



# Adaptive Control for Chilled Water Plants

## Technology Overview

This technology optimizes the operation of central plant cooling systems by using an adaptive control algorithm to improve the energy efficiency of a building's entire chilled water system, including chillers, air handling units, fan coils, and other water and air distribution equipment. The system interfaces with existing plant controls and equipment, regardless of brand, and can be configured to optimize the chilled water setpoint alone, the condenser water setpoint alone, or both, depending on the building's needs. It is preconfigured with a graphical energy dashboard that allows facility managers to monitor and analyze the energy performance of their systems in real-time.

## Why is GSA Interested?

Central plants are responsible for cooling about 80% of GSA's floor space. This technology claims to represent a significant improvement over the current state-of-the-art, which uses modeling, rather than real time information, to optimize operations. Real-time information allows the algorithm to respond to aging equipment, changes in environmental conditions, and other system changes.

## How Will Success Be Measured?

The test bed will be designed to verify the manufacturer's claim that, over the course of the cooling season, this technology will save 3-15% of total energy costs associated with central plant cooling, with payback under five years and a Savings to Investment Ratio > 1. Actual savings will be influenced by operating conditions and utility costs at the test-bed location. Additional criteria to be evaluated: that the system will function autonomously once commissioning is complete (i.e. no periodic maintenance is required); and that the software passes GSA's cyber security requirements. Measurement and verification (M&V) will also evaluate the degree to which the O&M staff finds value in the diagnostic capability of the dashboard.

## Deployment Potential

Adaptive setpoint reset control is applicable to virtually all central cooling plants with a BACnet enabled BAS. While applicable to most plant configurations, the ideal system would be a variable flow chilled water plant with variable speed drives on all pumping equipment, tower fans, and AHU fans. Electrical metering, via commutating speed drives and/or field-installed metering, ensures maximum performance from the optimization logic. If adaptive control were installed in 200 GSA buildings with Energy Star Ratings of less than 75, estimates suggest that it could save \$3.4 million annually.

*GSA'S Proving Ground (GPG) program, in association with Lawrence Berkeley National Laboratory, is evaluating the real-world performance of Adaptive Control for Chilled Water Plants at the Charles F. Prevedel Federal Building in Overland, MO. The technology will be provided by Carrier Corporation and coordinated with other ongoing evaluations of this technology.*