GREEN TECHNOLOGY ACCELERATOR CENTER

CASE STUDY

NYSP2I's Product Assessment of Keen Home's Smart Vent System™ Identifies Energy Saving Opportunities

Keen Home Inc, is a New York based company emerging from the NYU-Poly ACRE incubator. Keen Home developed the Smart Vent™, a unique building control system targeting increased user comfort and energy savings through intelligent control of individual Heating, Ventilation and Air Conditioning (HVAC) room vents. The system can be utilized year-round for both heating and cooling operations, and can regulate the temperature room-by-room to eliminate the common problem of certain rooms being too hot or too cold, and save energy in the process. In addition to the Smart Vent System's™ room-by-room temperature control capability, it can also provide remote access through smartphones and tablets via Keen Home's mobile application.

Challenge

Keen Home requested New York State Pollution Prevention Institute (NYSP2I) at Rochester Institute of Technology to provide an independent third party assessment to verify their claims of energy efficiency and improved occupant comfort of their Smart Vent System™. In order to evaluate the system, a comparision to a common forced-air HVAC equipped home with manual vents was required.

Keen Home Smart Vent™

Keen Home identified the test site and installed the Smart Vent System™ at the site, however the room-by-room temperature control capability was still under development. Therefore each room required manual programming of the vent opening position which controlled the airflow to each room. NYSP2I was contracted to design and execute the independent assessment, including instrumentation of the test site and evaluation of the energy savings and occupant comfort when using the Smart Vent System™ vs. the baseline forced air system.

Solution

Testing of Keen Home's Smart Vent™ product was performed by NYSP2I experts during the 2015 air conditioning season, at a rented home in Maywood, NJ. Both room-by-room temperature control and energy use were evaluted. Testing occurred during the summer, and thus cooler indoor air temperatures were considered more comfortable in this evaluation. Temperature instrumentation was placed throughout the house, and a power data logger recorded the air conditioner's energy consumption during the test. Approximately every two weeks, vent installation alternated between manual "baseline" vents and the Smart Vent System™. Weather data was retrieved from Weather Underground® during the test period.

CHALLENGE

- Keen Home requested an independent product assessment to verify their claims of energy efficiency and improved occupant comfort for their Smart Vent System™. A comparison of the Smart Vent System™ and a common forced air HVAC equipped home with baseline manual vents was required.

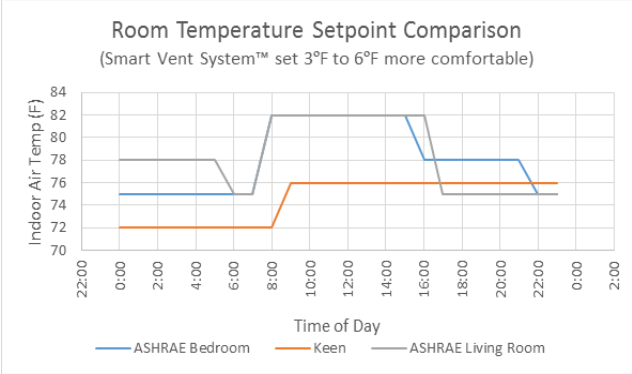
SOLUTION

- NYSP2I's experts conducted an independent third party assessment of the energy efficiency gains and occupant comfort associated with Keen Home's Smart Vent™ product.

RESULTS

- NYSP2I's assessment found that the average temperature in Keen Home's Smart Vent™ equipped house was more comfortable, with no detectable increase in energy consumption as compared with the manual baseline vents.
- Additional opportunities to further improve occupant comfort and reduce energy consumption were identified by NYSP2I, by utilizing the features unique to the Smart Vent System™.
- Keen Home has a credible, independent third party verification of energy efficiency and improved occupant comfort of their Smart Vent System™.

Keen Home used the rental home as both an office and living space. If it were occupied by a typical dual-career family, the use of the Smart Vent System™ would differ during testing because houses are generally unoccuped during the day. The rented house was constantly occupied, and thus the thermostat settings used by NYSP2I differed from the settings recommended by the American Society for Heating Refrigeration and Air Conditioning (ASHRAE). In this case, NYSP2I did not confirm the full energy saving potential for a Smart Vent™ System along ASHRAE guidelines.



Comparison of ASHRAE recommended set points and the test house set points used during the project testing (Keen TX).

Results

Upon completion of the assessment, NYSP2I concluded that the use of the Smart Vent System™ did, in fact, indicate an overall improvement in occupant comfort. The average test house temperature was reduced from 79.4°F using baseline vents to 75.7°F using the Smart Vent System™. While this increased comfort, there was no detectable increase in energy consumption.

NYSP2I concluded that Smart Vents™ could provide the home additional energy savings while maintaining comfort through careful setup of a programmable thermostat combined with the use of Smart Vents™. In addition, NYSP2I was able to identify opportunities that would further improve occupant comfort and reduce energy use.

NYSP2I provided Keen Home with an engineering report containing the independent third party assessment findings, which includes a list of potential product improvements that can be implemented by Keen Home to further optimize and support commercialization of their new Smart Vent™ technology.

Keen Home may choose to perform a repeat evaluation using temperature based settings similar to the ASHRAE settings recommended by NYSP2I, and integration of thermostatic room temperature control by the Smart Vent System™ (i.e. a “smart” thermostat like Nest™ or Ecobee™). It’s expected that the energy consumption will be further reduced under Smart Vent operation if Keen Home incorporates the findings in the report.

TESTIMONIAL

“The NYSP2I third party assessment has been very helpful to our organization. The study instilled independent analytical rigor around our product’s value propositions which gave us confidence to proceed to commercialization .”

– Nayeem Hussain, Co-Founder & CEO, Keen Home Inc.

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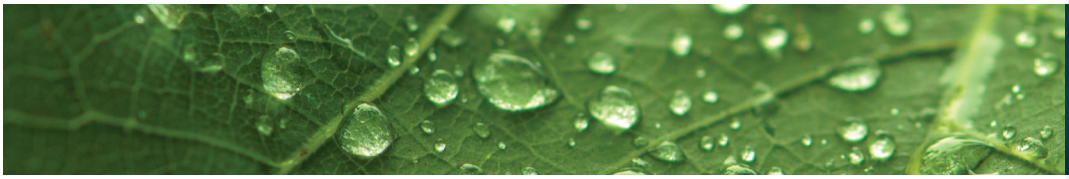

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