THE QUEEN'S MEDICAL CENTER RETROCOMMISSIONING AND CENTRAL PLANT OPTIMIZATION

A CHELSEA GROUP CASE STUDY

TAKE AWAY

Concept

Bring existing central plant equipment up to peak operating efficiency

- Easier to see if efficiency actions are maintained
- Upgrades automation to improve central plant control

Features

Add high tech measurement and monitoring along with good engineering to guide future operations

- Single dashboard on central plant operations for better control
- Pulls together data from new meters and existing EMS
- Unified analysis of all central plant equipment and CHW distribution

Benefits

- First year savings of $197,684
- Measured annual savings of 687,013 kWh
- Web access to central plant operations data
- Hawaii Energy incentives plus performance bonuses equal to project cost

CONTINUOUS IMPROVEMENT AT QMC

The Queen's Medical Center (QMC) retained Chelsea Group in a series of central plant studies that began in 2008 and culminated in the Retrocommissioning and Central Plant Optimization Program in 2011. The key factor in moving forward on this major undertaking was a collaboration between QMC and Hawaii Energy, the ratepayer-funded energy conservation and efficiency program for Hawaii, Honolulu and Maui counties.

The vision for improving central plant operations came from Darren Ito-Ohara, Facilities Manager at QMC. He spearheaded the development of the team and built support within QMC for efficiency improvement. "The spark for getting this project started came from Chelsea Group," explained Ito-Ohara. "The on-going working relationship with Hawaii Energy that Chelsea Group brought really enabled the full realization of the concept Chelsea had introduced."

"The project was a financial homerun for The Queen's Medical Center," explained Darren Ito-Ohara, Facilities Manager at QMC.

In a team effort, QMC, Hawaii Energy, and Chelsea Group developed an effective program to reduce electrical use in the core facility operations of the 2.3 million square foot medical center. It has become the showcase of a continuous improvement program to reduce energy costs at QMC.

COLLABORATION

Hawaii Energy announced its Central Plant Optimization offering in 2010. At that time, QMC and Chelsea Group had recently completed an initial study on how to advance efficiency in central plant operations and were discussing a

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THE PROJECT

Campus

- Largest medical center in Hawaii
- 2.3 million square feet
- Eleven buildings
- Free standing central plant
- Total of 3,950 tons of chiller capacity
- Five generations of Trane EMS installed over 40 years

Project

- ns2u overlay to EMS for data integration
- Added 28 ultrasonic flow meters
- Added 18 electrical meters
- Real time (5 min interval) and trend analysis and reporting

Actions

- Revised chiller operational strategy
- Optimized condenser water cycle
- Recommended AHU valve repairs and replacements (not yet implemented)

retrocommissioning program. Hawaii Energy joined the discussions and the collaborative effort took off.

Initial survey work started in 2011, looking at the central plant and chilled water distribution to the eleven buildings on the campus served by that plant. Existing metering, valves, and controls were all examined in detail and a plan was hatched for integration of existing metering and the addition of both flow and electrical meters. The need for metering of the condenser water in addition to the chilled water became clear as the study progressed.

The integration plan introduced the need to bring another long-time QMC service provider, Trane. They joined the team for the installation of metering equipment and integration of the five generations of building automation systems they had installed.

The complexity of the metering and data transfer systems drove the addition of another team member, NSTech USA. NSTech supplied their innovative ns2u system and its advance software to provide the overarching translation of different data sources and construction of a single, innovative analytical and reporting platform. The result was a highly informative "dashboard" that provides key performance indicators (KPIs) and access to a wealth of trend data. The ns2u unit became the centerpiece in enabling Chelsea Group to do the energy analytics that produced optimization recommendations.

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The complexity of the plant and distribution system required the development of a range of advancements in measurement and data integration that called on all of the skills of all of the partners.

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OUTCOMES

Financial

- QMC made the initial cash outlay for equipment and services
- 50% of cost of equipment and services incentivized by Hawaii Energy (HE)
- Performance incentive by HE @ $0.10 per kWh for one year of annual savings up to 100% of project costs
- Performance exceeded targets and QMC received 100% of its initial cash outlay from HE
- 100% of all savings accrue to QMC - $197,684 annually

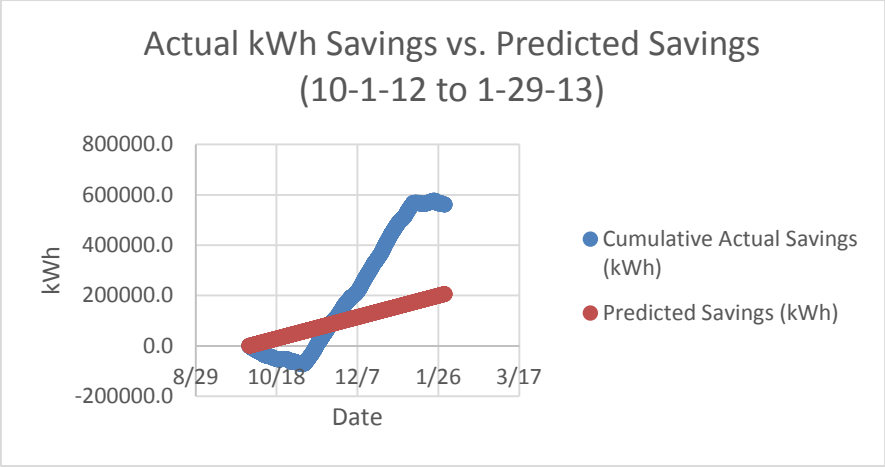
Operational

- Routine use of dashboard and trending for continuous retro-commissioning of central plant
- Ongoing use of fresh data in planning further energy and capital projects
- Developing improved internal bill-back for better allocation of costs to various departments

"Chelsea Group helped me grasp new ways to hold this complex team together," said Ito-Ohara. "As the project went along, they were the glue that kept the partnerships from falling apart, as well as the technical leaders on all of the metering and data interpretation." Coordination within QMC provided a continuing leadership opportunity for Ito-Ohara as well. In particular, coordination of BAS protocols with the QMC IT Department requirements for secure operations highlighted Ito-Ohara's own technical skills. His efforts at satisfying the security needs of QMC while meeting project goals proved among the most serious challenges to the mission.

RESULTS

Program implementation in late 2012 started to produce impressive results. The greatest savings were anticipated as cooler weather came to Honolulu. Fine tuning took a bit longer than hoped, but then savings exceeded predictions.



The net result was measured annual saving rate that totals 687,013 kWh, which equates to electrical bill savings of $197,684.

Hawaii Energy provides cash rebates and incentives to businesses and organizations to help them offset the cost of installing a variety of energy-efficient measures. They provided 50% incentive's to QMC on equipment and services for the project. In addition, under the central plant optimization program, Hawaii Energy offered an incentive of $0.10 per kWh saved. At 687,013 in kWh savings, a potential incentive of $68,702.13 would be provided. However, QMC's performance incentive was capped at $53,764.38, which brought rebates and incentives to a total equal to the cost of the entire project.

"The project was a financial homerun for The Queen's Medical Center," said Ito-Ohara. "The combination of incentives and performance bonuses worked together to cover our entire investment. Plus we get to keep all of the savings."

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