

CASE STUDY / CENTRAL PLANT OPTIMIZATION

Institute for Bioscience and Biotechnology Research

OptimumLOOP® nearly doubles chiller plant output while cutting energy use 30%, without replacing a five-year-old plant.

LOCATION

Rockville,
Maryland

FACILITY

IBBR Environmental
Stabilization Plant

ENGAGEMENT

Continuous
Optimization

SOLUTIONS

OptimumLOOP® +
OptiCx®

ANNUAL SAVINGS

\$36K

per year

Annual operations cost
savings

EFFICIENCY GAIN

36.6%

improvement

Plant efficiency improvement
from 0.9 to 0.57–0.65
kW/ton

OUTPUT INCREASE

2×

plant output

Plant output nearly doubled,
from ~50% to ~90%, at flat
energy consumption

Overview

Cutting energy use in research labs is notoriously tough. But when the state of Maryland committed to reducing energy consumption 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.

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, IBBR's plant cut energy use by an average of 30 percent while its output almost doubled, and energy consumption remained flat.

The Challenge: Increase Efficiency of a Five-Year-Old Plant With No Clear Justification for Replacement

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.

The plant was consuming energy at 0.9 kW/ton and operating at just 50 percent output, a significant inefficiency for a facility that connects award-winning scientists in interdisciplinary bioscience and biotechnology research.

The Solution: All-Variable Flow Plant Conversion With OptimumLOOP® and Continuous Monitoring

IBBR converted to an all-variable flow plant, with OptimumLOOP® as the optimization and control layer. The solution calculates the most efficient operation of the entire chilled water system in real time, dynamically adapting to changes in load, weather, and occupancy.

Through OptiCx® Chiller Diagnostics, Johnson receives monthly maintenance reports with prioritized recommendations, keeping the chillers running at peak performance and extending equipment life.

- All-variable flow conversion: CW pumps and cooling tower cells now variable speed
- OptimumLOOP® dynamically stages and optimizes two 450-ton variable-speed chillers
- OptiCx® monthly Chiller Diagnostics with prioritized maintenance recommendations

Results

Within a year, plant efficiency improved from 0.9 kW/ton to 0.57–0.65 kW/ton as output nearly doubled from 50% to 90%, with annual savings of 266,836 kWh, 128 tons of CO2, and \$36,000 in operational costs.

DETAILS

Institute for Bioscience and Biotechnology Research (IBBR)

A University System of Maryland and NIST joint research enterprise in Rockville, MD, operating 110,000 sq ft of research laboratory space with year-round precision environmental controls.

PLANT EQUIPMENT

- 2 × 450-ton electric centrifugal chillers (variable speed)
- 2 condenser water pumps (variable speed)
- 2 chilled water pumps (variable speed)
- 2 cooling tower cells (variable speed)
- 900 tons total cooling capacity
- OptimumLOOP® real-time optimization
- OptiCx® with monthly Chiller Diagnostics

PERFORMANCE RESULTS (ANNUAL)

Pre-Optimization Efficiency	0.9 kW/ton @ 50% output
Post-Optimization Efficiency	0.57–0.65 kW/ton @ 90% output
Energy Savings	266,836 kWh/yr
Demand Reduction	18 kW
CO2 Reduction	128.38 tons/yr

FINANCIAL RESULTS

Annual Operations Savings	\$36,000
Estimated ROI	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

Results reflect first-year verified performance following OptimumLOOP® installation. Energy savings and CO2 reductions are measured and verified through the OptiCx® platform analytics.