,000 animals. With this amount of life at stake, Siemens could not put the building's life sustaining systems, including the chiller plant, at risk throughout the project.

Siemens Solutions

To help the Aquarium of the Pacific achieve its carbon footprint, sustainability, and energy consumption goals, Siemens implemented the Demand Flow chiller plant optimization solution in the central chilled water plant utilizing the existing Siemens APOGEE® building automation system.

Demand Flow is Siemens patent-pending, proven technology that optimizes central chilled water systems to reduce a central plant's total energy consumption by 20-50%. Demand Flow offers a holistic approach for optimizing an entire chilled water system, including potential air-side savings. This optimization increases the deliverable tonnage of the chilled water plant and simplifies plant operations and controls, without sacrificing occupant comfort in favor of energy savings. Demand Flow uses specialized algorithms, delivered through any building automation system, to optimize all components of the chilled water system. As a result, central plants can more accurately maintain optimal differential system pressure.

During the design phase of the project, Siemens estimated that the Aquarium of the Pacific could reduce energy consumption by approximately 46% with Demand Flow. To achieve these results, Siemens added Variable Frequency Drives (VFDs) to the chilled water and condenser water pumps,

Aquarium of the Pacific

as well as the cooling tower fans. High-accuracy temperature sensors, and flow meters in the proper locations were also installed along with revised sequencing and reprogramming of the three existing chillers to achieve the system optimization. Additionally, Siemens included 12 months of EMC web-based system energy monitoring via the APOGEE system to ensure that the Demand Flow solution delivered the projected and required chilled water plant energy reductions.

Client Results

Siemens Demand Flow energy optimization solution has delivered the following results for the Aquarium of the Pacific:

- Electric kWh was reduced by 51%—from 2,128,448 kWh annually before Demand Flow to a predicted 1,042,940 kWh by the end of the first 12 months following implementation.
- These savings greatly exceeded the 850,000 kWh annual offset goals desired by the Aquarium to minimize its impact on the electrical grid.

- Energy consumption savings exceeded \$168,000 in the first year.
- Thanks to the reduced energy consumption, the Aquarium received an \$114,000 rebate from the local utility company.
- The Aquarium of the Pacific has been recognized for its sustainable practices, and specifically for the Demand Flow solution's positive results.

The energy savings generated by Demand Flow not only help the Aquarium of the Pacific achieve their sustainability goals, but also allow the facility to improve its educational programs. The Aquarium of the Pacific offers educational programs for the public, scientists, policy-makers, and other stakeholders; thus the additional operating capital Demand Flow helped generate has enhanced the Aquarium's ability to achieve its mission and vision of stewardship through education and interaction.

“Because of the reduced demand and low-flow energy scenario, we were able to apply for and receive a one-time rebate from the utility company—in the amount of nearly \$114,000. In addition, our reduced energy consumption is helping us achieve our sustainability and carbon footprint goals.”

*John Rouse
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