

Title 24, Part 6
2013 Standards

2013 Building Standards Update

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May 7, 2013

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Authority & Process

Public Resources Code (PRC 25402): Reduction of wasteful, uneconomic, inefficient or unnecessary consumption of energy

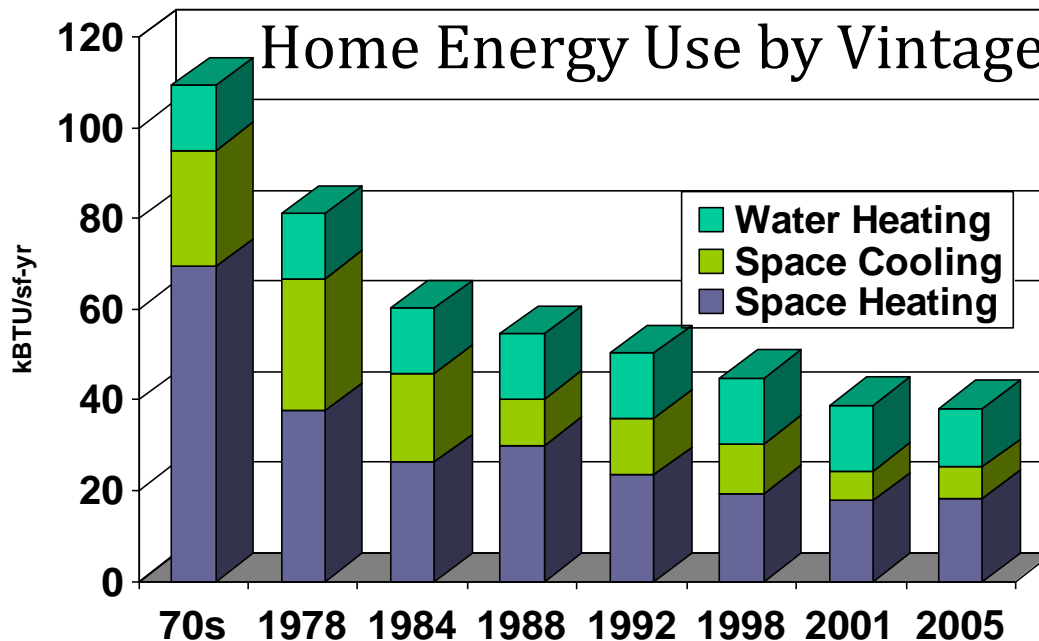
(a)(1) Prescribe, by regulation, lighting, insulation climate control system, and other building design and construction standards that increase the efficiency in the use of energy and water...

- Residential and Nonresidential Building Standards first adopted in 1978 and updated every three years
- The Standards are demonstrated to be cost effective
- The Standards include mandatory performance requirements with alternative prescriptive requirements
- The Standards are developed in an open public process

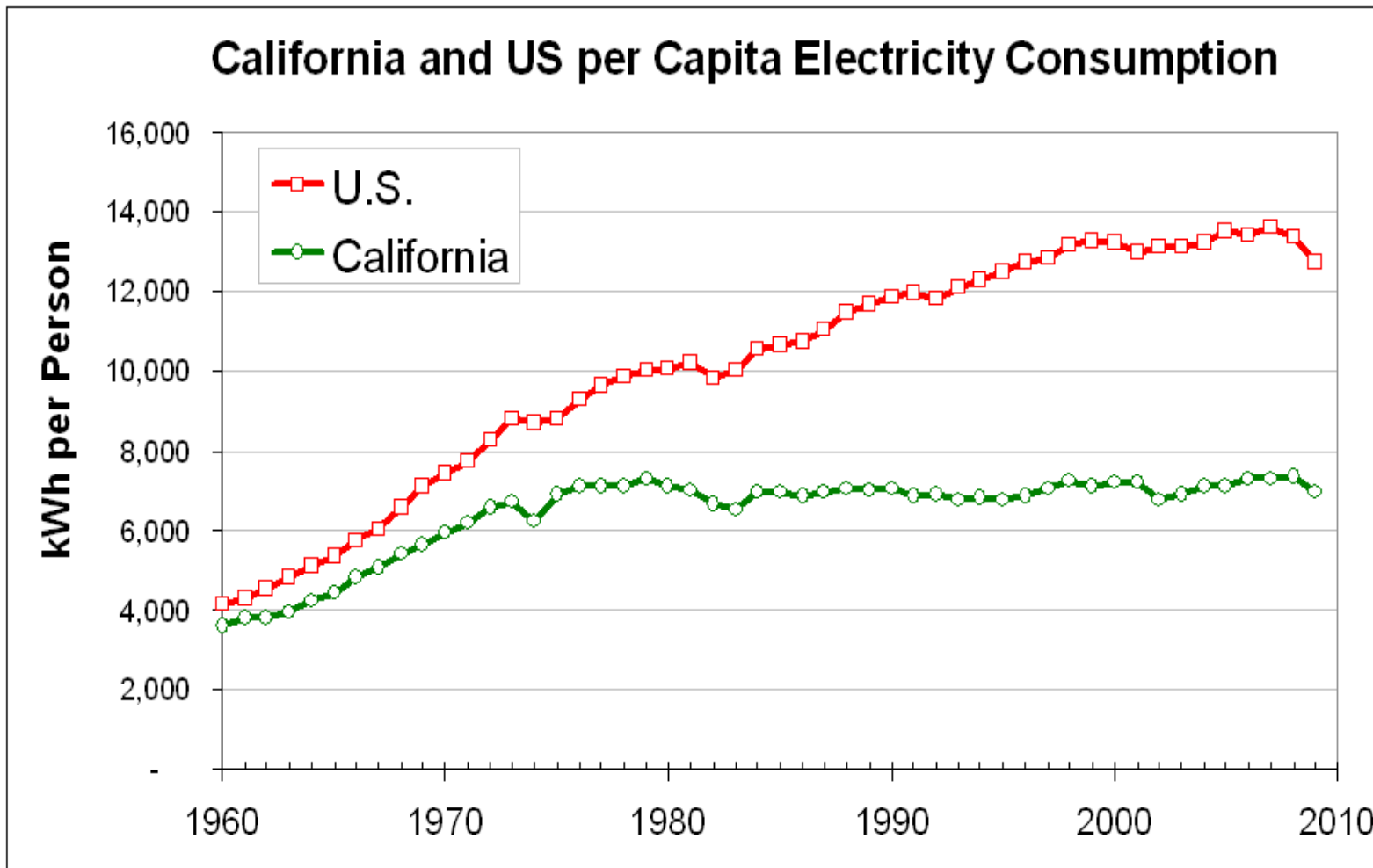


Historical Impact of Title 24, Part 6

- Achieved over \$65 billion in savings to ratepayers since mid-70s
- Californians pay 20 percent 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



Building and Appliance Standards have contributed to relatively flat per capita electricity consumption in California since 1974. Source: US Energy Information Administration (EIA)



Title 24
2013
Standards



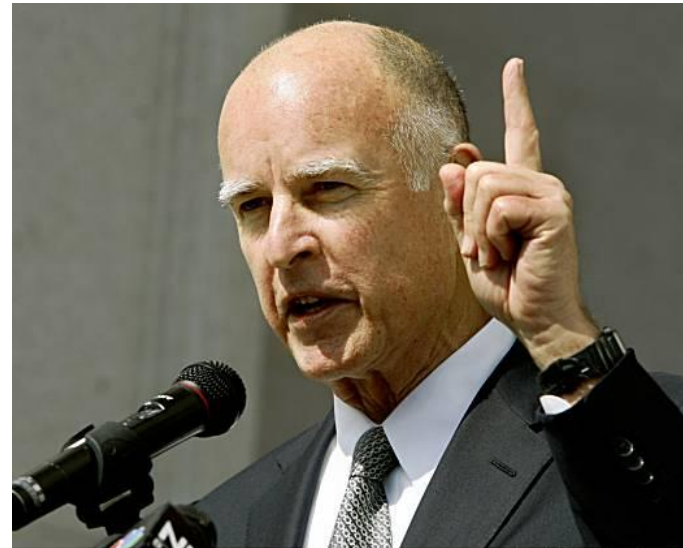
Authority & Process Title 24, part 6

- **Pre-rulemaking industry meetings**
- **Workshops on proposed standards**
- **Notice of Proposed Action and “45-day language” submitted to CBSC**
- **CEC holds hearings, conducts rulemaking proceeding, adopts regulations (T-24, Part 6)**
- **Submits to CBSC for “nine-point criteria” review and approval**
- **CBSC incorporates California Energy Code into entire Title 24 code update**
- **Goes into effect one year later**

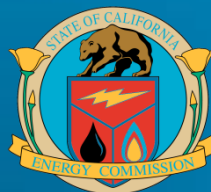


Policy Drivers

- Governor's “Clean Energy Jobs Plan”
- Zero Net Energy: Residential by 2020 and Nonresidential by 2030
- CARB Climate Change Scoping Plan
- California Long Term Energy Efficiency Strategic Plan
- SB 1 Goals: 3,000 MW of solar PVs statewide and PVs on 50% of new homes



Paul Chinn / The Chronicle



More Efficient Buildings...

Require the manufacturing, design, installation, monitoring and maintenance of efficient systems and technologies, resulting in:

- Green Job Creation
- Higher Paying Jobs
- Investment By Entrepreneurs
- Global Competitiveness

“Most new jobs should and will be created in the private sector, but government can play an important role in establishing a favorable climate for job creation.” *Governor Jerry Brown*

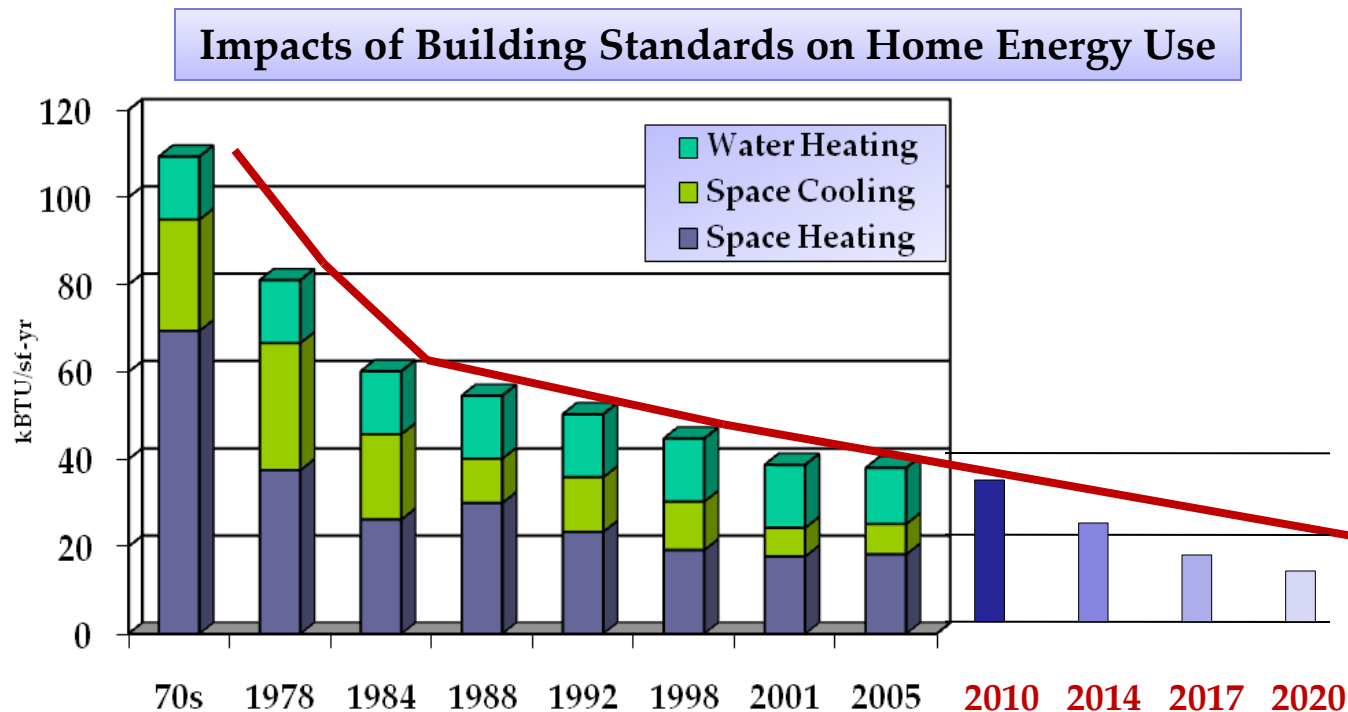
New Efficiency Standards for New Buildings

- Design new more efficient buildings that use half the energy they use today
- Establish a plan and timeline to make new homes and commercial buildings “Zero Net Energy”
- Highly efficient structures that use onsite renewables to “get to zero”

“Energy Efficiency is the cheapest, fastest, and most reliable way to create jobs, save consumers money and cut pollution from the power sector.” *Governor Jerry Brown*

Zero Net Energy Standards

- Need to accelerate energy savings from building components regulated under Title-24 to reach ZNE goals
- Integrate onsite generation into building code to accomplish ZNE



Standards Development Public Review

- Convened more than 45 Industry stakeholder groups over the last year to inform them of potential changes to the standards and to consider their input
- Held 15 Workshops
- Responded to more than 1,000 public comments



2013 Standards Update Schedule

| | |
|------------------|---------------------------------------------------------------------------------------------------------|
| January 2012 | Rule-making phase for the 2013 Standards begins |
| May 31, 2012 | Commission adoption of Parts 1 and 6 |
| October 10, 2012 | Commission adoption of Acceptance Testing Certification Requirements |
| January 2013 | CBSC Approval of T-24 Parts from “recommending agencies” for integration into Full Title 24 2013 Update |
| Jan 1, 2014 | 2013 Update Becomes Effective |



2013 Standards Highlights

- Avoid the need for 6 new large powerplants at the current depressed levels (*As high as 16 powerplants if housing starts revert back to the 2006 levels*)
- 25% on Residential improvements compared to 2008
- 30% Nonresidential Improvements
- First update to address Zero Net Energy goals
- Photovoltaics in code for the first time as compliance option and “Solar-ready” requirements
- Process energy in Supermarkets, Parking Garages, Commercial Kitchens, and Laboratory Hoods covered for the first time



Cost of Residential Measures

- Average costs per home range from \$2,100 to \$4,300 depending on climate zone
- Statewide residential costs of \$2,290, total life cycle cost savings of \$6,200 for a net savings of \$3,910 for a residential building over the 30 year life of the building

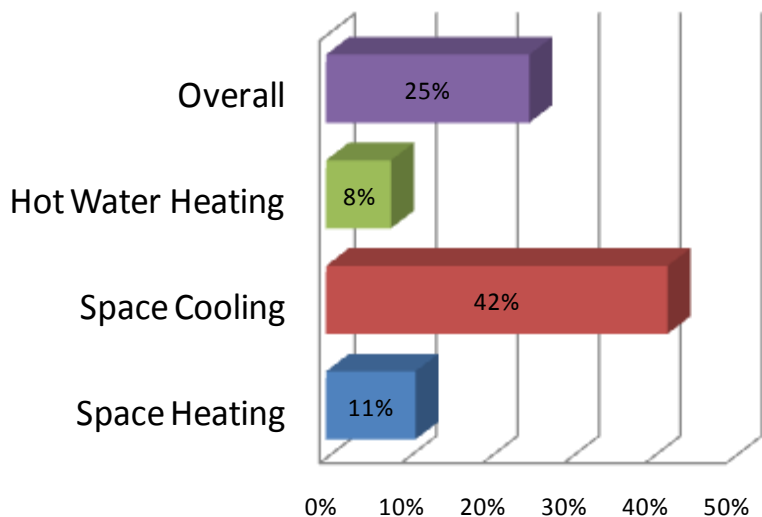


- Statewide levelized residential life cycle costs of \$11 and savings of \$27 for a “typical” residential unit per month
- All measures are cost-effective using Life Cycle Cost for residential and nonresidential buildings

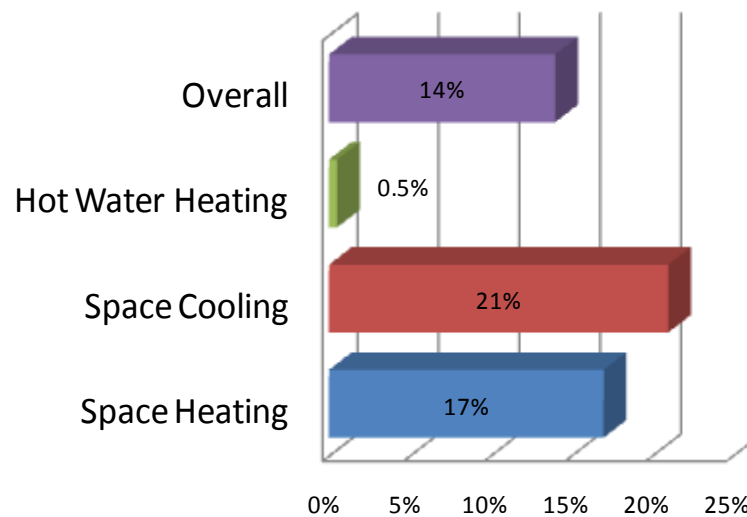
2013 Standards: Residential Energy Savings

- 23.6 GWh/yr; 1.1 Mtherms/yr; 35 MW
- Single Family: 25% better than current Standards
- Multi-Family: 14% better than current Standards

Single Family Savings by End Use



Multi-Family Savings by End Use



2013 Standards: Residential Envelope

- Better windows U-factor (0.32) and SHGC (0.25) in all CZs
- More wall insulation in all climate zones – R15+4



Wall Insulation



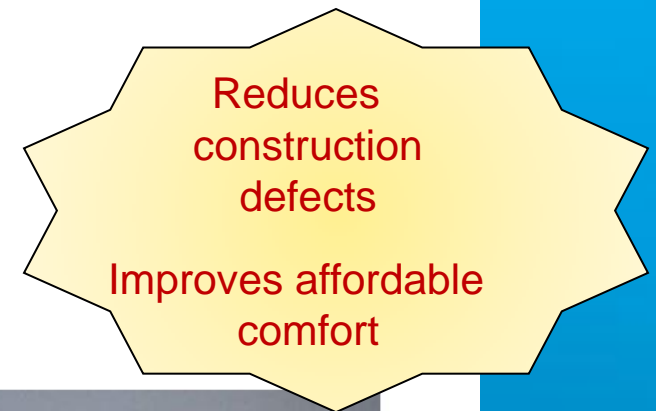
Residential
Windows

2013 Standards: Residential HVAC

- Night ventilative cooling - whole house fans or central fan integrated ventilation systems as alternatives - in CZs 8-14
- R-6 instead of R-4.2 duct insulation in CZs 6-8



Residential HVAC Ducts



Whole House Fan

2013 Standards: Residential HVAC

New Quality HVAC Installation Mandatory Requirements (Previously Prescriptive Measures):

- Duct sealing in all Climate
- Return duct design or fan power and airflow testing



Residential HVAC Ducts



Mandatory Measures

2013 Standards: Existing Residential Bldgs.

- Simplified rules for additions and alterations
 - Simple forms option for small additions and alterations that do not include HERS measures
 - Both prescriptive and performance paths have been simplified
 - Covers alterations to existing homes, additions, and existing plus additions plus alterations



2013 Standards : Residential Update

■ Hot Water:

- Improves hot water system performance, saving energy and water:
 - Hot water pipe insulation on large pipe sizes
 - Demand-controlled recirculation systems
 - Credit for compact plumbing designs
 - Enables future high-efficiency water heater installations, including 200,00 btu/hr NG pipe connection, 120V electrical connection nearby, and direct venting.



HW Pipe Insulation

2013 Standards : Residential Solar Ready

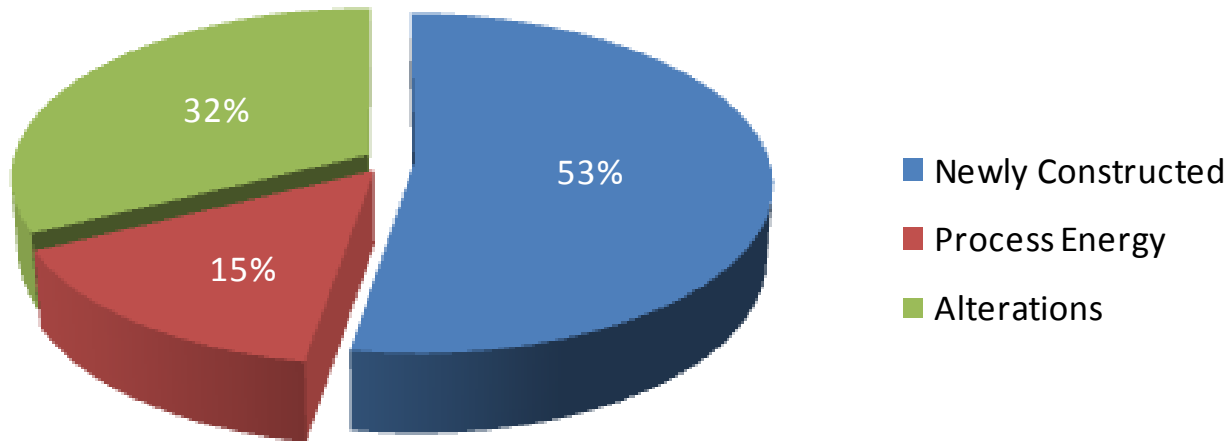
- Provides an area on roof that is penetration and shade free
- Ensures that future solar not precluded by original construction
- Exceptions:
 - Installing solar electric system or domestic SWH system
 - Sites with significant shading
 - Reduced solar zone area with demand response thermostat
 - No solar zone with high efficacy lighting and DR thermostat
- Credit when solar electric installed in climate zones 9-15



2013 Standards: Nonresidential Energy Savings

- 30% more energy efficiency compared to current Standards
- 372 GWh/yr; 6.7 Mtherms/yr; 84 MW

Nonresidential Savings Attribution



2013 Standards : Nonresidential Lighting

- Controllable ballasts and advanced multi-level lighting controls, including demand response functions and at least three intermediate step-dimming (in addition to on/off) or continuous dimming for most linear fluorescent lamps and other lamps.



2013 Standards : Nonresidential Lighting

- Lighting Alterations in Existing Buildings



Retrofits >> # newly constructed bldgs.

Alterations occur every 8-15 years

~ 40 million in energy savings per year

2013 Standards : Nonresidential Envelope

- Daylighting:
 - More comprehensive daylighting controls
 - Visual Transmittance requirements for windows
 - Increased skylight requirements
- Higher cool roof reflectance of 0.63
- Envelope Sealing



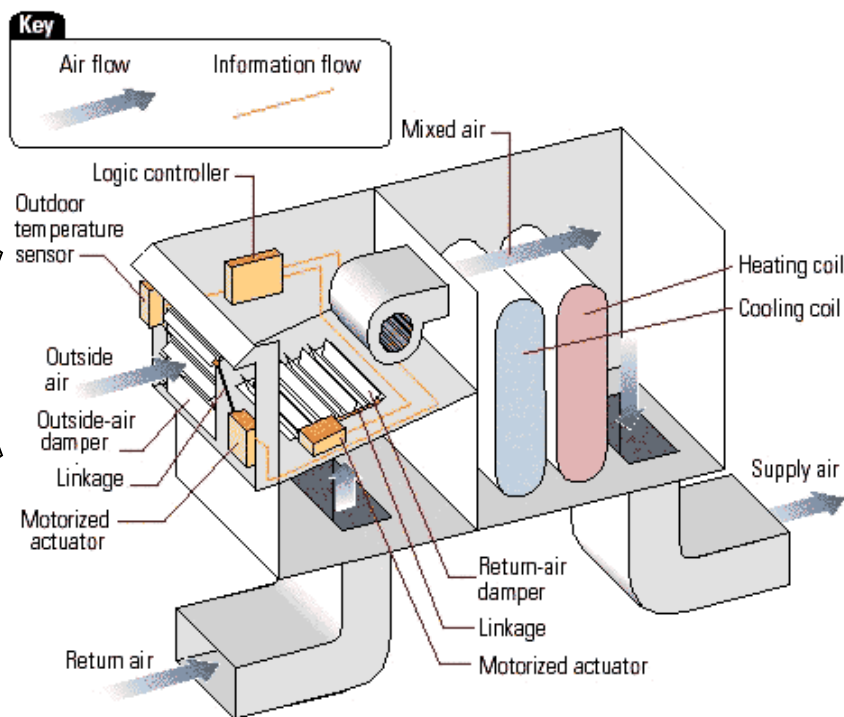
2013 Standards: Nonresidential HVAC

- HVAC economizers & speed controls on more and smaller equipment
- Increased chiller efficiencies
- More options for occupancy-based shut-off controls

More HVAC equipment will use outside air for cooling

HVAC equipment can adjust speed to meet variable needs

Reduces energy used to heat/cool unoccupied spaces



HVAC schematic detailing the
ECONOMIZER

2013 Standards: Nonresidential HVAC

- Cooling Tower Water Efficiency
 - Controls that maximize water use
 - Overflow alarms
 - Efficient drift eliminators
 - Make-up water flow meters

Saves 33 million gallons
of water per year

Equivalent to 600,000
clothes wash loads



2013 Standards : Nonresidential Demand Response

- Occupant Controlled Smart Thermostat
 - Setback thermostat plus communications and demand response capable
 - Communications and DR can be built-in or thermostat can be upgradeable with modular components
 - Communications can be turned on/off by occupant
 - Optional enrollment in DR services and programs enabled
 - Occupant always has full control of settings



2013 Standards : Process Energy Systems

- Process Energy Systems
 - Updates to Refrigerated Warehouse requirements
 - **NEW** Supermarket Refrigeration efficiency requirements



Infiltration Barriers



Condensers

ANNUAL SAVINGS:
20 GWh
1.9 million therms
Over \$60 million



Evaporators

2013 Standards : Process Energy Systems

- Process Energy Systems
 - NEW Data Center cooling
 - NEW Commercial Kitchen exhaust
 - NEW Process Boilers
 - NEW Compressed Air Systems
 - NEW Laboratory exhaust
 - NEW Parking Garage ventilation



Data Centers



Kitchen Exhaust Hoods



Boilers

2013 Standards : Nonresidential Solar Ready

- Provides an area on roof that is penetration and shade free
- Ensures that future solar not precluded by original construction
- High-rise multifamily, hotel/motel buildings 10 stories or fewer
- Other nonresidential buildings 3 stories or fewer
- Exceptions:
 - Installing solar electric system or domestic SWH system
 - Sites with significant shading



2013 Standards: Related Documents

The followings are the documents related to the 2013 Building Energy Efficiency Manuals:

- Building Standards Document
- Reference Appendices
- Residential and Nonresidential ACM Approval Manuals
- Residential and Nonresidential ACM Reference Manuals
- Residential and Nonresidential Compliance Manuals
- Data Registry Requirement Manual (to be developed)

Download from:

http://www.energy.ca.gov/title24/2013standards/supporting_docs.html



Possible 2016 Standards - Residential

This is a partial and preliminary list of measure for the 2016 update of the residential building Standards

1. High performance attics
 - Roof deck insulation, R-8
 - R-8 duct insulation
 - 4-5% duct leakage
 - 1:150 sf attic ventilation
 - Raise hill trusses
 - Compare HPA with ducts in conditioned space
2. Compliance credit for mini-splits
3. Walls: R-21 plus R-4 continuous insulation
4. Reduce windows from 20% to 16% of floor area for single family
5. Compliance credit for super high performance windows including triple-pane windows and dynamic glazing
6. Controlled supply mechanical ventilation for IAQ
7. Quality Insulation Installation as prescriptive measure



Possible 2016 Standards - Nonresidential

This is a partial and preliminary list of measure for the 2016 update of the nonresidential building Standards

1. Updating the U-factors for opaque surfaces to bring inline with ASHRAE/IECC
2. Evaluate window U-factors and window/wall ratios
3. Reducing LPDs for lighting and requiring more automated controls
4. Consider duct sealing test methods and requirements for more areas including: ducts upstream and downstream of VAV boxes, and return ducts. Remove exceptions for terminal reheat in VAV and other systems.
5. Limit connected HVAC connected load. Don't double count interlocked loads. Consider a fan efficiency requirement or W/cfm requirement. Evaluate requirement that all ventilation fans are variable speed and tuned to the airflow requirement using fan speed, instead of damper or nothing at all.



Possible 2016 Standards - Nonresidential

This is a partial and preliminary list of measure for the 2016 update of the nonresidential building Standards

7. Prescriptive requirement for outside air heat recovery with thresholds by cfm of O/A and climate zone.
8. Develop solar heating requirements for swimming pools and communal showers. Consider off-ramps for buildings without solar access. Solar heating could be provided by PV not only by solar thermal.
9. Develop modeling methods for combined heat and power systems
10. Thermally Driven Chillers - Develop a solar absorption and a solar regenerated descant cooling model in EnergyPlus. Include waste heat, e.g. cogeneration. Develop rule set for the ACM.
11. Develop modeling methods for combined heat and power systems
12. Develop IAQ model based upon contaminant sources, infiltration, ventilation quantity and ventilation effectiveness



Questions?

Title 24
2013
Standards

