Energy Code for Townhomes

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Presenter

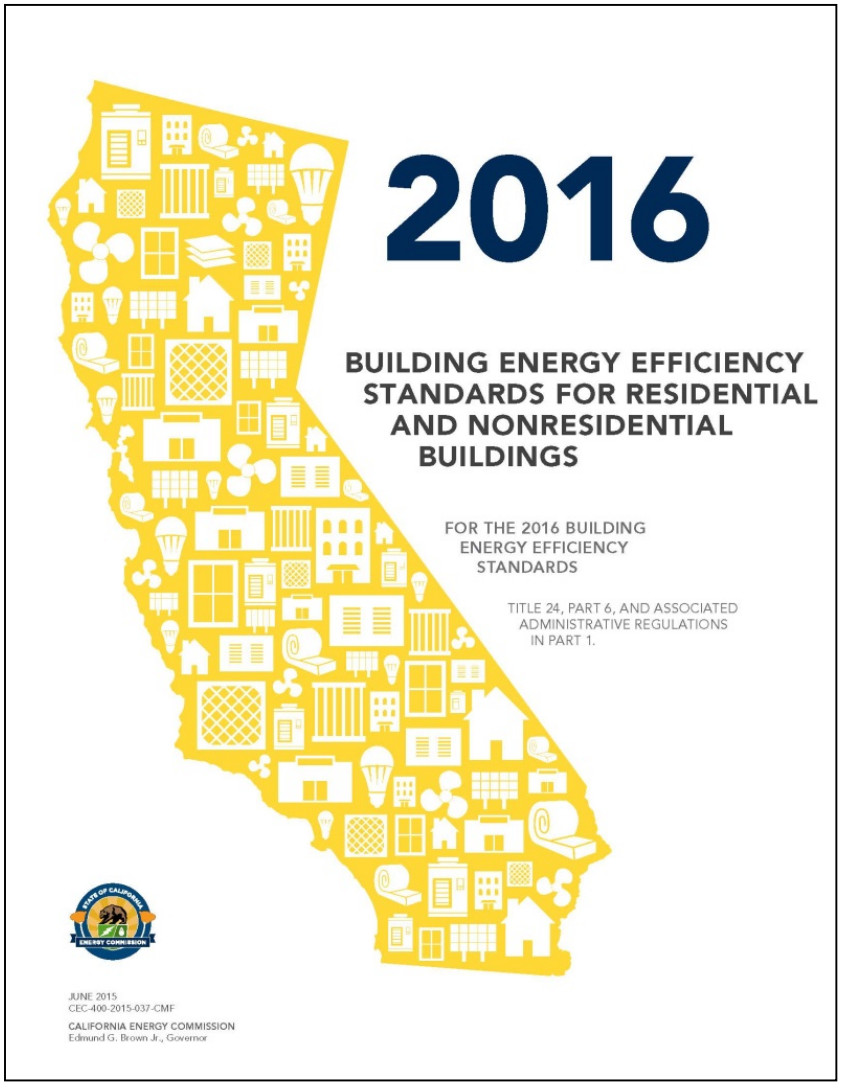
Christopher Olvera is the supervisor of the California Energy Commission's Outreach and Education Unit. He has over 15 years of experience working at the Energy Commission. He began work as a student on the Energy Standards Hotline, and has served in several other positions supporting a variety of programs, including: Home Energy Rating System (HERS), Acceptance Test Technician Certification Provider (ATTCP), low interest Energy Conservation Assistance Act (ECAA) loans, Bright Schools, and Clean Energy Jobs Act (Proposition 39).

Goals For This Course

- Define low-rise residential vs. high-rise residential buildings per the Energy Code
- Define habitable story and habitable space per the Energy Code
- Specify key differences in the applicable requirements for residential vs. nonresidential buildings
- Discuss considerations when modeling townhomes

Current Energy Code

- **2016 Building Energy Efficiency Standards**
  - Title 24, Part 6 (Energy Code)
  - In effect since January 1, 2017
- **Townhouses must meet:**
  - Low-rise residential requirements; or
  - High-rise residential requirements (nonresidential)



What is a Townhome?

Source: 123RF

- **Townhouse per Building Code**
- **Title 24, Part 2 & 2.5**
  - Single-family dwelling unit constructed in a group of three or more attached units in which each unit extends from the foundation to the roof and with open space [a yard or public way on not less than] on at least two sides
- **Title 24, Part 6**
  - Same definition as Part 2

Occupancy Classification

- **Defined in Part 2 & 2.5**
- **Assigned/determined by enforcement agency**
- **Occupancy Group R-3**
  - Townhouses not more than three stories above grade in height with a separate means of egress
- **Occupancy Group R-2**
  - Townhouses more than 3 stories

Low-rise Residential

- **Single family dwellings (any # of stories)**
- **Duplexes (any # of stories)**
- **Multi-family occupancies in any building 3 habitable stories or less**

Nonresidential

Nonresidential and commercial buildings

- All buildings in California Building Code (CBC) that are occupancy group A, B, E, F, H, M, R, S, or U
- Hotels and motels
- High-rise residential buildings

- ✓ Offices
- ✓ Retail and wholesale stores
- ✓ Restaurants
- ✓ Assembly and conference areas
- ✓ Industrial work buildings
- ✓ Commercial or industrial storage
- ✓ Schools and churches
- ✓ Theaters
- ✓ Hotels and motels
- ✓ Apartment and multi-family buildings, with four or more stories
- ✓ Long-term care facilities, with four or more stories

Applying the Energy Code to Townhouses

Source: 123RF

- **Low-rise residential building**
  - A building, other than a hotel/motel, that is Occupancy Group:
    - R-2, multi-family, with three habitable stories or less; or
    - R-3, single family; or
    - U-building, located on a residential site
- **High-rise residential building**
  - A building other than a hotel/motel, of Occupancy Group R-2 or R-4 with four or more habitable stories
  - Grouped with nonresidential

Habitable Story and Space

- **Habitable story**
  - A story that contains space in which humans may work or live in reasonable comfort, and that has at least 50% of its volume above grade
- **Habitable space**
  - A space in a building for living, sleeping, eating or cooking
  - Spaces that are not considered habitable:
    - Bathrooms, toilets, hallways, storage areas, closets, and utility rooms

Example I

Source: Jose Perez, Energy Standards Hotline

- Townhouses with 4 stories above grade, all are conditioned, and have a R-2 occupancy. One story is an entry landing and stairs.
- Are these townhouses classified as low-rise residential or high-rise residential buildings?
  - They are low-rise residential buildings (R-2 occupancy with 3 habitable stories or less)

Example II

- Multiple townhouses in one building with a R-2 occupancy. Some have 4 stories, others have 3, but all stories are habitable.

- Are these townhouses classified as low-rise residential or high-rise residential buildings?

  - They are high-rise residential buildings (R-2 occupancy with 4 or more habitable stories)

Source: 123RF

Example III

Source: 123RF

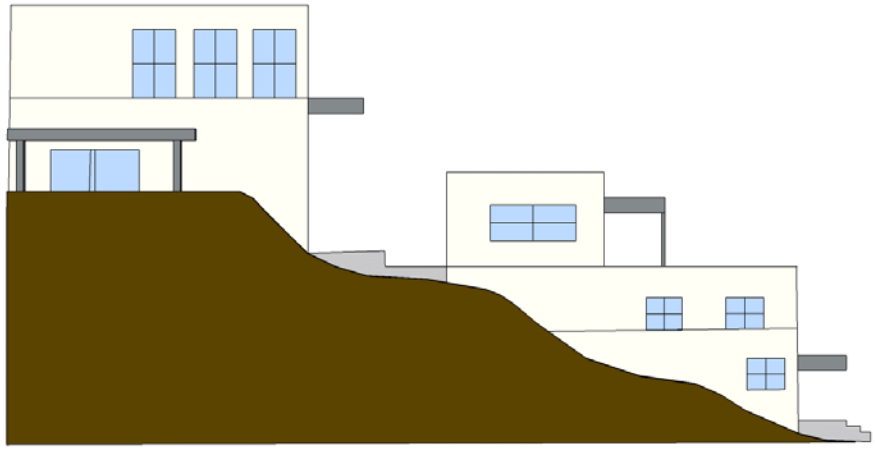
- Townhouses with more than 4 stories above grade (i.e., on a steep hillside) with a R-2 occupancy. Only 3 stories are habitable.
- Are these townhouses classified as low-rise residential or high-rise residential buildings?
  - They are low-rise residential buildings (R-2 occupancy with 3 habitable stories or less)

Example IV

- Townhouses built up into two levels but are connected by an unconditioned (sometimes exterior) walkway. Has 4 stories above grade, but only 3 are habitable.

- Are these townhouses classified as low-rise residential or high-rise residential buildings?

  - They are low-rise residential buildings (R-2 or R-3 occupancy with 3 habitable stories or less)



Source: Jose Perez, Energy Standards Hotline

Part 6 Low-rise Residential Sections

TABLE 100.0-A APPLICATION OF STANDARDS

Occupancies	Application	Mandatory	Prescriptive	Performance	Additions/Alterations
General Provisions for All Buildings		100.0, 100.1, 100.2, 110.0			
Nonresidential, High-Rise Residential, And Hotels/Motels	General	120.0	140.0, 140.2	140.0, 140.1	141.0
	Envelope (conditioned)	110.6, 110.7, 110.8,120.7	140.3		
	Envelope (unconditioned process spaces)	N.A.	140.3(c)		
	HVAC (conditioned)	110.2, 110.5, 120.1, 120.2, 120.3, 120.4, 120.5, 120.8	140.4		
	Water Heating	110.3, 120.3, 120.8, 120.9	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6		
	Indoor Lighting (unconditioned and parking garages)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	N.A.	
	Outdoor Lighting	110.9, 130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 130.5	N.A.		
	Pool and Spa Systems	110.4, 110.5, 150.0(p)	N. A.		141.0
	Solar Ready Buildings	110.10	N.A.		141.0(a)
Covered Processes[1]	Envelope, Ventilation, Process Loads	110.2, 120.6	140.9	140.1	120.6, 140.9
Signs	Indoor and Outdoor	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H
Low-Rise Residential	General	150.0	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)
	Envelope (conditioned)	110.6, 110.7, 110.8, 150(a), 150.0(b), 150.0(c), 150.0(d), 150.0(e), 150.0(g)			
	HVAC (conditioned)	110.2, 110.5, 150.0(h), 150.0(i), 150.0(j), 150.0(m), 150.0(o)			
	Water Heating	110.3, 150.0(j, n)			
	Indoor Lighting (conditioned, unconditioned and parking garages)	110.9, 130.0, 150.0(k)			
	Outdoor Lighting	110.9, 130.0,150.0(k)			
	Pool and Spa Systems	110.4, 150.0(p)	N. A.	N.A.	150.2(a), 150.2(b)
	Solar Ready Buildings	110.10	N. A.	N.A.	N.A.

[1] Nonresidential, high-rise and hotel/motel buildings that contain covered processes may conform to the applicable requirements of both occupancy types listed in this table.

- **§110.0 – 110.11 as applicable**
  - Apply to all buildings
- **§150.0 for mandatory measures**
- **§150.1 for ALL prescriptive requirements**
  - Newly constructed buildings
- **§150.2 for additions and alterations**

Part 6 Nonresidential Sections

TABLE 100.0-A APPLICATION OF STANDARDS

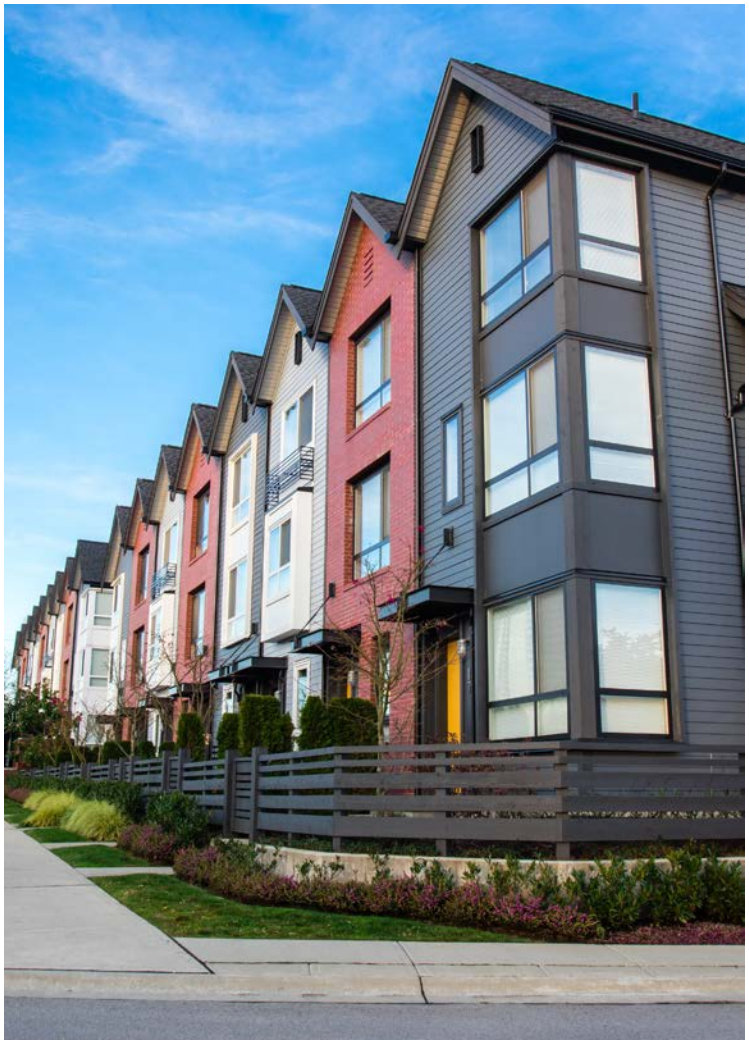
Occupancies	Application	Mandatory	Prescriptive	Performance	Additions/Alterations
General Provisions for All Buildings		100.0, 100.1, 100.2, 110.0			
Nonresidential, High-Rise Residential, And Hotels/Motels	General	120.0	140.0, 140.2	140.0, 140.1	141.0
	Envelope (conditioned)	110.6, 110.7, 110.8,120.7	140.3		
	Envelope (unconditioned process spaces)	N.A.	140.3(c)		
	HVAC (conditioned)	110.2, 110.5, 120.1, 120.2, 120.3, 120.4, 120.5, 120.8	140.4		
	Water Heating	110.3, 120.3, 120.8, 120.9	140.5		
	Indoor Lighting (conditioned, process spaces)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6		
	Indoor Lighting (unconditioned and parking garages)	110.9, 120.8, 130.0, 130.1, 130.4	140.3(c), 140.6	N.A.	
	Outdoor Lighting	110.9, 130.0, 130.2, 130.4	140.7		
	Electrical Power Distribution	110.11, 130.5	N.A.		
	Pool and Spa Systems	110.4, 110.5, 150.0(p)	N. A.		141.0
	Solar Ready Buildings	110.10	N.A.		141.0(a)
Covered Processes[1]	Envelope, Ventilation, Process Loads	110.2, 120.6	140.9	140.1	120.6, 140.9
Signs	Indoor and Outdoor	130.0, 130.3	140.8	N.A.	141.0, 141.0(b)2H
Low-Rise Residential	General	150.0	150.1(a, c)	150.1(a), 150.1(b)	150.2(a), 150.2(b)
	Envelope (conditioned)	110.6, 110.7, 110.8, 150(a), 150.0(b), 150.0(c), 150.0(d), 150.0(e), 150.0(g)			
	HVAC (conditioned)	110.2, 110.5, 150.0(h), 150.0(i), 150.0(j), 150.0(m), 150.0(o)			
	Water Heating	110.3, 150.0(j, n)			
	Indoor Lighting (conditioned, unconditioned and parking garages)	110.9, 130.0, 150.0(k)			
	Outdoor Lighting	110.9, 130.0,150.0(k)			
	Pool and Spa Systems	110.4, 150.0(p)	N. A.	N.A.	150.2(a), 150.2(b)
	Solar Ready Buildings	110.10	N. A.	N.A.	N.A.

[1] Nonresidential, high-rise and hotel/motel buildings that contain covered processes may conform to the applicable requirements of both occupancy types listed in this table.

- **§110.0 – 110.11 as applicable**
  - Apply to all buildings
- **§120 – 130 series for mandatory measures**
- **§140 series for prescriptive requirements**
  - Newly constructed buildings
- **§141.0 for additions and alterations**

Key Low-rise Residential Requirements

- High Performance Attics
- High Performance Walls
- Mandatory HERS Testing
- Indoor Air Quality
- High-efficacy lighting (JA8)
- Instantaneous water heater baseline
- Solar ready in subdivisions with ten or more
- In general, requirements more stringent for envelope

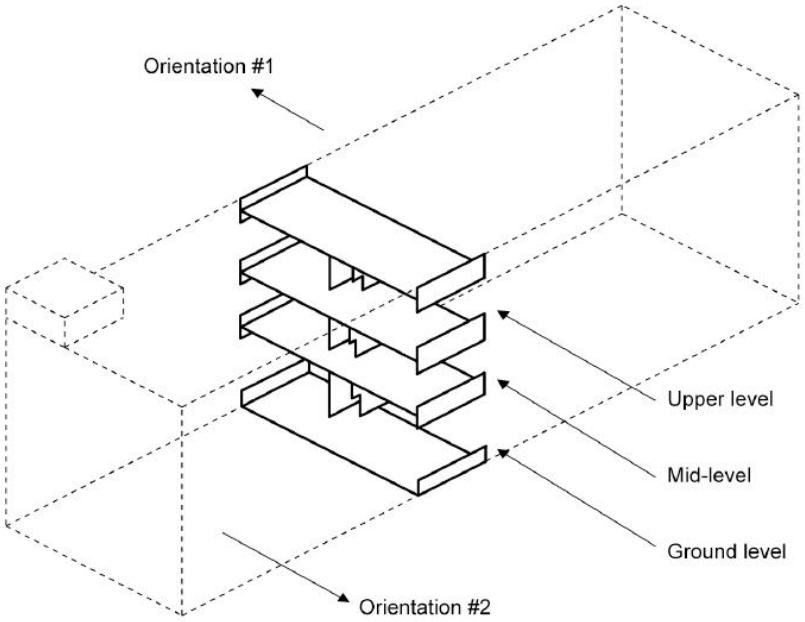


Source: 123RF

Key Nonresidential Requirements

- **HVAC**
  - Natural or mechanical ventilation
  - HERS duct leakage testing prescriptive requirement
  - No oversizing prescriptively
  - Acceptance Testing
    - Outdoor air ventilation
    - HVAC controls
- **Electrical power distribution**
- **Elevators**
- **Solar ready for high-rise residential buildings**
- **Outdoor lighting (including acceptance testing)**
- **Cool roofs (applicable in more climate zones)**
- **High-rise dwelling units**
  - Meet low-rise residential water heating and lighting requirements

Modeling Considerations



- **Low-rise residential**
  - Single-family, model each unit
  - Attic area error for HVAC ducting
  - More HERS measures to trade-off
- **High-rise residential**
  - Multi-family, model all units as one building
- **Demising walls**
  - Don't ignore them, requirements are different

Modeling Questions?

- **Low-Rise Residential**
- CBECC-Res
  - cbecc.res@gmail.com
- EnergyPro
  - support@energysoft.com
- Wrightsoft Right-Energy Title 24
  - support@wrightsoft.com

- **Nonresidential**
- CBECC-Com
  - cbecc.com@gmail.com
- EnergyPro
  - support@energysoft.com
- IES Virtual Environment
  - enquiries@iesve.com

Online Resource Center (ORC)

Online Resource Center

The Online Resource Center is provided to assist the building community and enforcement agencies with Building Energy Efficiency Standards (Energy Standards) compliance. Energy Standards apply to newly constructed buildings, as well as additions and alterations for existing buildings. Presently, the Energy Standards are updated every three years.

To assist in the compliance process, we provide compliance documents and free Public Domain Compliance Software programs for commercial and residential buildings. Training and links to the Energy Standards and compliance software are available on the Energy Commission website and at utility training centers throughout the state. To help direct you to an appropriate resource, Energy Commission and external resource information are provided on this page.

Building Energy Efficiency Standards

2016 Energy Standards

2013 Energy Standards

Past Energy Standards

Energy Standards Information and Training Materials

Overview

Commissioning

Covered Processes

Follow

Energy Standards Questions?

- Energy Standards Hotline

Energy Standards Booth Handouts

- Handouts - 02212017 (zip file, 507 mb)
- Help with the zip file

Forms

- 2016 Residential Compliance Forms
- 2016 Nonresidential Compliance Forms

Trainings & Events

- Energy Standards Outreach & Education Schedule
- Utility Sponsored Training Schedules

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Blueprint

- Email Newsletter
- Published quarterly
- Clarifications on frequently asked questions

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BLUEPRINT

CALIFORNIA ENERGY COMMISSION

EFFICIENCY DIVISION

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- Energy Code Ace Nonresidential PEBI Classes

2019 ENERGY CODE ADOPTED!

The California Energy Commission (Energy Commission) adopted the *2019 Building Energy Efficiency Standards* (Energy Code).

The 2019 Energy Code goes into effect January 1, 2020. Homes built under this Code will use about 53 percent less energy than those under the 2016 Code. Nonresidential buildings are estimated to use about 30 percent less.

Low-Rise Residential Highlights

PV Systems - For the first time, photovoltaic (PV) systems will be required prescriptively for newly constructed low-rise residential buildings, per **Section 150.1(c)14.** There are several exceptions which may allow a reduction in the size of the PV system required.

Quality Insulation Installation - Quality insulation installation becomes a prescriptive requirement in **Section 150.1(c)1E.**

All Electric Homes - A prescriptive pathway for an all electric home is introduced in **Section 150.1.**

Nonresidential, High-Rise Residential, and Hotel/Motel Highlights

Hospitals - For the first time, Occupancy Group I - Institutional (excluding I-3 and I-4) will have to meet the Energy Code for newly constructed buildings. The inclusion of Occupancy Group I is introduced in **Section 100.0(a)**. Additions and alterations to Occupancy Group I buildings do not have to comply.

MERV 13 Air Filters - New mandatory ventilation requirements are introduced in **Section 120.1**. Specified mechanical systems will be required to have minimum efficiency reporting value (MERV) 13 air filters. Air class and recirculation limits introduced based on occupancy categories.

LEDs - Lighting power density will be based on the energy consumption of LEDs instead of linear fluorescent lamps. This change to **Section 140.6**. results in largest energy savings in the 2019 Energy Code.

The **2019 Energy Code** is available for review. More information on the 2019 Energy Code is available in the **frequently asked questions**, infographics for **residential** and **nonresidential** buildings, and **news release.**

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www.energy.ca.gov/efficiency/blueprint/

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- Subscribe to the following Efficiency Lists
  - Building Standards
  - Blueprint
- Respond to confirmation email within 24 hours

Energy Standards Hotline

- Open Monday through Friday

  8:00 a.m. to 12:00 p.m. and 1:00 p.m. to 4:30 p.m.

- Call

  800-772-3300 (in CA)

  916-654-5106 (outside CA)

- Email

  Title24@energy.ca.gov