

# PG&E Pacific Energy Center

**Provider Number: H663**

**Title 24 - Where We're Headed with the 2016 Residential Standards - 16WS**

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Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

This course is registered with **AIA**



# Course Description

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The 2016 Title 24 Building Energy Standards will be more stringent than prior versions as we move closer to ZNE. The new standards are intended to reduce peak energy consumption and slow the growth in demand for electricity and natural gas in California. Martyn Dodd will summarize the new and revised requirements in the 2016 standards for residential buildings and direct participants to informational and training resources that provide more in-depth Title 24 information. Architects, engineers, lighting designers, energy consultants, contractors, and building department staff should find this training of interest and directly applicable to their work. Participants will benefit if they have some background on California's Title 24 Building Energy Standards. See:  
<http://www.energy.ca.gov/title24/>

# Learning Objectives

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At the conclusion of the program:

1. Will have an overview understanding of changes in scope, and new and revised mandatory and prescriptive requirements for residential building envelope in the 2016 Title 24 Energy Standards;
2. Will have an overview understanding of changes in scope, and new and revised mandatory and prescriptive requirements for residential electric lighting and associated controls in the 2016 Title 24 Energy Standards;
3. Will have an overview understanding of changes in scope, and new and revised mandatory and prescriptive requirements for residential mechanical systems and associated controls in the 2016 Title 24 Energy Standards;
4. Will be able to identify additional sources for in-depth information on the requirements of the 2016 Title 24 Energy Standards for residential buildings

# Course Conventions

## Mandatory



- Always required regardless of compliance approach used.

## Prescriptive



- Required when using the Prescriptive compliance approach.

## Performance



- Optional feature that would be accounted for when doing Performance based computer modeling.



# Overall Changes in Scope and Application

## Welcome

### Overall Changes in Scope and Application

- Schedule
- Additional Scope of Coverage
- Commissioning

Low-rise Residential Envelope

Nonresidential Envelope

Low-rise Residential Mechanical

Nonresidential Mechanical

Residential Lighting

Nonresidential Indoor Lighting

Nonresidential Outdoor Lighting

# Update Schedule

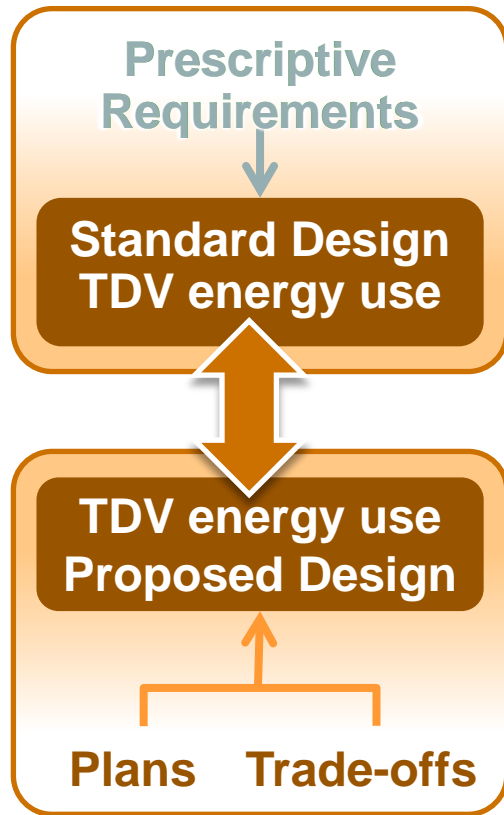
- June, 2015 Business Meeting – Language Adoption
- **Jan 1, 2017 Implementation Date**

Any projects that apply for permit on or after Jan 1, 2017 will be subject to the 2016 Standards.

- Information and Documents available at:

<http://www.energy.ca.gov/title24/2016standards/>

# Performance Compliance Approach



- Approved Performance software for 2016 Standards:
  - Nonresidential
    - CBECC-Com Version 2016
    - EnergyPro Version 7.0
  - Residential
    - CBECC-Res Version 2016
    - EnergyPro Version 7.0
- Performance approach allows a custom description of building features for many tradeoff opportunities
- Residential Compliance – 30% tougher than 2013.
- Nonresidential Compliance – 5% tougher than 2013.

\* NOTE: The list of approved software changes over time. Please check the CEC site for the latest information:

[http://www.energy.ca.gov/title24/2013standards/2013\\_computer\\_prog\\_list.html](http://www.energy.ca.gov/title24/2013standards/2013_computer_prog_list.html)



# Residential PV Systems



- The PV System Credit is available only if:
  - The Performance Approach is used
  - The project is in Climate Zones 1-5, 8-16
  - The system is  $\geq 2$  kWdc\* for Single Family
  - The system is  $\geq 1$  kWdc\* for Multi Family
  - The amount of credit will depend upon the Climate Zone and the Conditioned Floor Area of the dwelling.
- PV System credit does not require HERS verification unless getting rebate from the New Solar Homes Partnership (NSHP)

\* kilowatts direct current

A typical 1kWdc system often has approximately four PV panels

# Low-rise Residential Envelope

Welcome

Overall Changes in Scope and Application

## Low-rise Residential Envelope

- Insulation
- Fenestration
- Additions and Alterations

Nonresidential Envelope

Low-rise Residential Mechanical

Nonresidential Mechanical

Residential Lighting

Nonresidential Indoor Lighting

Nonresidential Outdoor Lighting



# Mandatory Measures

- Ceiling/Roof insulation minimum = R-22
- Non-framed (mass) wall minimum = R-13
  - Equivalency to R-13 wood framing
- Maximum fenestration U-factor = 0.58
  - New exception allows for 30 sqft for dual glazed greenhouse window
- Pet doors
  - Must meet maximum 0.3 cfm/ft<sup>2</sup> Air Leakage



# Prescriptive Wall Insulation



- U-Factor = 0.051
  - R-19 in 2x6 wall cavity (16" OC)
  - Additional R-5 rigid over framing members
- or;
- R-15 in 2x4 wall cavity (16" OC)
- Additional R-8 rigid over framing members
- Climate Zones 6 and 7 use 2013 U-Factor of 0.065 (R-15 w/R-4 rigid)

# Prescriptive Roof Insulation Option A



- Attic Radiant Barrier (zones 2-15)
- R-38 Insulation at ceiling
  - R-30 in zones 3, 5-7
- Continuous Roof Deck insulation
  - Zones 4, 8-16
  - R-6 With Air Space above insulation
  - R-8 with No Air Space
- Ducts and air handler may be located in the Attic



# Prescriptive Roof Insulation Option B



- Attic Radiant Barrier (zones 2, 3, 5-7)
- R-38 Insulation at ceiling
  - R-30 in zones 3, 5-7
- Below Roof Deck insulation (at rafter)
  - Zones 4, 8-16
  - R-13 With Air Space above insulation
  - R-18 with No Air Space
- Ducts and air handler may be located in the Attic



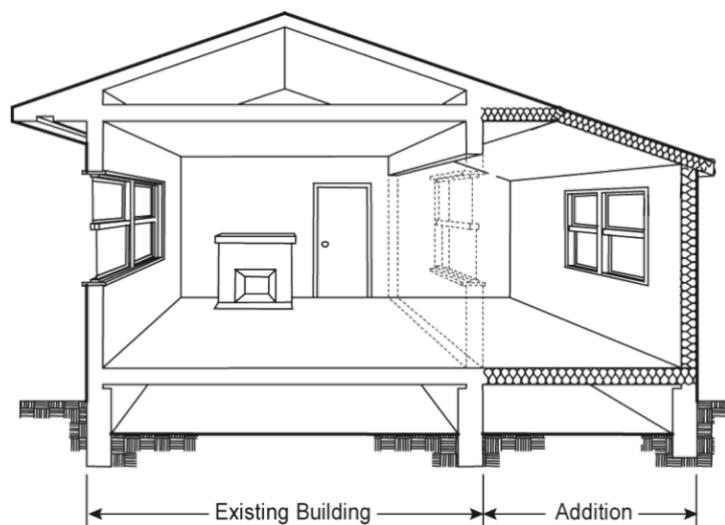
# Prescriptive Roof Insulation Option C



- Attic Radiant Barrier (zones 2-15)
- R-38 Insulation at ceiling
  - R-30 in zones 3, 5-7
- Ducts and air handler must be located in conditioned space



# Prescriptive Additions



- Special Package for Additions
- Extensions of existing wood-framed walls may retain the dimensions of the existing walls
- R-15 in 2x4 framing
- R-19 in a 2x6 framing
- Allows wall dimensions to remain the same
- Only applies where wall is extended
- No Foam board insulation required

# Low-rise Residential Mechanical

Welcome

Overall Changes in Scope and Application

Low-rise Residential Envelope

Nonresidential Envelope

## Low-rise Residential Mechanical

- Ducts
- Domestic Hot Water
- Whole House Fans
- Multi-Family

Nonresidential Mechanical

Residential Lighting

Nonresidential Indoor Lighting

Nonresidential Outdoor Lighting

# Mandatory Ducts



- Mandatory requirement all ducts in conditioned space include R-4.2 insulation
- Single Family duct leakage reduced to 5% maximum



# Prescriptive HVAC



- Roof/Ceiling Options A & B (Ducts in Attic)
  - R-8 in Zones 1-2, 8-16
  - R-6 in Zones 3-7
- Roof/Ceiling Option C (Ducts in Conditioned)
  - R-6 in all zones
- Zonally controlled central AHUs must meet 350 cfm/ton airflow rate and maximum 0.58 w/cfm fan wattage draw



# Domestic Hot Water Option 1



- Water heaters serving individual units
  - Gas or Propane tankless
  - Minimum Energy Factor = 0.83





# Domestic Hot Water Option 2



- Water heaters serving individual units
  - Gas or Propane with 55 gal or less tank
  - Minimum Energy Factor = 0.60
  - HERS verified Quality Insulation Installation (QII) and one of the following:
    - a. HERS verified compact hot water distribution system; or
    - b. HERS verified all DHW piping insulated



# Domestic Hot Water Option 3

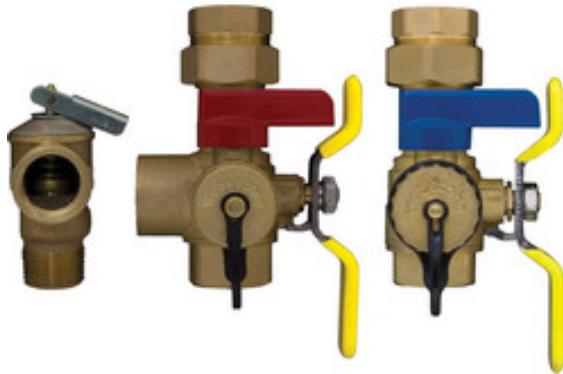


- Water heaters serving individual units
  - Gas or Propane greater than 55 gal tank
  - Minimum Energy Factor = 0.76 and one of the following:
    - a. HERS verified compact hot water distribution system; or
    - b. HERS verified all DHW piping insulated



# Domestic Hot Water

## Isolation valves



- Instantaneous water heaters with an input rating greater than 6.8 kBTU/hr (2 kW) shall have isolation valves on both the cold water supply and the hot water pipe leaving the water heater.
- Hose bibbs or other fittings on each valve for flushing the water heater when the valves are closed.

# Domestic Hot Water



- Water Heater Replacement
- Newly install piping insulated per Mandatory Measures
- Existing accessible piping also insulated

# Ventilation Cooling



## Whole House Fans

- Reduced from 2 cfm/sqft to 1.5 cfm/sqft
- Attic vent area reduced to 1 sqft per 750 cfm of airflow



Source: Residential Compliance Manual

2016 Title 24 Standards

# Residential Lighting

Welcome

Overall Changes in Scope and Application

Low-rise Residential Envelope

Nonresidential Envelope

Low-rise Residential Mechanical

Nonresidential Mechanical

## Residential Lighting

- Kitchens
- Bathrooms
- Garages, Laundry Rooms & Utility Rooms
- Outdoor

Nonresidential Indoor Lighting

Nonresidential Outdoor Lighting



# Overview of Residential Lighting



- ALL lighting requirements are Mandatory Measures
- Lighting energy is NOT part of energy budget for the whole building
- No tradeoffs between lighting and other features
- Standards apply only to permanently installed luminaires (light fixtures)

# Occupancies Covered

- ✦ Single-family buildings
- ✦ Low-rise multifamily buildings (three stories or less)
- ✦ High-rise multifamily residential units
- ✦ Hotel and motel guest rooms
- ✦ Outdoor lighting controlled from the inside of a high-rise multifamily unit or hotel/motel guest room
- ✦ Fire station dwelling accommodations
- ✦ Dormitory and senior housing dwelling
- ✦ Accessory buildings such as sheds or garages (U occupancy type) on residential sites

# Light Sources



- All light sources must be high efficacy per Table 150.0-A

## High Efficacy

- Pin-based linear or compact fluorescent lamps light sources using electronic ballasts.
- Pulse-start metal halide lamps.
- High pressure sodium lamps.
- GU-24 sockets containing light sources other than LEDs.
- Inseparable SSL luminaires that are installed outdoors.
- Inseparable SSL luminaires containing colored light sources that are installed to provide decorative lighting.

# Light Sources



## JA8 High Efficacy

- ✦ Light sources in ceiling recessed downlight luminaires.\*
- ✦ LED luminaires with integral sources
- ✦ Screw-based LED lamps (A-lamps, PAR lamps, etc.)
- ✦ Pin-based LED lamps (MR-16, AR-111, etc.)
- ✦ GU-24 based LED light source
- ✦ Any source or luminaire not listed elsewhere on the prior table
- ✦ Note controls required! (next slide)

\* No screw based sockets

# JA8 High Efficacy Light Sources



Residential Lighting



- ✦ Must be controlled by **vacancy sensor**
- or
- ✦ Must be controlled by a **dimmer**

## Exceptions:

- ✦ Closets <70 ft<sup>2</sup>
- ✦ Hallways



# Blank Electrical Boxes



- The number of electrical boxes that are more than 5 feet above the finished floor and do not contain a luminaire or other device shall be no greater than the number of bedrooms.
- These electrical boxes must be served by a dimmer, or vacancy sensor control, or fan speed control.



# Bathrooms, Laundry Rooms, Utility Rooms & Garages



- At least one fixture must be controlled by a **vacancy sensor**



# Undercabinet Lighting



## Lighting Under Cabinets

- Switched separately from other lighting systems



# Questions?

This concludes the Title 24 Standards Training.

Please be sure to complete your evaluation sheets so we can plan future events.