IDEA

PHASE 3 TECHNOLOGY DEMONSTRATION HIGHLIGHT

COMPANY
FlowEnergy

TECHNOLOGY
Surge Valve System: SmartValves and Surge Software

DEMONSTRATION SITE(S)
Manhattan Civil Courthouse
111 Centre Street
New York, NY 10013

DEMONSTRATION PERIOD
May 2018 – October 2019

SYSTEM(S) INVOLVED
CHILLED WATER / COOLING

TYPE OF SAVINGS GENERATED
ELECTRICITY

VENDOR'S POTENTIAL FOR SAVINGS
5%

SAVINGS ACHIEVED IN THIS DEMONSTRATION
4.5 – 4.7%

SAVINGS

SIMPLE PAYBACK PERIOD
6 years

Technology Description

The FlowEnergy Surge Valve System is designed for precision control of chilled water in order to reduce energy use in a building's air handing units (AHUs). The system combines SmartValves and proprietary Surge software that together can reduce demand for chilled water and heating fuel, lower energy usage, improve occupant comfort, and stabilize overall system operation.

Traditional control valves can experience a change in flow rate as pressure in the system fluctuates, which results in a cycle of unstable control as the valve works to maintain a temperature set point. SmartValves look to address this issue with a two-section design, that controls the flow rate through the valve and automatically adjusts to system pressure changes to maintain a constant differential pressure. SmartValves are available in various sizes from 2- to 8-inches, and each is custom built for the AHU coil where it will be installed.

Data analysis from the FlowEnergy system can identify low pressure conditions, clogged coils and strainers, and unstable water temperatures. When used in conjunction with information from the building automation system (BAS), the system can help operators recognize and correct inefficiencies such as unstable temperature control, overheating and overcooling, simultaneous heating and cooling, damper control issues, and poor economizer control. A properly installed system promises to eliminate most three-way connections and bypasses so that the precise amount of chilled or heating water is delivered at the AHU coil, creating a comfortable and stable environment that requires less energy and operator oversight.

In addition to SmartValves, system hardware includes temperature sensors at the coil inlet and outlet. The valves and sensors track water flow rate through the coil and measure the differential temperature (Delta T) to the Surge software platform via a cellular network. The dashboard uses these data points to act as a British thermal units (Btu) energy meter, allowing operators to monitor the heating and cooling load for each coil. The system can track a number of other data points, including the pressure profile of the hydronic system it is logging, air temperature at the inlet and return, and zone air humidity.

Optimal Facility Characteristics

A large facility with a BAS and significant cooling and/or heating demands will benefit most from installation of the system.

Demonstration Results & Discussion

FlowEnergy technicians conducted a site survey to assess facility conditions and identify and measure the AHUs that will receive SmartValves. In this demonstration, the team determined that SmartValves would be installed in four AHUs in the Manhattan Civil Courthouse penthouse, while DeltaPValves were installed in three AHUs with smaller loads in the facility's plant, garage, and basement.

FlowEnergy estimated savings as a result of the demonstration at 25% in the chilled water system and 5% for the whole building. Edison Energy, an energy services company contracted by DCAS to verify the measurement and verification of the demonstration, verified that the installation realized whole buildings savings just below the target: 4.5% for 2018 and 4.7% for 2019, or 116,480 kWh saved in 2018 and 112,074 kWh saved in 2019. The savings represent 17% of the chilled water system baseline usage.

Recommendations for Implementation

- While electricity savings fell short of what the vendor projected, the margin of difference was minor, and it is anticipated that savings will compound across the future. In combination with other retrofits and adjustments in operations and maintenance practices, SmartValves can help large facilities with BAS achieve greenhouse gas reduction goals.
- The cost of the demonstration was about $100,000 with an estimated simple payback period of six years, but subsequent installations are expected to be less expensive, as mechanical and electrical installation contractors gain familiarity with the process.
- Though SmartValves require little routine maintenance, proper chemical treatment of the hydronic system is required to prevent clogging pressure sensors, corrosion of valve components, and poor coil heat transfer.
- In order to avoid damage to the SmartValves, positive differential pressure must be maintained. Operators should follow the manufacturer's guidelines for monitoring and managing the system, especially if back-flushing, back-filling or hydrostatic testing is required, or if the software platform indicates a drop in pressure in the valves.
- In this demonstration, the courthouse penthouse was already equipped with a panel that provided an analog connection between the SmartValves and the BAS. If a facility is not similarly equipped, setting up a connection should be anticipated to be incorporated into project planning and timelines.

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FlowEnergy Surge