TITLE 24 ENERGY EFFICIENCY STANDARDS

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Title 24 Energy Efficiency Standards

CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 6

The Energy Efficiency Standards for Residential and Nonresidential Buildings were established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods.
The latest, 2005 Standards-went into effect **October 1, 2005**, and supersede the 2001 Standards. Projects that apply for a building permit on or after this date must comply with the 2005 Standards. The compliance and enforcement process consists of design, permit application, plan check, construction, acceptance commissioning, and operation.

There are two major building types govern by Title 24 Energy Efficiency Standards, Residential and Non-residential Standard for compliance. In the Residential Standard, it covers buildings define in the Uniform Building Code (UBC) for Occupancy Group R. Occupancy Group R further separates into High-Rise Residential Building (four or more habitable stories) and Low-Rise Residential Building (three stories or less). In the Non-residential Standard, it covers any building defines in the UBC, for Occupancy Group A, B, E, F, H, M, S or U. Title 24 applies to all buildings that are unconditioned, indirectly or directly conditioned by mechanical heating or cooling or process spaces or Low-rise residential buildings that are heated with a wood heater or another non-mechanical heating system.

Energy and Atmosphere made up 27%, the largest portion of the pie, for LEED certification. Title 24 Energy Efficiency Standards reduce energy costs for owners, increases reliability and availability of electricity for the State, improves building occupant comfort, and reduces environmental impact.

The 2005 Standards (for residential and nonresidential buildings) are expected to reduce energy consumption as follows:

Estimated Savings for 2005 Standards*

		Electricity		Demand		Gas	
		Savings (GWh)	Percent of Total	Savings (MW)	Percent of Total	Savings (m-therms)	Percent of Total
Newly Constructed Building	Low-Rise Residential	98.7	20.6%	66.4	36.4%	5.5	62.5%
	Nonresidential	143.0	29.9%	44.0	24.1%	0.5	5.7%
	Relocatable Classrooms	3.1	0.7%	n.a.	n.a.	0.0	0.0%
	Outdoor Lighting	17.1	3.6%	0.0	0.0%	0.0	0.0%
	Total	262.0	54.7%	110.3	60.5%	6.0	68.2%
Alterations (fenestration replacement & duct sealing)	Low-Rise Residential	41.4	8.7%	26.7	14.7%	3.0	34.0%
	Nonresidential	175.0	36.5%	44.3	24.3%	-0.2	-2.3%
	Total	216.4	45.2%	71.0	39.2%	2.8	31.8%
Grand Total		**478.5**	**100.0%**	**181.4**	**100.0%**	**8.8**	**100.0%**

*** Source: Impact Analysis 2005 Update to the California Energy Efficiency Standards (Publication #400-03-014)**

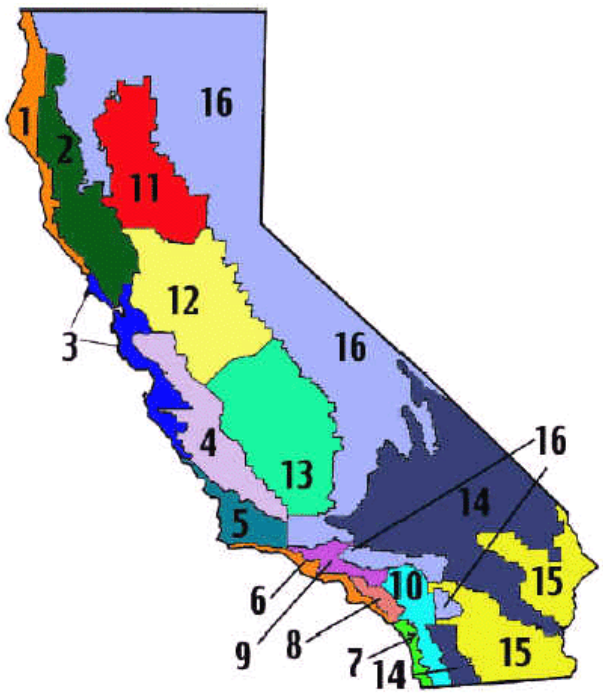
Buildings are one of the major contributors to electricity demand. We learned during the 2000/2001 California energy crisis, and the East Coast blackout in the summer of 2003, that our electric distribution network is fragile and system overloads caused by excessive demand from buildings can create unstable conditions. Resulting blackouts can seriously disrupt business and cost the economy billions of dollars. Since the California electricity crisis, the Energy Commission has placed more and more emphasis on demand reductions. Changes in 2001 (following the electricity crisis) reduced electricity demand by about 150 megawatts (MW) each year. The 2005 Standards are expected to reduce electric demand by another 180 MW each year. Like energy savings, demand savings accumulate each year.

Changes to the *Standards* occur periodically to account for improvements in conservation technologies, changes in the cost of fuels and energy-conserving strategies, and improved capabilities in analyzing building energy performance. In addition, modifications are also made to further improve compliance and enforcement.

California's building efficiency standards (along with those for energy efficient appliances) have saved more than $56 billion in electricity and natural gas costs since 1978. It is estimated the standards will save an additional $23 billion by 2013.

Energy use depends partly on climate conditions, which differ throughout the state. To standardize calculations and to provide a basis for presenting the criteria, the Energy Commission has established 16 climate zones, which are used with both the low-rise residential and the nonresidential standards.

California Climate Zones 1-16:



There are two methods to comply with the Title 24 Energy Standards:

Prescriptive Approach:
Building Envelope (Insulation and Fenestration), Mechanical System, Indoor Lighting, Outdoor Lighting, and Service Water Heating are requirements Title 24 looks for in a building design under this method.
This is the simplest approach in which each individual component of the proposed building must meet a prescribed minimum energy requirement. The prescriptive approach is the least flexible yet simplest compliance path. It is simple because an applicant need only show that a building meets each minimum or maximum level prescribed in the set of requirements contained in a package.

Performance Approach:
The use of Energy Commission-approved computer methods provides the most flexibility and accuracy in calculating energy use. The software calculates and compares by using a standard building with similar fixed entities (occupancies, designs, climate zone, construction materials, and devices) which based upon Title 24 guidelines. Detailed accounting of energy *trade-offs* between measures is possible with this approach. While this approach requires the most effort, it also provides the greatest flexibility. The computer program automatically calculates the energy budget for space conditioning. The budget is determined from the standard design, a version of the building, which is upgraded or downgraded to achieve minimum compliance with the prescriptive approach. The basic procedure is to show that the Time Dependent Valuation (TDV) energy of the proposed design is less than or equal to the TDV energy of the standard design, where the standard design is a building like the proposed design, but one that complies exactly with both of the mandatory measures and the prescriptive requirements.
The following list of energy analysis computer programs includes all Alternative Calculation Methods approved by the California Energy Commission (CEC), see last page for approved computer programs. These are the only programs that should be used under the energy budget alternative methods of compliance for the 2005 standards.

Mandatory Measures:
Mandatory Measures are required features with either the Prescriptive or Performance Approach. The mandatory measures require minimum ceiling, wall, and raised floor insulation; minimum HVAC (heating, ventilating and air conditioning) and water heating equipment efficiencies, and other requirements. Many of the mandatory measures deal with infiltration control and lighting; others require minimum insulation levels and equipment efficiency. The minimum mandatory levels are sometimes superseded by more stringent prescriptive requirements.

Certificate of compliance shall be signed by the person(s) responsible for the building design and prepare energy compliance documentation to certify conformance
Design has to be documented in proper forms and submit to CEC for approval.

Currently California Energy Commission is developing the 2008 Energy Efficiency Standards.

The first phase of the development process will include a series of public workshops to communicate to the public what changes the Commission is considering, to share the results of related research sponsored by the Commission, utilities, and other stakeholder groups, and to obtain input from the public.

The second phase, expected in mid to late 2006, will present draft language for the 2008 Standards based on the discussions in the first phase and will offer opportunities for further public input.

The third phase will be the formal rulemaking for which final proposed language for the 2008 Standards and related documents will be released for public comment for 45 days (this language is referred to as "45-day language"). If needed, substantial changes to 45-day language would subsequently be released as "15-day language." This phase will also include Energy Commission adoption of the final Standards that would take effect in late 2008. The Commission expects this third phase in late 2006 and early 2007, with adoption in mid 2007. Preparation of the Residential and Nonresidential Compliance Manuals and approval of updated compliance software will follow Commission adoption.

California Energy Commission Approved Computer Programs:

1. Residential Buildings, 2005 Standards
   - **Energy Pro** www.energysoft.com
   - **Micropas 7** www.micropas.com
2. Nonresidential Buildings, 2005 Standards
   - **Energy Pro** www.energysoft.com
   - **Perform 2005** www.energy.ca.gov/title24/
3. Residential Solar Water Heating
   - **California F-Chart** www.energy.ca.gov/title24/swh_calculator/index.html
   - **F-Chart 4R** www.imaginegreen.com
   - **F-Chart 3 through 6** Web mail: info@fchart.com
   - **Solargy-F** www.solargy.com

References:

1. http://www.energy.ca.gov/title24/index.html
2. http://www.title24express.com/title_24_codes.htm
3. A Project Manager's Guide to Exceed the 2005 Title 24 Energy Efficiency Standards, Charles Eley, Architectural Energy Corp.