

Product Performance Assessment of Bonded Energy Solutions' Building Management System

Bonded Energy Solutions, Inc. (Bonded Energy), a New York based company emerging from the Stony Brook Clean Energy Business Incubator, is developing products for the clean energy sector. Bonded Energy provides new product solutions for management of building heating control to assist with meeting the minimum acceptable energy benchmarks, while reducing fuel utilization and greenhouse gas emissions.

Bonded Energy's Building Management System (BMS) enables zone control for steam-heated buildings without additional piping or conversion to hydronic systems. Using the concept of connected devices and the Internet-of-Things (IoT), Bonded Energy utilizes wall sensors in each room where a steam heat radiator is located, along with an air vent controller for one pipe steam heating systems thereby allowing occupants to modulate the individual room temperature.

CHALLENGE

Bonded Energy requested New York State Pollution Prevention Institute (NYS P2I) at Rochester Institute of Technology (RIT) to provide an independent 3rd party assessment to verify the energy efficiency improvements and improved temperature control when using their new BMS.

To facilitate the assessment, Bonded Energy identified two similar buildings with identical boilers that were available during the 2014 and 2015 heating seasons for evaluation. After initial baseline testing of both buildings in 2014, Bonded Energy installed their new BMS in one of the buildings, while the other remained in an unaltered state for a baseline comparison. NYSP2I's objective was to instrument and perform a comparative study on the two buildings, document energy use and apartment temperatures during the 2015 heating season, in order to quantify the product's impact.

CHALLENGE

- Bonded Energy requested an independent product assessment to verify energy efficiency improvements and improved temperature control when using their new BMS
- A performance evaluation of Bonded Energy's building management system as applied to a standard building steam heating system was requested

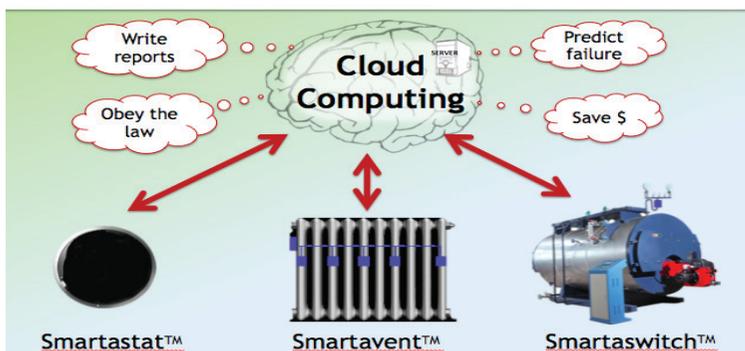
SOLUTION

- NYSP2I conducted an independent on-site assessment at two identical buildings, performing temperature data acquisition and energy use measurements over the course of the project

RESULTS

- NYSP2I documented baseline operating conditions and identified opportunities for improved heating controls at the two identified buildings
- Bonded Energy may use the data and analysis provided by NYSP2I to further optimize their BMS system applications.

Product: Cloud-Based Building Management System



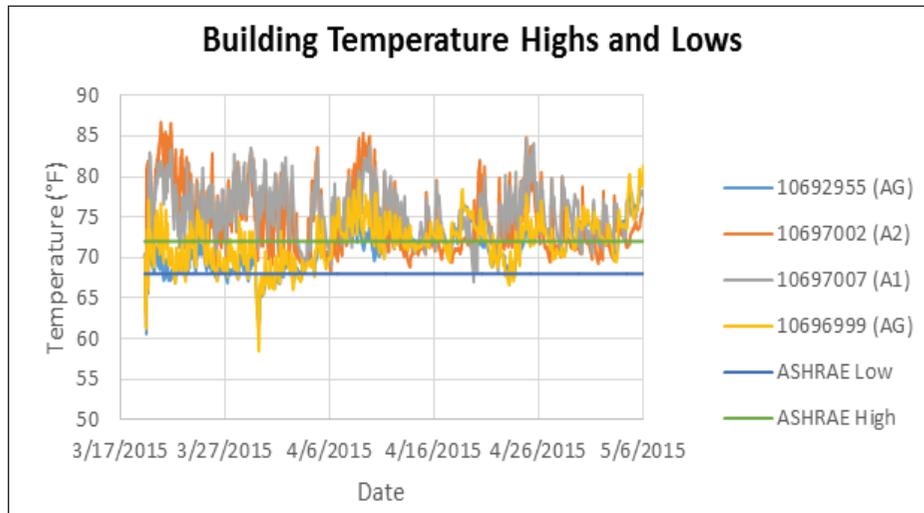
Bonded Energy control system provided by Bonded Energy Solutions, Inc.

SOLUTION

Installation of the sensor and control system by NYSP2I and Bonded Energy was conducted at the two identified buildings. NYSP2I required access to both buildings to perform data acquisition and energy use measurements over the course of the project. Baseline data was obtained and compared for both buildings, but the project ended prior to the completion of the operational data being collected due to limited building access.

RESULTS

NYSP2I documented baseline operating conditions and identified opportunities for improved heating controls at the two buildings identified. Temperature excursions recorded by NYSP2I instrumentation are illustrated in the figure below for apartments indicated, and plotted against the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommended Indoor Air Temperatures for comfort.



NYSP2I engineers observed and concluded the following:

- Uneven heating of apartments in the baseline building operating system was observed.
 - » Apartment temperatures ranged from 15 °F above, to 10 °F below, the ASHRAE recommended range for the baseline buildings without Bonded Energy's system installed.
 - » Some apartments were substantially warmer than others.
 - » Heat variation appears to be linked to apartment location within the building.
 - » Apartments directly above the boilers were warmer than those further away.
- The temperature in all apartments increased with outside air temperature (OAT), even when the OAT was below the building set-point.
- Individual control of apartment radiators could potentially help balance the temperatures throughout the building.
- Individual control of apartment radiators linked to boiler controls could likely help reduce delivered heat during warmer OAT when heat is not needed and save energy.

Bonded Energy may consider a future installation to replicate this study and qualify the energy savings and improved temperature control with their latest building management system.

TESTIMONIAL

“Over the course of the past year, I have had the opportunity to work closely with the NYS2PI team. The program and staff are truly an asset to both NYS and any company looking for a comprehensive evaluation of their product and its performance. As for results, the NYS2PI group maintains the highest level of integrity while working with their clients. The summary reports are useful both internally to the company and valuable to the industry that the company serves.”

– Jerritt Gluck, Founder & CEO
Bonded Energy Solutions, Inc.

NYSP2I PARTNERS



New York Manufacturing Extension Partnership

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