SCE DRET Findings
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DR12.13: Demand Response Technology Evaluation of AutoDR Occupant Controlled Smart Thermostats

OPPORTUNITY

Test the viability of DR using OCST, this could bring participation of a larger number of customers in a wider range of groups.

The purpose of this study was to evaluate the demand response (DR) capabilities of occupant controlled smart thermostats (OCSTs). OCSTs are radio thermostats with communication modules that typically serve as direct replacements for existing thermostats for heating, ventilation, and air conditioning (HVAC) units or heat pumps. These devices leverage Open Automated Demand Response (OpenADR) 1.0 protocol. For the study, four commercially available OCSTs and automation systems were installed in two fast food restaurants in the Inland Empire (California Climate Zone 10).

TECHNOLOGY

OCST and web-enabled energy management system. Allows Wi-Fi DR signals from utility to remotely control.

OCST and Intelligent system autonomous web-enabled energy management system. The OCSTs used were equipped to remotely alter the thermostat cooling or heating setpoint temperature in response to a DR event signal. DR signals from the utility were received via the customer's internet and connected energy management system. When the OCST raises the cooling setpoint temperature during the cooling season, the AC unit will turn off or operate at a reduced duty cycle.

- Determine if the OCSTs reliably received the DR signal
- Determine if the OCSTs reduced AC demand upon receipt of a DR signal
- Determine how much AC demand was dropped for each setting tested

RESULTS

The OCSTs reliably received DR signal during approximately 71% of the tests.

The OCSTs reliably received DR signal during approximately 71% of the tests. The cell service signal is suspect in the cases where the signal was not received. This underlines the importance of a strong, reliable internet connection as part of the communication chain. The OCSTs were able to reduce demand in 4 of the 10 successful events (that is, the OCST received the DR signal and changed the cooling temperature offset accordingly). AC demand was reduced when the temperature at the OCST was lower than the temperature offset requested by the DR signal. **The study found** a single quantitative result for AC demand drop: **an average demand savings of 1.8 kW**, or about 20%, per AC unit measured.

CONCLUSION

The results show that demand savings can be achieved through the use of OCSTs however the OCST system had compatibility issues that need to be addressed during specification of equipment.

The results of this field evaluation show that demand savings can be achieved through the use of OCSTs responding to a demand reduction request. As with some new technologies, the OCST system had compatibility issues that need to be addressed like specifying a hardwired network connection to an internet router at the facility.

Also, in facilities that have remote temperature sensors, it should be noted if the OCST is capable of using these sensors. In order to effectively reduce demand, the AC units cannot be undersized. If the space is overheating, raising the cooling setpoint may not turn the AC unit off, and no DR will be realized.