



Penn State Health Milton S. Hershey Medical Center



OptimumLOOP™ delivers operational efficiencies and beats expected cost savings.

Introduction

Since 2009, the Penn State Health Milton S. Hershey Medical Center has been implementing a multiphase energy efficiency program. Six years into the program, Kevin Kanoff, the center's campus energy engineer, knew the chiller plants were efficient—but he believed they could be improved. Johnson Controls, the center's lead vendor, brought in Optimum Energy to perform an engineering site assessment (ESA), which proved him correct: optimizing the chiller plants across the campus would deliver significant energy savings.

After Optimum Energy completed the installation of its OptiCx™ platform and OptimumLOOP in June 2016, the center's 12 chillers were running at peak efficiency, saving electricity costs, using less water, and reducing carbon emissions. In fact, annual energy savings were found to be almost 4.2 GWh/year, roughly 1 GWh more than expected, and campus energy intensity dropped 4 percent.

“We are more aware of energy efficiency and savings. It's helping the team see the bigger picture.”

—Kevin Kanoff, campus energy engineer, Penn State Health Milton S. Hershey Medical Center

Challenge: Optimizing a Large, Efficient Plant

The plant optimization project was not a small task. The Milton S. Hershey Medical Center serves more than 1.2 million patients and employs 10,000 people. The campus—which includes two hospitals, five institutes, and Penn State College of Medicine—has 2.6 million square feet of air-conditioned building space served by three chiller plants: a central plant of eight chillers and two



satellite plants with two chillers each that provide a total of 14,200 tons of cooling. The system also includes a 1.4 million gallon chilled-water storage tank.

The previous phases of the energy efficiency initiative had reduced the campus's energy intensity by 20 percent, but Kanoff had to find a way to squeeze out additional efficiencies. The ESA showed that optimization would provide the additional energy savings he sought.

First, Johnson Controls paved the way for the optimization solution and analytics platform, installing variable-speed drives on pumps and fans, adding power meters and sensors for precise measurement of all system components, and fully automating the plant.

Recognizing that the security of data systems is a high priority for a medical facility, Optimum Energy worked closely with the center's IT staff to ensure all data going from the plant in Hershey to Optimum Energy's cloud-based OptiCx platform would be absolutely secure.

Solution: A Holistic System with Real-Time Analytics and Relational Control

Optimum Energy's OptimumLOOP relational control provided a solution that optimizes the plant holistically—it automatically stages all the chillers and the chilled-water storage tank as an integrated whole, choosing the best option based on equipment efficiency and demand for cooling. The software continuously collects data about plant operations, outside conditions, and hundreds of other parameters, and calculates how to operate for peak efficiency and operational stability. It then adjusts the set points of pumps, fans, and other components in real time. The result of combining this system with the data analytics of the OptiCx platform is what Optimum Energy calls True Optimization®.

The implementation at all three plants went smoothly, says Kanoff. "From a building environment perspective, the system went through start-up seamlessly. Critical patient areas were not compromised."

Optimization also streamlined chiller operations that staff had performed manually without a complete picture of the system.

"The team still monitors the chillers and verifies the data, but now they do it with OptimumLOOP," says Kanoff, noting that facility operators had been skeptical at first. "Now they're able to accomplish more, managing and operating the entire plant without the old white-knuckle approach."

Result: Energy and Cost Savings Beyond Expectations

The payoff goes well beyond ease of operation. OptimumLOOP reduced the center's energy intensity by 4 percent, bringing the campuswide reduction to 24 percent over 2009 levels.

"We initially projected an energy savings of 3.4 GWh annually, but the electric utility's evaluator found that savings are actually 4.16 GWh annually," says Kanoff. That translates into electricity costs savings of about \$300,000 a year; he originally projected that the system would save \$261,000 a year. As a bonus, the medical center earned a onetime \$416,000 incentive from the utility.

The center has significantly decreased its carbon footprint. The optimization project has saved 7 million pounds of CO₂ emissions through March 2017. It is also saving more than 1.4 million gallons of water per year as a result of the reduced energy consumption.

"Through this project, we are more aware of energy efficiency and savings," said Kanoff. "It's helping the team see the bigger picture—we're not just providing chilled water, but we're doing it as efficiently as possible and, ultimately, saving money."

ABOUT OPTIMUM ENERGY

Since 2005, Optimum Energy has helped customers in higher education, healthcare and other industries reduce energy use in buildings, delivering typical energy savings of 30 percent, improved operating efficiency and reduced carbon emissions. The OptiCx™ platform combines technologically advanced HVAC optimization software with world-class expertise in system design and operations. It has saved current customers more than 500 million kilowatt-hours of electricity, 288,000 tons of carbon emissions, and over 100 million gallons of water to date.

DETAILS

COOLING PLANTS

Central plant: eight chillers and a 1.4 million gallon chilled-water storage tank; two satellite chiller plants of two chillers each. Annual energy consumption is approximately 112,000,000 kW of electricity and 573,000 MMBtu of natural gas.

Cooling capacity: 14,200 tons

Chilled water production: 24.8 million ton-hours

MILTON S. HERSHEY MEDICAL CENTER

2.6 million square feet of conditioned space on the chiller system

4,942 hours of cooling per year

Benefits

- Energy savings
- Demand savings
- Cost savings
- Automated facilities operations
- CO₂ emissions reductions
- Water savings

Plant efficiency improvement

Annual average plantwide efficiency, pre-optimization: 0.828 kW/ton

Annual average plantwide efficiency, post-optimization: 0.646 kW/ton

Utility savings (annual, projected)

Electrical energy savings	4.16 GWh/year
Electrical demand reduction	874 Kw
CO ₂ emissions reductions	3,220 tons/year
Water use savings	over 1.44 million gallons/year

Financial savings (annual, projected)

Annual electricity cost savings	\$300,000
Estimated ROI	4.3 years (includes incentive)