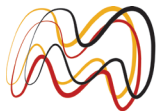


Institute for Bioscience and Biotechnology Research Optimization Case Study



Implementing OptiCx® platform with OptimumLOOP® nearly doubles chiller plant output while increasing reliability of the IBBR facility, a University System of Maryland joint research enterprise



UNIVERSITY OF MARYLAND | NIST
INSTITUTE FOR BIOSCIENCE
& BIOTECHNOLOGY RESEARCH

Rockville, MD

Higher Ed

Industry

5+

Years with Optimum

\$36,000

Annual Operations
Cost Savings

6.25 Yrs

ROI

Project Details & Scope

Facility: Institute for Bioscience and Biotechnology Research (IBBR), Rockville, MD

Building Size: 110,000 sq ft

Cooling Capacity: 900 tons (two 450-ton electric centrifugal chillers)

Cooling Hours: 3,800 hours/year

Ton Hours: 1.2M+ ton-hours produced

Plant Type: All-variable flow; two condenser water pumps, two CW pumps, two cooling tower cells (all variable speed)

Solution: OptimumLOOP® + OptiCx® Platform

Pre-Optimization: 0.9 kW/ton at ~50% output

Post-Optimization: 0.57–0.65 kW/ton at ~90% output

Energy Savings: 266,836 kWh/year

Demand Reduction: 18 kW

CO₂ Reduction: 128.38 tons/year

Operations Cost Savings: \$36,000/year

Est. ROI: 6.25 years

Executive Summary

Cutting energy use in research labs is notoriously tough. But when the state of Maryland committed to aggressively reducing its energy consumption by 20 percent by 2020. James Johnson, IBBR's director of facilities and lab services, knew he had to find a way to make the Institute for Bioscience and Biotechnology Research more efficient.

Calling the 110,000-square-foot facility "as big an energy pig as there was out there," Johnson took a close look at the environmental stabilization plant. When he started the optimization project, the plant was consuming energy at 0.9 kW/ton and operating at just 50 percent output.

Optimum Energy performed a rigorous audit and implemented OptimumLOOP® and the OptiCx® platform, converting the facility to an all-variable flow plant. In the first year of optimization, IBBR's plant cut energy use by an average of 30 percent while its output almost doubled, and energy consumption remained flat.

Challenge: Increasing the Efficiency of a New Plant

When Maryland charged Johnson with reducing energy consumption, the environmental stabilization plant was only five years old and had few operational maintenance issues, making traditional replacement difficult to justify. Consulting with Optimum Energy engineers, Johnson found that optimizing each piece of equipment individually, as part of the whole system, could increase the plant's overall efficiency considerably.

"Being able to reduce energy consumption through optimization is significant. If we don't have to run the water chillers as hard in the summer months, then we can reduce a good amount of the energy used to condition the outside air," says Johnson.

Johnson wanted to go beyond energy efficiency to increase reliability and redundancy. IBBR connects award-winning scientists in interrelated fields of study to accomplish world-class interdisciplinary bioscience and biotechnology research. Anything the facilities engineers can do to further stabilize lab environments is vital to the mission.

Located in Rockville, Maryland, the two 450-ton variable-speed electric centrifugal water chillers labor year-round through icy winters and hot, humid summers, providing 3,800 hours of cooling annually across 110,000 square feet.

“Optimum Energy gave us a lot of the options we were interested in, including making maintenance and operations more flexible and extending the life of the equipment,” he says, explaining that the solution offered a greater return on investment than other options.

Solution: Optimum Energy OptimumLOOP®

IBBR converted to an all-variable flow plant, with Optimum Energy's OptiCx® Platform as the optimization and control layer. OptimumLOOP® calculates the most efficient operation of the entire chilled water system and optimizes plant performance in real time, dynamically adapting to changes in load, weather, and occupancy to yield the lowest possible kW/ton while maintaining optimal lab temperatures.

The results were immediate. Within a year, plant efficiency improved from 0.9 kW/ton to 0.57-0.65 kW/ton, a 27 to 37 percent improvement depending on conditions. “We're able to run one chilled water pump at 55 Hz instead of 60 Hz. By itself, that's not a huge gain, but multiply that by two, and then run those chillers more efficiently at a lower flow, running individual pieces of equipment at more efficient speeds all wraps up to one big number,” Johnson explains.

Through OptiCx® Chiller Diagnostics, Johnson receives monthly maintenance reports with prioritized recommendations, keeping the chillers running at peak performance. The solution's analytics and measurement and verification capabilities allow continuous monitoring of HVAC system performance, efficiency, and energy savings.

Result: Almost Twice the Energy for the Same Cost

When Johnson began looking at a plant optimization solution, IBBR's environmental stabilization plant was running at about 50 percent output. After running at full optimization for about a year, the facility increased to 90 percent output, and its energy consumption remained flat.

The project is on track to save IBBR 266,836 kWh per year and reduce CO₂ emissions by 128.38 tons annually. Plant efficiency improved from 0.9 kW/ton to 0.57–0.65 kW/ton, a 36.6% improvement, with operational cost savings of \$36,000 per year and an estimated ROI of 6.25 years.

“Optimum is different. The solution looks at how each piece of equipment runs and figures out at what speed, what pressure, and so on it would work optimally. I've got a plant that is running at absolute maximum efficiency.”

— James Johnson,
Director of Facilities and Lab Services,
Institute for Bioscience and Biotechnology Research

Plant Details

Environmental Stabilization Plant

Chillers: Two 450-ton electric centrifugal (variable speed)

Pumps: Two condenser water + two chilled water pumps

Cooling Towers: Two cells (all variable speed)

Capacity: 900 tons

Ton Hours: 1.2M+ ton-hours

IBBR Facility

Building: 110,000 sq ft

Cooling Hours: 3,800 hours/year