Guest Room Occupancy Controls

California Statewide Utility Codes and Standards Program

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California Energy Commission
Staff Pre-Rulemaking Workshop
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Overview

- Proposed measure requires installation of occupancy controls for HVAC equipment, and lighting fixtures in hotel/motel guest rooms, including plug-in lighting.
- These occupancy controls can be captive card key controls, or occupancy sensor based controls.

Overview

- Mandatory installation of automatic controls for HVAC, lighting, and (~1/2 of) receptacles in guest rooms
- Controls return HVAC equipment to a setback position and turn off lighting and receptacles when room is vacant

Type of Change

- Mandatory
- Change to Section 150
- Table N2-7 in ACM Manual
  - Change occupancy usage patterns
  - Return HVAC to setback temperatures when room is unoccupied
- Change lighting schedule

Measured Site Energy Savings

- CLTC Field Study
  - 12 - 2,600 kWh annual savings per guest room
  - 7-40 therms annual savings per guest room per year
  - 7% -73% heating and cooling savings
- SCE
  - Palm Springs (CTZ 15)
  - 43% (average) heating and cooling savings
  - 930 kWh/yr HVAC savings extrapolated from 7 months data
  - 144 kWh/yr lighting savings extrapolated from 3 months data
- AEC
  - 28% average heating and cooling measured savings
  - Calibrated model CTZs 3, 4, 5, 12, 13
  - HVAC Savings Range 283 to 248 kWh/yr, 2.1 to 1.1 therm/yr
  - HVAC Average 273 kWh/yr, 1.4 therms/yr per room
  - Lighting savings average 47 kWh/yr per room

Site Lighting Energy Savings

- Energy savings realized any time guests leave the room without turning lights off
- No data available that explicitly describe the percentage of time for which lighting is left on in unoccupied guest rooms
- PIER Hotel Bathroom Lighting Control System case study measured savings in hotel guest room bathrooms
  - Represents the best available occupancy-based energy savings data for hotel guest rooms

Site Lighting Energy Savings

	Average Savings between 11am and 5pm	Annual Savings (kWh/year)
Bathroom	16%	32.8
Bedside	15%	13.8
Desk	12%	2.5
General	22%	12.9

System Costs per Guest Room

Occupancy Control Manufacturer/Product	Cost per Guest Room
Occupancy Sensor based	
Onity System - Stand Alone	$270
INNCOM System - Stand Alone	$325
Energy Eye System	$280
Smart Systems	$230
Lodging Technology Corp.	$270
Average	$275
Captive Card Key	
Watt Stopper Card Key Control	$100

System Costs per Guest Room

- Additional relay for lighting control
  - Approx. $30 for wired systems
  - Approx. $45 for receptacle control
  - Wireless systems may require additional components at higher costs
- Total installed cost
  - Card key control, HVAC reset, lighting and plug load relay = $175
  - Occupancy sensing (ave) , HVAC reset, lighting and plug load relay = $350

Guest Room Occupancy Controls

Proposed Code Language

SECTION 122 – REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS

Space-conditioning systems shall be installed with controls that comply with the applicable requirements of Subsections (a) through (h).

(c) **Hotel/Motel Guest Room and High-rise Residential Dwelling Unit Thermostats.** Hotel/motel guest room thermostats shall have:

1. Numeric temperature setpoints in ˚F; and

2. Setpoint stops accessible only to authorized personnel, to restrict over-heating and over-cooling.

High-rise residential dwelling unit thermostats shall meet the control requirements of Section 150(i). Hotel/Motel guest room thermostats shall also meet the requirements 150(q).

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Proposed Code Language

SECTION 130 – LIGHTING CONTROLS AND EQUIPMENT—GENERAL

(a) Except as provided in Subsections (b) and (c), the design and installation of all lighting systems and equipment in nonresidential, high-rise residential, hotel/motel buildings, and outdoor lighting subject to Title 24, Part 6, shall comply with the applicable provisions of Sections 131 through 139. All lighting controls and equipment shall be installed in accordance with the manufacturer's instructions.

(b) **Indoor Lighting in High-rise Residential Dwelling Units and Hotel/Motel Guest Rooms.** The design and installation of all lighting systems, lighting controls and equipment in high-rise residential dwelling units and in hotel/motel guest rooms shall comply with the applicable provisions of Section 150(k). Lighting controls in Hotel/Motel Guest rooms shall also meet the requirements of Section 150(q).

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Proposed Code Language

SECTION 150 – MANDATORY FEATURES AND DEVICES

Any new construction in a low-rise residential building shall meet the requirements of this Section. Dwelling units in high rise residential or in hotel /motel buildings shall meet the applicable requirements in subsections (i), (k), and (q).

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Proposed Code Language

(q) Hotel/Motel Guest Room Automatic Control of HVAC and Lighting. In hotels and motels, all hardwired lighting, HVAC equipment and half of the receptacles serving each guest room shall be automatically controlled so that no more than 30 minutes after the guest room has been vacated, the power for lighting and controlled receptacles will be turned off and the HVAC set points raised by at least 5˚F (3˚C) in the cooling mode and lowered by at least 5˚F (3˚C) in the heating mode. Captive card key systems are also deemed as an automatic control. Controlled receptacles shall meet the following requirements:

1. Electric circuits serving controlled receptacles shall be equipped with automatic shut-off controls; and

2. At least one controlled receptacle shall be installed within 1 foot from each uncontrolled receptacle or a split-wired duplex receptacle with one controlled and one uncontrolled receptacle shall be installed; and

3. Controlled receptacles shall have a permanent marking to differentiate them from uncontrolled receptacles.

ACM Manual Proposed Change

- Section 2.4.3 Schedules:
  - Table N2-7 – Schedule Types of Occupancies & Sub-Occupancies - include an additional line for Hotel/Motel Guest Room with Occupancy Controlled Setback Thermostat and Lighting.
  - Addition of Table N2-X - Residential Occupancy Schedules (Including Hotel/Motel Guest Rooms) with Occupancy Controlled Setback Thermostat and Lighting

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QUESTIONS & COMMENTS