CALIFORNIA ENERGY COMMISSION

Building Energy Efficiency Standards

Mazi Shirakh, P.E.
Buildings and Appliances Office

PCT Workshop
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EFFICIENCY · ENERGY FOR THE FUTURE ·

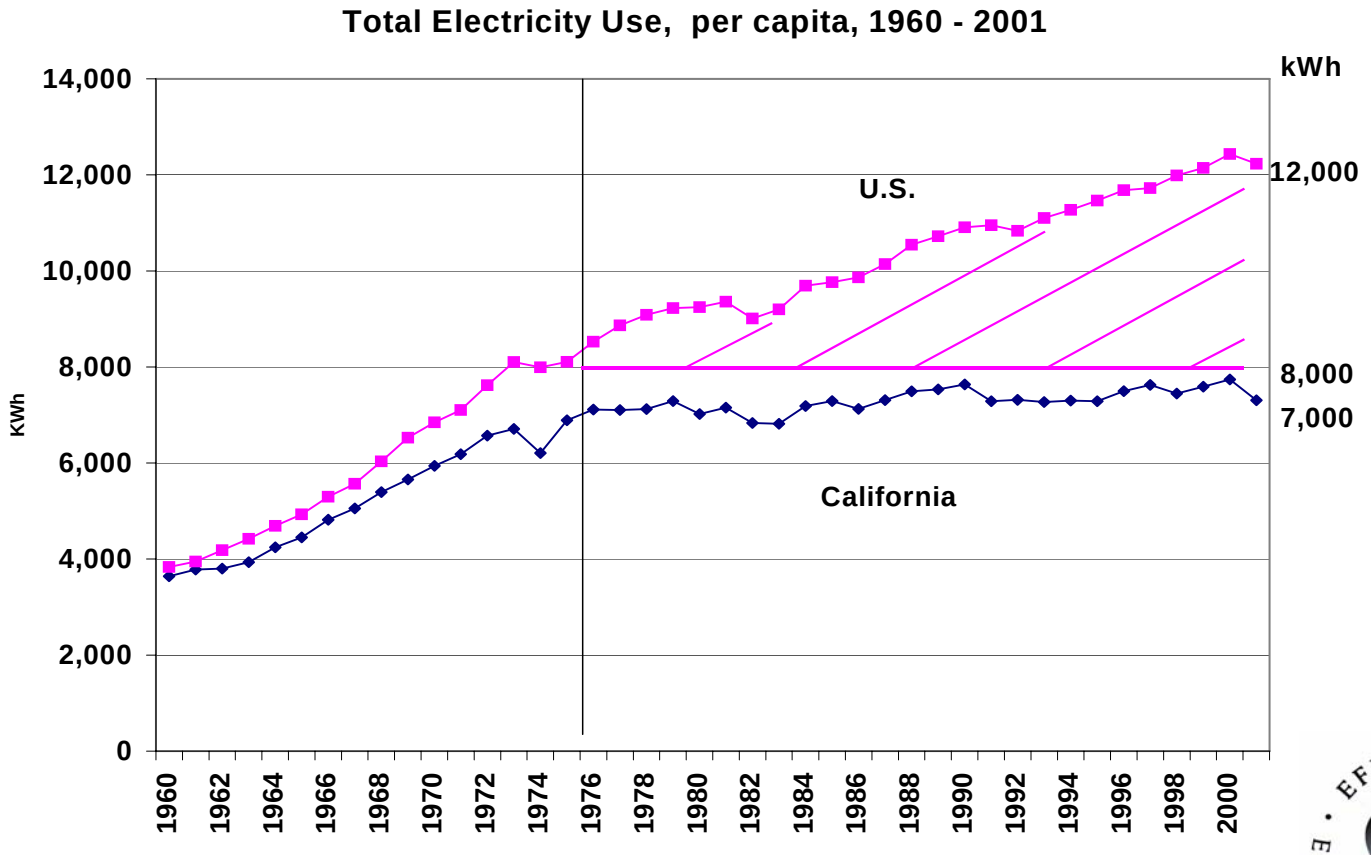
Policy Goals

- Energy Action Plan / IEPR
  - Efficiency at the top of the Loading Order
  - Demand Response
  - Encourage PVs in the Standards
  - Combined Energy and Water Efficiency
- West Coast Governors' Global Warming Initiative
  - 15% efficiency savings through State Building Codes by 2015
- Green Building Initiative (Exec Order S-20-04)
  - 20% increase in Nonresidential Standards by 2015
- Climate Action Initiative (Exec Order S-3-05)
  - Standards must help to meet Greenhouse Gas Emissions Reduction Goals

Major Collaboration

- PIER Focused Research
  - Views Standards as a primary delivery mechanism
  - Substantial Research for 08 Standards
- PGC-funded Codes and Standards
  - CASE Initiatives by PG&E, Edison, Sempra
- Public process with active stakeholder input

USA vs California



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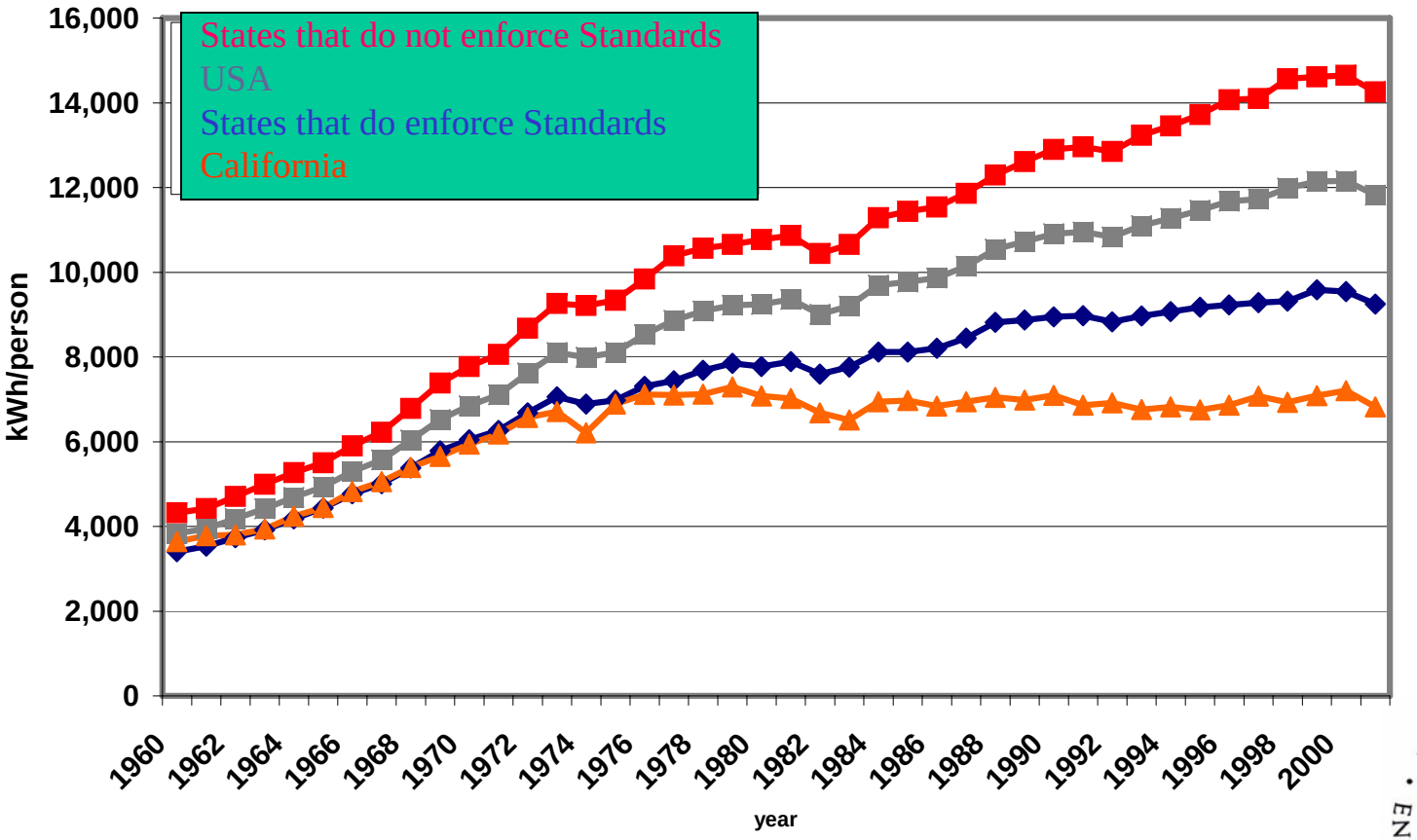
Per Capita Electricity Consumption



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History of Building Standards

- First Building Standards were adopted in 1978
- Standards have been updated roughly every three to four years
- More recently, the Standards have been updated in 1992, 1998, 2001, and 2005
- The next update is scheduled for 2008

How Standards Are Updated

- Staff, its consultants, and the utility partners write Triennial Standards update
- The updates are presented to the public in staff workshops and committee hearings
- All public comments are processed and responded to

How Standards are Updated – Cont'd

- Get input from the public, including designers, architects, energy consultants, builders, utilities, equipment manufacturers, building officials, environmentalists, scientists and engineers, and others
- Work with Policy Committee – 2 Commissioners
- Cost effectiveness (LCC) must be done for items adopted

How Standards are Updated – Cont'd

- For the 2005 standards, 19 public workshops and hearings were held – hundreds participated
- 2005 Standards were adopted (Nov '03) by Energy Commission and Building Standards Commission (April 04)
- Oct. 1, 2005 = Effective date of 2005 Standards

Support and Outreach

ER&DA division also helps train Building Depts. on Standards

- Residential and Nonresidential Compliance Manuals interpret the Standards
- Hotline for questions on Standards – special number for CA building depts. = 800-772-3300
- Facilitates training sponsored by utilities (usually starting about 3-6 months before new effective dates)

Training and Outreach – Cont'd

- Blueprint newsletter (now online and e-mailed only) – answers commonly asked questions about the Standards

- Videos at – http://www.energyvideos.com and http://www.energy.ca.gov/title24/changeout/index.html

Standards Compliance

- Building Standards are enforced by the local building officials

- Enforcement may involve third party verifiers such as HERS Raters for particular measures such as duct sealing and TXVs

Compliance Methods:

- Buildings must comply with mandatory measures and with either the prescriptive or performance compliance approaches (basically an energy "budget" for each building referenced to specific climate zone – 1 of 16 zones)

Standards Compliance – Cont'd

- Mandatory Measure – All buildings must comply with mandatory measure regardless of compliance path
- Prescriptive Compliance – Compliance through prescriptive packages which varies with climate zones – no tradeoffs allowed
- Performance Approach – Use an approved compliance software to demonstrate compliance for the entire building – allows tradeoffs
- Compliance Options – Measures that are not required prescriptively but can result in a compliance credit if installed, such as high EER air conditioning and gas cooling

Changes in 2005 include

All Occupancies:

- Time Dependent Valuation (TDV) - Source energy was replaced with TDV energy in 2005 Standards. TDV energy values energy savings greater during periods of peak demand, such as hot summer weekday afternoons, and values energy savings less during off peak periods. TDV gives more credit to measures such as high EER air conditioning units that are more effective during peak periods

Changes in 2005 include
Residential

- Efficient lighting – High efficacy (e.g., fluorescent) in all permanent lighting or controls; high efficacy in kitchens; high efficacy or motion sensor in bathrooms, utility rooms, garages, laundry rooms; high efficacy or combined photo sensor/motion sensor for exterior lights; high efficacy or dimmer in other lighting; airtight recessed luminaries

- Duct insulation – Insulation levels depend on climate zone and range from R-4.2 to R-8

- Pipe insulation – Hot water pipes ¾ inch and greater in diameter to the kitchen have to be insulated

Changes in 2005 include

Residential – Cont'd

- Replacement windows – Shall be high efficiency
- Fenestration area limit – Limits the fenestration area to 20% of the conditioned floor area in all climate zones for new construction and existing homes subject to certain alterations; for new construction, limits the west facing glass to 5% of the conditioned floor area in cooling climate zones
- Duct sealing – Required when air conditioner/furnace is replaced or ducts are replaced
- Compliance credit – High EER air conditioners, gas cooling, high quality insulation installation, properly sized air conditioners, efficient air conditioner fan motors, ducts buried in attic insulation

Changes in 2005 include
Nonresidential

- Cool Roofs - The nonresidential prescriptive standards require "cool roofs" (high reflectance, high emittance roof surfaces, or exceptionally high reflectance and low emittance surfaces) in all lowslope applications. The cool roof requirements also apply to roof replacements for existing buildings

- Acceptance Requirements - Basic "building commissioning", at least on a component basis, is required for electrical and mechanical equipment that is prone to improper installation

Changes in 2005 include
Nonresidential – Cont'd

- Demand Control Ventilation - Controls that measure CO2 concentrations and vary outside air ventilation are required for spaces such as conference rooms, dining rooms, lounges, and gyms

- T-bar Ceilings - Placing insulation directly over suspended ceilings is not permitted as a means of compliance, except for limited applications

- Relocatable Public School Buildings - Special compliance approaches are added for relocatables so they can be moved anywhere statewide

Changes in 2005 include
Nonresidential – Cont'd

- Duct Efficiency - R-8 duct insulation and duct sealing with field verification is required for ducts in unconditioned spaces in new buildings. Duct sealing is also required in existing buildings when the air conditioner is replaced. Performance method may be used to substitute a high efficiency air conditioner in lieu of duct sealing

- Indoor Lighting - The lighting power limits for indoor lighting are reduced in response to advances in lighting technology

- Skylights for Daylighting in Buildings - The prescriptive Standards require that skylights with controls to shut off the electric lights are required for the top story of large, open spaces (spaces larger than 25,000 ft² with ceilings higher than 15 ft.)

Changes in 2005 include

Nonresidential – Cont'd

- Thermal Breaks for Metal Building Roofs - Continuous insulation or thermal blocks at the supports are required for metal building roofs

- Efficient Space Conditioning Systems - A number of measures are required that improve the efficiency of HVAC systems, including variable speed drives for fan and pump motors greater than 10 hp, electronically-commutated motors for series fan boxes, better controls, efficient cooling towers, and water cooled chillers for large systems

Changes in 2005 include
Nonresidential – Cont'd

- Unconditioned Buildings - New lighting Standards—lighting controls and power limits—applies to unconditioned buildings, including warehouses and parking garages. Lighting power tradeoffs are not permitted between conditioned and unconditioned spaces

- Compliance Credits - Procedures are added for gas cooling, underfloor ventilation

Current Events

The 2008 Standards Workshops have already begun

- A two day workshop was held in October of 2005
- Another two day workshop is scheduled for February 22 and 23
- Future workshops will be held in March and May of 2006
- Public workshops will be followed by adoption hearings

Changes Considered for 2008 Standards

- Demand Response (DR) – Programmable communicating Thermostats (PCT)
- Global Temperature Adjustment (nonres DR)
- Tier 2 Standards for residences with PVs
- Better modeling of residential roofs and attics
- Ventilation and IAQ requirements for res
- Standards for hospitals

Changes Considered for 2008 Standards - Cont'd

- Refinements of residential lighting
- Refinements of nonresidential indoor and outdoor lighting
- Changes to Joint Appendix 4 assemblies
- Refining the acceptance requirements
- Changes to nonres site-built fenestration
- Refinements to cool roof requirements

Changes Considered for 2008 Standards - Cont'd

- Residential windows performance
- Nonres insulation levels
- Nonres daylighting requirements
- Refinements of additions and alterations for both res and nonres
- Expanded DDC systems for nonres

Changes Considered for 2008 Standards - Cont'd

COMPLIANCE OPTIONS:

- Cooling Equip for hot and dry climates
- Under Floor Air Distribution Systems
- Displacement Ventilation
- Bi-level Stairway Controls
- Load Shedding Ballasts

PCT Standards Language

- The PCT language will be in the mandatory measures sections of the Residential and Nonresidential Buildings.
- It will cover all residential split systems, packaged units, heat pumps, as well as nonresidential unitary units.
- It will not cover nonres built-up systems, VAV, MZ, and systems controlled by Energy Management Controls Systems (EMCS). These systems are covered under a separate proposal.

Tentative Schedule for 2008 Standards

- Standards Development
  - Oct '05 to May '06 – Public workshops on potential changes
  - July '06 to Nov '06 – Public workshops on marked-up draft Standards, ACM manuals, and Joint Appendices
  - Dec '06 to May '07 – Formal rulemaking / adoption
- Tools Development and Approval
  - May '07 to Apr '08 - Compliance Manuals Developed and Compliance Software Approved
- Effective date November 1, 2008

Building Energy Efficiency Standards

Questions?