

DR10SCE1.05.01: DR Technology Evaluation of AutoDR Programmable Communicating Thermostats

OPPORTUNITY

Why is testing in a real-world setting so important?

By testing in real-world settings, researchers can verify that the technology proposed by the participating manufacturer performs to the published specifications by delivering the Demand Response (DR) signal needed to reliably reduce demand. Additionally, it allows for quantification of the benefit of participating in a DR event by leveraging this technology.

TECHNOLOGY

How does the programmable communicating thermostat (PCT) work?



The remotely controlled PCT enables DR by altering the thermostat set points of packaged rooftop HVAC units. The built-in communication module communicates through a wireless network to the internet, allowing all features and functions of the thermostat to be accessed remotely. The module is compatible with the OpenADR standard.

Clients can log on to a secure website to program heating and cooling schedules and set points, to establish moderate and high temperature offsets, and to lockout local thermostat control. The website also displays groups of thermostats, showing their connection status, temperature and humidity at the thermostat, cooling and heating set points, operating mode, and fan state.

The thermostat can operate one- and two-stage AC units, and can be programmed with up to seven schedules per day. Demand response periods can be scheduled in advance. The thermostat also has a large, easy-to-read temperature display.

M&V

Where did Measurement and Verification occur?

The study was conducted at three fast food restaurants in the Inland Empire, California, where a total of eight HVAC units had PCTs installed. The PCTs are typically a direct replacement for existing thermostats for HVAC units, or heat pumps, except where the existing thermostat used a remote temperature sensor.

RESULTS

How did the PCTs perform in M&V?

THE ENERGY SAVINGS FOR THE DR EVENTS WAS APPROXIMATELY 25%

There were many factors influencing the demand savings results. These include communication module firmware issues, manual override of set points during DR tests, occasionally intermittent WiFi at the site, non-optimal test conditions, AC units that were turned off, and AC units that may not be properly sized for the cooling load.

DEPLOYMENT

What improvements need to be made prior to deploying PCTs at a large scale?

COMPATIBILITY IMPROVEMENTS NEEDED - Compatibility issues need to be addressed during specification of equipment prior to installation. One of the specifications is that the PCT is not compatible with thermostats using remote temperature sensors.

INSTALLATION TRAINING NEEDED - Because these are new technologies, HVAC installation technicians must be trained on how to pair the units with any wireless networks that already exist at customer facilities.

FURTHER STUDIES of these installations should be conducted during summer conditions in order to determine how much savings are achievable during conditions similar to actual DR events.

