

The EEM1 (guestroom controls) post M&V plan intends to collect a sample of guestroom FCU operation, guestroom occupancy data, and daily vacancy data (for the sampled guestrooms and the average for the hotel) over a period of two weeks in order to modify the hotel eQUEST model with site-specific findings. Fan motor state and time-series supply & return temperatures will also be collected over a period of 2 weeks. These data will be used to create site-specific heating and cooling hourly thermostat schedules for the guestroom zones in the eQUEST model. The guestroom zones and respective thermostat schedules can be categorized in to rented and unrented room types using the collected vacancy data.

The following sample size and data is to be collected:

1. The sample size of guestrooms will be 15 rooms with the guestrooms controls enabled (the “installed room”), and 15 rooms with the guestroom controls disabled (the “baseline room”). The selection shall be random if possible but should also incorporate both rented and unrented rooms (or unrented rooms that are expected to be rented within the metering period). To reduce the risk of logger removal and attrition, instruct all staff to not remove the logging equipment. If hotel management agrees, note each guestroom sampled so that hotel staff are aware of which rooms have logging equipment in case an occupant reports a removed logger or if they wish to mention the equipment to the occupant. Alternatively, a formal letter could be written to assist in explaining the purpose and importance of the loggers. These letters could be placed in the sampled guestrooms;
2. Collect pre-existing hotel staff protocol for vacant and unoccupied guestrooms cleaned by staff. Specifically, determine whether cleaning staff were instructed to turn off or set back the guestroom FCU thermostat for vacant and/or unoccupied rooms;
3. Collect the site-specific programmed operation of the guestroom thermostat controls by reviewing the equipment programmed settings. Specifically, collect the setback (unoccupied) heating and cooling thermostat set points, the time interval for the thermostat to go in to the unoccupied setback mode (i.e., delay between the time the occupants leave and the time the unit goes into setback mode) , and the unoccupied fan mode (i.e., if the fan runs continuously in unoccupied mode or if it cycles on only when there is a call for cooling);
4. Collect daily vacancy state (rented or unrented) for each sampled room and for the entire hotel (e.g., xx guestrooms rented out of yy guestrooms total), for the duration of the metering period (2 weeks). For 14 metered days and 30 guestrooms, a total of 434 vacancy data points will be collected;
5. Collect motor state data for each sampled guestroom. The logger needs to be placed as close to the motor (not the fan blower casing) as possible. Calibrate the state logger and test on all fan speeds (if there are multiple speeds);
6. Collect supply and return temperatures for each sampled guestroom. The temperature loggers should be placed behind the supply and return vent grilles. Set the logging interval for as short as possible (1 minute logging interval would be desirable) to allow at least 2 weeks of metering;
7. Collect at least 2 weeks occupancy data for four (4) randomly selected guestrooms *with the occupancy controls enabled*. The hotel management will have to be notified of these particular rooms so that they can inform occupants of the equipment. Additionally, the loggers should be

placed in an area that is as inconspicuous as possible. A potential area could be the upper wall near the supply vent where the field of view of the occupancy sensor is similar to the thermostat sensor but more inconspicuous and out of reach than the thermostat wall; and

8. Collect nameplate information for the guestroom fan coil unit. Some of the nameplate information may include motor size, full load current, and nominal coil flow rate. Collect the pre-existing fan modes (e.g., low, medium, high) and the installed thermostat fan modes (i.e., did it change from the pre-existing).

The collected data will be used to modify the eQUEST model's guestroom cooling and heating hourly thermostat schedules and to add three (3) guestroom categories: rented & occupied, rented & unoccupied, and vacant/unrented. The current eQUEST model simulates all the guestroom spaces as being rented throughout the year. Using the pre-existing hotel protocol for vacant rooms and the logger data collected for vacant rooms, heating and cooling thermostat schedules can be created for a respective portion of the modeled guestroom zones to represent the average vacancy of the hotel and the baseline and installed FCU operation of those vacant guestrooms.

Cooling and heating thermostat hourly schedules will be generated for all three guestroom categories. The collected occupancy data will be used with the temperature data in order to verify proper guestroom occupancy controls operation and to assist with identifying between manual occupant thermostat adjustments and automatic unoccupied setback adjustments in the temperature data for guestrooms that do not have occupancy sensors. The temperature and motor state data analysis will utilize the pre-existing hotel protocol for vacant rooms, the site-specific programmed operation of the installed thermostats, and the room-specific vacancy data in order to parse the data as precisely as possible and create thermostat schedules for each room type. The data collection effort will ultimately create 10 hourly thermostat schedules to be input in to the eQUEST model: four for the vacant room type (the baseline and installed heating & cooling schedules), two for the rented & occupied room type (the heating and cooling schedules; they are the same for the baseline and installed), and four for the rented & unoccupied room type (the baseline and installed heating and cooling schedules). Depending on the pre-existing hotel protocol for unrented rooms, the number of schedules may be less.