



2013 Energy Standards Overview for Envelope

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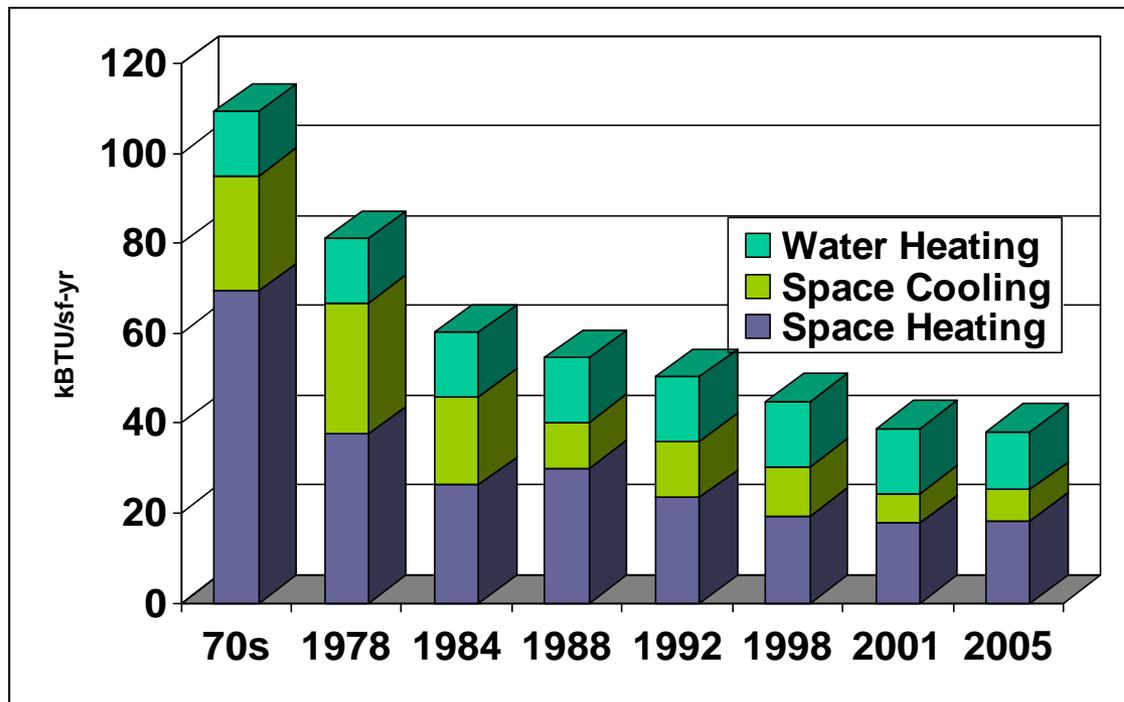


A Little CEC History

- Section 25402 of the Public Resources Code (known as the **Warren Alquist Act**)
- The act created the Energy Commission in 1974 and gave it authority to develop and maintain Building Energy Efficiency Standards
- Requires the Standards and new requirements to be cost effective over the economic life of the structure
- Requires the Energy Commission to update the Standards periodically (about every 3 years)



Historical Impact of Energy Standards



- Achieved over \$65 billion in savings to ratepayers since mid-70s
- Californians pay 20% less on residential electricity bills than the average U.S. household
- Energy savings avoided the need to build nearly 30 large (500 MW) power plants since the mid-70s



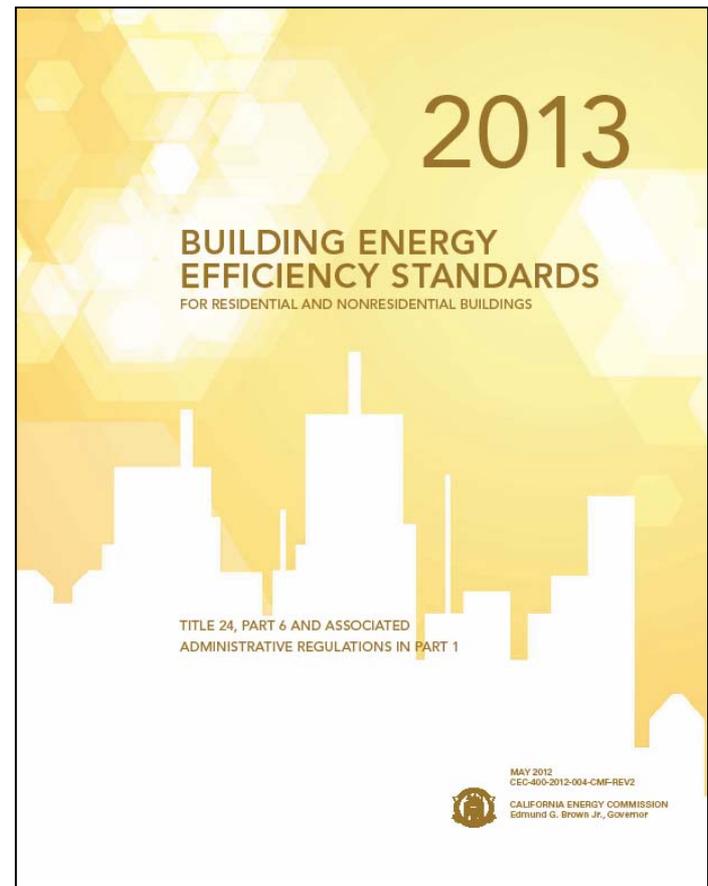
What the future holds

- AB 32 – Reduce carbon footprint
- CPUC/CEC Strategic Plan:
 - Net-zero energy use for residential buildings by 2020
 - Net-zero energy use for nonresidential buildings by 2030
- Energy Standards will “evolve/expand” and become more stringent to reach these goals



2013 Building Energy Efficiency Standards

- **Effective on July 1, 2014**
 - Building permit applications submitted on or after this date
- **Larger projects in plan review may be affected:**
 - Need to resubmit if permits pulled on/after effective date





*Residential Envelope Energy
Standards
Mandatory Measures*



Solar Ready

- New Mandatory measures in §110.10
- Applicable to subdivisions ≥ 10 homes and all low-rise multi-family buildings
- Requirements for:
 - Solar zone (location and area)
 - Orientation and Shading
 - Interconnection pathways
 - Structural Design Loads
 - Main electrical service panel



Insulation

2008 – §150(a), (c), (d)

- Ceiling insulation
 - Minimum R-19 required
- Wall Insulation
 - Minimum R-13 required
- Raised floor insulation
 - Minimum R-13 Required
- Weighted avg. permitted to meet equivalent U-factor

2013 – §150.0(a), (c), (d)

- Ceiling insulation
 - Minimum R-30 required
- Wall insulation
 - Minimum R-13 req. in 2 X 4
 - Minimum R-19 req. in 2 X 6
- Raised floor insulation
 - Minimum R-19 required



Fenestration

- New mandatory measure in §150.0(q)
- Windows and skylights must have a U-factor of 0.58 or less
 - Can calculate weighted average U-factor to meet requirement
- EXCEPTION:
 - Up to 10 ft² of fenestration or 0.5% of the CFA, whichever is greater, may be exempt from the maximum U-factor requirement of 0.58



*Residential Envelope Energy
Standards
Prescriptive Measures
(New construction)*



Insulation

2008 – §151(f)1

- Package D requirements:
 - Cavity insulation reqs. only for framed assembly types
 - R-value
 - Below grade wall insulation req. only in Cl. Zn. 13

2013 – §150.1(c)1

- Package A requirements:
 - Must meet R-value or U-factor
 - Cavity and continuous insulation requirements for walls
 - 2 X 6 walls must meet U-factor req.
 - Below grade insulation required in ALL Cl. Zns. (interior or exterior)



Radiant Barrier

2008 – §151(f)2

- Required in Climate Zones 2, 4, and 8 through 15
- Specified in “Special Features” section on CF-1R
- Verified on CF-6R-ENV-01 form
- Must be installed under roof deck and on gable ends and walls

2013 – §150.1(c)2

- Required in Climate Zones 2 through 15
- Specified in Section F of the CF1R
- Verified separately on CF2R-ENV-04-E form
 - Including free ventilation area requirements



Fenestration

2008 – §151(f)3, 4

- Package D requirements:
 - 0.40 U-factor in all Cl. Zns.
 - 0.40/0.35 SHGC in Cl. Zns. 2 and 4 through 15
 - 20% maximum glazing area
 - 5% west facing glazing area in Cl. Zns. 2, 4, and 6 through 15

2013 – §150.1(c)3, 4

- Package A requirements:
 - 0.32 U-factor in all Cl. Zns.
 - 0.25 SHGC in Cl. Zns. 2, 4, and 6 through 16
 - 5% west facing glazing area in Cl. Zns. 2, 4, and 6 through 16



Cool Roofs

2008 – §151(f)12

- Package D requirements:
 - Steep-sloped roofs < 5 lb/ft²:
 - 0.20 SR and 0.75 TE, or 16 SRI in Cl. Zns. 10 – 15
 - Steep-sloped roofs ≥ 5 lb/ft²:
 - 0.15 SR and 0.75 TE, or 10 SRI in ALL Cl. Zns.
 - Low-sloped roofs:
 - 0.55 SR and 0.75 TE, or 64 SRI in Cl. Zns. 13 and 15

2013 – §150.1(c)11

- Package A requirements:
 - Density criteria removed
 - Steep-sloped roofs:
 - 0.20 SR and 0.75 TE, or 16 SRI in Cl. Zns. 10 - 15
 - Low-sloped roofs:
 - 0.63 SR and 0.75 TE, or 75 SRI in Cl. Zns. 13 and 15

Solar Reflective Index (SRI) Calculation Worksheet

SRI-WS

Computer Generated Form

Date:		Climate Zone:		Building Type:	<input type="radio"/> Residential
					<input type="radio"/> Nonresidential

Project Name: _____

Project Address: _____

Roofing Products (Cool Roof)

Roofing products with high solar reflectance and thermal emittance are referred to as "Cool Roof", which refers to an outer layer or exterior surface of a roof. As the term implies, the temperature of a cool roof is lower on hot sunny days than for a conventional roof, reducing cooling loads and energy required to provide air conditioning.

The benefit of a high reflectance surface is obvious: while dark surfaces absorb the sun's energy (visible light, invisible infrared, and ultraviolet radiation) and become hot, light-colored surfaces reflect solar energy and stay cooler. However, high emittance is also important. Emittance refers to the ability of heat to escape from the surface once it is absorbed. Surfaces with low emittance (usually shiny, metallic surfaces) contribute to the transmission of heat into the roof components under the roof surface. The heat can increase the building's air conditioning load, resulting in increased energy costs and detracting from the comfort level of the home. High-emittance roof surfaces give off absorbed heat relatively quickly through the path of least resistance: upward and out of the building.

Rating and Labeling

Roofing products that are used for compliance with the standards (prescriptive and performance approaches) are required to be tested and labeled by the Cool Roof Rating Council (CRRC). Roofing product manufacturers must have their roofing product tested for solar reflectance and thermal emittance, and be labeled according to CRRC procedures. See example of a CRRC label at right.

	Solar Reflectance	<u>Initial</u> 0.00	<u>Weathered</u> Pending
	Thermal Emittance	0.00	Pending
Rated Product ID Number		-----	
Licensed Seller ID Number		-----	
Classification		Production Line	
<small>Cool Roof Rating Council ratings are determined for a fixed set of conditions, and may not be appropriate for determining seasonal energy performance. The actual effect of solar reflectance and thermal emittance on building performance may vary. Manufacturer of product stipulates that these ratings were determined in accordance with the applicable Cool Roof Rating Council procedures.</small>			

CRRC-1 Label Attached to Submittal

(Note: If no CRRC-1 label is available, this compliance method cannot be used and another method is required to meet compliance)

CRRC Product ID Number	Manufacturer	Brand	Model
-			

Roof Slope		Product Type		SRI Calculations				
≤2:12	>2:12	Field-Applied Coating	Other	Aged Reflectance Listed with CRRC?	CRRC listed Aged Solar Reflectance	Initial Solar Reflectance	Calculated Aged Solar Reflectance	Thermal Emittance
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>		0	0	0	0

Solar Reflective Index	0
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*Residential Envelope Energy
Standards
Prescriptive Measures
(Additions)*



Additions – Prescriptive

2008 – §152(a)

- Meet Package D reqs.
 - Some envelope alternatives and exceptions for:
 - Additions < 100 ft²
 - Additions < 1,000 ft²
 - Table 8-2 in Manual
- CF-1R or CF-1R-ADD form req. at Plan Review
- CF-6Rs req. at Final

2013 – §150.2(a)

- Meet Package A reqs.
 - Env. alternatives/exception for:
 - Additions ≤ 400 ft²
 - Additions > 400 ft² and ≤ 700 ft²
 - Additions > 700 ft²
 - Tables 9-3A – C in [Manual](#)
- Can exempt additions < 300 ft² from CF1R and CF2R forms if HERS not req.



*Residential Envelope Energy
Standards
Prescriptive Measures
(Alterations)*



Fenestration

2008 – §152(b)1A, B

- Package D requirements:
 - Replacement fen. must meet U-Factor and SHGC reqs.
 - Added fen. must meet efficiency and area reqs.
 - Exception: when fen. added $\leq 50 \text{ ft}^2$
- CF-1R-ALT required
- CF-6R-ENV-01 required

2013 – §150.2(b)1A, B

- Package A requirements:
 - Replacement fen. must meet efficiency reqs.
 - Exceptions for vertical glazing and skylights
 - Added fen. must meet efficiency and area reqs.
 - Exceptions for vertical glazing and skylights
- Can exempt from CF1R and CF2R forms



Re-roofs

2008 – §152(b)1H

- When more than 50% or 1,000 ft² replaced (whichever is less), must be cool roof
 - Steep-sloped roofs: same reqs. as prescriptive ([new const.](#))
 - Numerous alternatives
 - Low-sloped roofs: same reqs. as prescriptive (new const.)
 - Exempt if no ducts in attic

2013 – §150.2(b)1H

- When more than 50% replaced, must be cool roof
 - Steep-sloped roofs: same reqs. as prescriptive (new const.)
 - [Alternatives](#) revised/added
 - Low-sloped roofs: same reqs. as prescriptive (new const.)
 - New roof deck alternative in [TABLE 150.2-A](#)



*Nonresidential Envelope
Energy Standards
Mandatory Measures*



Solar Ready

- **New Mandatory measures in §110.10**
- **Applicable to hotel/motel and high-rise multi-family buildings ≤ 10 stories; and all other nonres. buildings ≤ 3 stories**
- **Requirements for:**
 - Solar zone (location and area)
 - Orientation and Shading
 - Interconnection pathways
 - Structural Design Loads
 - Main electrical service panel



Insulation

- **New mandatory insulation reqs. in [§120.7](#)**
- **Maximum U-factor for roofs/ceilings**
 - Incl. metal buildings and wood framed
- **Maximum U-factor for walls**
 - Incl. metal buildings and framed, light and heavy mass, wood framed, and spandrel panels and glass curtain walls
- **Maximum U-factor for floors and soffits**
 - Incl. raised mass floors

** Can req. a note block on structural/architectural plans*



*Nonresidential Envelope
Energy Standards
Prescriptive Measures
(New construction)*



Cool Roofs, Fenestration, etc.

2008 – §143(a)

- Cool roof reqs. dependent on:
 - Slope
 - Climate zone
 - Density (lb/ft²)
- Windows/skylights must meet U-factor and SHGC reqs.
- Req. in TABLE 143-A through 143-C

2013 – §140.3(a)

- Cool roofs:
 - Density criteria removed
 - Solar reflectance trade-off in TABLE 140.3
- Windows/skylights
 - Must meet min. VT reqs.
- New air barrier reqs.
 - Approved materials in TABLE 140.3-A
- Req. in TABLE 140.3-B through 140.3-D



*Nonresidential Envelope
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Prescriptive Measures
(Alterations)*



Re-roofs

2008 – §149(b)1B

- When more than 50% or 2,000 ft² replaced (whichever is less), must be cool roof
 - Same as prescriptive reqs. for both low-sloped and steep-sloped roofs (new const.)
 - Roof insulation alternative in TABLE 149-A

2013 – §141.0(b)2B

- Same threshold criteria
 - Same efficiency reqs. as [prescriptive](#) reqs. for new construction
 - Remember that density criteria was removed
- Solar reflectance trade-off in [TABLE 141.0-B](#)



For more information

- **2013 Standards Website at:**
 - <http://www.energy.ca.gov/title24/2013standards/index.html>
- **Training**
 - <http://www.energy.ca.gov/title24/training/>
- **List servers and Newsletter (*Blueprint*)**
 - <http://www.energy.ca.gov/efficiency/listservers.html>
- **Ace Web Toolkit**
 - <http://www.energycodeace.com/content/home/>