STATE OF CALIFORNIA — THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, *Governor*

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INITIAL STATEMENT OF REASONS

FOR PROPOSED BUILDING STANDARDS OF THE CALIFORNIA ENERGY COMMISSION

REGARDING THE CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 1 and PART 6 (CALIFORNIA ENERGY CODE)

2008 BUILDING ENERGY EFFICIENCY STANDARDS DOCKET NUMBER 07-BSTD-1

Introduction

The Building Energy Efficiency Standards were first adopted in 1976 and have been updated periodically since then as directed by statute. In 1975 the Department of Housing and Community Development had adopted rudimentary energy conservation standards, under their State Housing Law authority, that were a precursor to the first generation of the Building Energy Efficiency Standards. However, the Warren-Alquist Act was passed that year with explicit direction to the Energy Commission to adopt and implement the Building Energy Efficiency Standards. The Energy Commission's statute created completely separate authority and specific direction to the Energy Commission regarding what the Standards are to address, what criteria are to be met in developing standards, and what implementation tools, aids, and technical assistance are to be provided. The Standards contain energy efficiency and indoor air quality requirements for newly constructed buildings, additions to existing buildings, alterations to existing buildings and in the case of nonresidential buildings, repairs to existing buildings. The Standards have contained requirements for alterations to existing buildings for both nonresidential buildings and residential buildings since 1976.

The 2008 Building Energy Efficiency Standards (2008 Standards) focus on several key areas to improve the energy efficiency of new buildings and also include requirements that will enable demand reductions during critical peak periods. The most significant efficiency improvements to the residential Standards are proposed for windows and roof systems. A requirement for mechanical ventilation in new homes is also proposed. Efficiency improvements in insulation and lighting levels, as well as lighting and water heating controls, are proposed for the nonresidential Standards. The 2008 Standards also include expanded criteria for acceptance testing of mechanical and lighting systems.

PURPOSE, RATIONALE, AND NECESSITY OF THE PROPOSED AMENDMENTS IN GENERAL

The California economy, and indeed the well-being of all of California's citizens, depends on an adequate, reasonably-priced, and environmentally-sound supply of energy. Recent growth in electricity demand has strained the reliability of California's electricity system and has in some

circumstances contributed to a substantial rise in electricity prices. Similarly, natural gas supplies are becoming tighter.
Improvements in energy efficiency are the cheapest and most environmentally-friendly methods to help bring demand and supply into balance. Thus existing law (Public Resources Code Sections 25213, 25402, 25402.1, 25402.4, 25402.5, 25402.8, and 25910) requires the Energy Commission to adopt standards that prescribe minimum efficiency levels for buildings and outdoor lighting. The standards setting the minimum efficiency levels must be feasible and cost-effective. Past rulemakings have described the feasibility and cost-effectiveness of each of the efficiency standards adopted by the Energy Commission, and this ISOR proposes amendments to the 2005 Building Energy Efficiency Standards.

Specific Purpose, Rationale, and Necessity of Each Proposed Adoption, Amendment, and Repeal

TITLE 24, PART 1, CHAPTER 10 : ADMINISTRATIVE REGULATIONS CHANGES
ARTICLE 1 – ENERGY BUILDING REGULATIONS

SECTION 10-102 – DEFINITIONS

The definition of "NSHP Guidebook" is being added to the definition section.

The specific purpose and rationale for this change is that this Guidebook is an integral part of the proposed standards and it is necessary for enforceability of the Standards.

SECTION 10-103 – PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS

Changed the compliance, installation, and HERS verification certification documentation and enforcement procedures. Expanded the scope of the HERS provider data registry to facilitate secure submittal, retention, and retrieval of compliance, installation, and HERS verification certification documentation. Added new procedures to support optional electronic document transmittals/submittals, and electronic signatures/certifications for electronic documents

The specific purpose and rationale for this change is that it specifies new requirements for code enforcement and it is necessary to improve the enforceability of the Standards.

SECTION 10-105 – ENFORCEMENT BY THE COMMISSION

Amended existing language to clarify the roles and responsibilities state agencies for buildings that are not under the jurisdiction of local agencies.

The specific purpose and rationale for this change is that it clarifies state agency responsibilities to comply with the Standards and it is necessary to improve compliance with the regulations.

SECTION 10-109 – CALCULATION METHODS AND ALTERNATIVE COMPONENT PACKAGES

The initial fee of one thousand dollars has been increased to two thousand dollars.

The specific purpose and rationale for this change is that the increased fee more accurately reflects the costs of reviewing the alternative component packages for inclusion as alternative calculation methods and it is necessary to adequately review and include proposed technologies not considered directly within the Standards.

SECTION 10-111 – CERTIFICATION AND LABELING OF FENESTRATION PRODUCT U-FACTORS, SOLAR HEAT GAIN COEFFICIENTS AND AIR LEAKAGE

This is being amended to clarify that "manufactured fenestration" certifies compliance with air leakage.

The specific purpose and rationale for this change is that it clarifies the intent of the Standards and it is necessary to improve compliance with the regulations.

SECTION 10-112 – CRITERIA FOR DEFAULT TABLES

Changed to specify that fenestration default values shall be based on the ASHRAE 2005 Handbook of Fundamentals, rather than NFRC rating procedures.

The specific purpose and rationale for this change is that it specifies the criteria for default fenestration values and it is necessary for consistency with national standards.

SECTION 10-113 – CERTIFICATION AND LABELING OF ROOFING PRODUCT REFLECTANCE AND EMITTANCE

Edited to reference applicable sections of the Efficiency Standards which deal with Cool Roofs.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

SECTION 10-114 – DETERMINATION OF OUTDOOR LIGHTING ZONES, LOCAL OUTDOOR LIGHTING ORDINANCES, AND ADMINISTRATIVE RULES FOR USE

Subdivision (e) and (f) are being added to establish rules for a local jurisdiction to officially adopt specific outdoor light levels by following a public process that allows for formal public notification, review, and comment about the proposed change.

The specific purpose and rationale for this change is that it establishes the criteria for local jurisdictions to adopt specific outdoor light levels and it is necessary to improve compliance with the regulations.

TITLE 24, PART 6 EFFICIENCY STANDARDS

SUBCHAPTER 1: ALL OCCUPANCIES—GENERAL PROVISIONS

SECTION 100 – SCOPE

Subdivision (a) Exception 1: Historical Building Exception was amended for clarity, including the following for buildings covered: Clarified the reference to the California Historic Building Code for conditions under which qualified historic buildings can be treated as an exception to the scope

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the Standards and it is necessary to improve compliance with the regulations.

Subdivision (c): Floors and Habitable Stories was amended for clarity, including the following for floors and habitable stories: All unconditioned space in a floor shall comply with the lighting requirements of Title 24, Part 6, whether or not the floor is above grade and whether or not it is habitable.

The specific purpose and rationale for this change is that it clarifies the lighting requirements of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (e)(1): Sections Applicable to Particular Buildings was amended to add an exception which explains that (§100 through §199) do not apply to spaces or requirements not listed in TABLE 100-A.

The specific purpose and rationale for this change is that it adds a clarifying exemption to the scope of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (f): Mixed Occupancy was amended for clarity, including the following for mixed occupancy: Changes from 90% to 80% of the conditioned building floor area for the allowance of the single majority occupancy to represent the entire building, and the application of HVAC, water heating, and lighting requirements of that majority occupancy.

The specific purpose and rationale for this change is that it increases the applicability of this section of the Standard to new building design and it is necessary to reduce the complexity of the regulations.

Subdivision (h): Certification Requirements for Manufactured Devices was amended to add language for clarity, including the following for certification requirements for manufactured devices: The certification of lighting control systems.

The specific purpose and rationale for this change is that it clarifies the lighting control certification requirements of the Standards and it is necessary to improve compliance with the regulations.

Table 100-A: Application of Standards was amended to be consistent with proposed changes to Title 24, Part 6.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

SECTION 101 – DEFINITIONS AND RULES OF CONSTRUCTION

Added new definitions, deleted obsolete definitions, and modified existing definitions to reflect the Standards language.

The specific purpose and rationale for this change is that it updates the definition of terms in the Standards and it is necessary to promulgate effective regulations.

SUBCHAPTER 2
ALL OCCUPANCIES—MANDATORY REQUIREMENTS FOR THE MANUFACTURE, CONSTRUCTION AND INSTALLATION OF SYSTEMS, EQUIPMENT AND BUILDING COMPONENTS

SECTION 110 – SYSTEMS AND EQUIPMENT—GENERAL: Minor editorial changes were added to clarify Lighting control devices.

SECTION 112 – MANDATORY REQUIREMENTS FOR SPACE-CONDITIONING EQUIPMENT

Some minor editorial amendments were made for clarity of this section.

Subdivision (c): Programmable Communicating Thermostats (PCT) was amended to add a requirement that all new thermostats installed on unitary systems in residential and nonresidential buildings that are not controlled by a central energy management system shall be controlled by a PCT that will respond to price and emergency demand response signals.

The specific purpose and rationale for this change is that it enables new buildings to respond to peak demand events by reducing mechanical equipment usage and it is necessary to reduce the societal costs of energy use during peak periods.

Table 112-a: Air Conditioners and Condensing Units - Efficiency Requirements was amended to change the minimum efficiency values listed in Table 112-A to be in agreement with the values specified by ASHRAE Standard 90.1 and NAECA

The specific purpose and rationale for this change is that it ensures that the mechanical equipment efficiencies in the Standards equal national codes and it is necessary for consistency with federal regulations.

Table 112- B: Heat Pumps - Efficiency Requirements was amended to change the minimum efficiency values listed in Table 112-B to be in agreement with the values specified by ASHRAE Standard 90.1 and NAECA.

The specific purpose and rationale for this change is that it ensures that the mechanical equipment efficiencies in the Standards equal national codes and it is necessary for consistency with federal regulations.

Table 112-E: Packaged Terminal Air Conditioners and Heat Pumps - Efficiency Requirements (§112, Table 112-E) was amended to change the minimum efficiency values listed in Table 112-E to be in agreement with the values specified by ASHRAE Standard 90.1 and NAECA.

The specific purpose and rationale for this change is that it ensures that the mechanical equipment efficiencies in the Standards equal national codes and it is necessary for consistency with federal regulations.

Boilers, Gas- And Oil-Fired – Minimum Efficiency Requirements §112, Table 112 F): **Deleted** Table 112-F.

The specific purpose and rationale for this change is that the values on this table where adopted into or exceeded by the Title 20 appliance regulations.

Table 112-G: Heat Rejection Equipment was amended to change the minimum efficiency values listed in Table 112-G to be in agreement with the values specified by ASHRAE Standard 90.1.

The specific purpose and rationale for this change is that it ensures that the mechanical equipment efficiencies in the Standards equal national codes and it is necessary for consistency with federal regulations.

SECTION 113 – MANDATORY REQUIREMENTS FOR SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT

Subdivision (c)(5): Water Heating Recirculation Loops Serving Multiple Dwelling Units, High-Rise Residential and Hotel/Motel Occupancies added new subdivision (5) requirements that central water heating systems be properly installed and include features to allow for optimized performance and reasonable access if performance problems occur.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of central water heating systems and it is necessary to achieve cost-effective improvements in this area of the Standards.

SECTION 114 – MANDATORY REQUIREMENTS FOR POOL AND SPA HEATING SYSTEMS AND EQUIPMENT

Subdivision (b): Mandatory Requirements for Pool and Spa Systems and Equipment was amended for clarity, including modified language related to pool covers and the use of controls to reduce peak demand.

The specific purpose and rationale for this change is that it clarifies the requirements for pool and spa energy use and demand response and it is necessary to improve compliance with the regulations.

SECTION 116 – MANDATORY REQUIREMENTS FOR FENESTRATION PRODUCTS AND EXTERIOR DOORS

Subdivision (a): Fenestration Acceptance Requirements was amended to established new fenestration acceptance requirements, subdivision (5) to ensure site-built fenestration meets Standards requirements, including a matching NFRC Label Certificate for each product is installed and readily accessible at the project location. Deleted from subdivision (b) the language stating "buildings with 10,000 or more square feet of vertical glazing shall have no more than 1,000 square feet of field-fabricated fenestration."

The specific purpose and rationale for this change is that it clarifies the requirements for fenestration acceptance testing and it is necessary to improve compliance with the regulations.

Table 116-A and B: *Default Fenestration Product U-Factors* and Solar Heat Gain Coefficients was amended to clarify language to add glass block and notes that allowed for additional adjustments to the U-factors are removed to simplify use of the tables.

The specific purpose and rationale for this change is that it updates and simplifies default fenestration heat transfer values and it is necessary to improve compliance with the regulations.

SECTION 118 – MANDATORY REQUIREMENTS FOR INSULATION AND COOL ROOFSROOFING PRODUCTS

Subdivision (a) Table 118-A: Mandatory Requirements for Insulation and Roofing Products was amended by adding a reference to the certification of insulation by the Department of Consumer Affairs, Bureau of Home Furnishing and Thermal Insulation, and deleted Table 118-A.

The specific purpose and rationale for this change is that it clarifies the cool roof requirements of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b): Installation of Urea Formaldehyde Foam Insulation was amended by adding language that Urea formaldehyde foam insulation may not be used as an insulating material within the state of California.

The specific purpose and rationale for this change is that it clarifies that formaldehyde-based insulation is not allowed to be used in the state of California and it is necessary to improve compliance with the regulations.

Subdivision (d): Installation of Insulation in Existing Buildings was amended to make minor changes with the specific purpose to make clear internal cites in this section

Subdivision (h) Wet Insulation Systems was amended to reference Joint Appendix JA4.

The specific purpose and rationale for this change is that it clarifies the correct appendix and it is necessary to improve compliance with the regulations.

Subdivision (i) and Table 118 A & C Insulation and Roofing Products was amended to require aged values for solar reflectance as they become available through Cool Roof Rating Council testing. Specified default reflectance and emittance for products that do not have CRRC certification. Added Solar Reflectance Index (SRI) as an alternative to meeting separate thermal emittance and solar reflectance requirements. [note the minimum coating thickness changes were adopted in the Cool Roof Coatings rulemaking and are already law. The Standards are incorrectly marked. The cool roof coatings were adopted into law some time ago; they are the current law - amendments should be marked relative to the existing law (not to the 2005 Standards absent the changes that were adopted in the cool roof coatings rulemaking.]

The specific purpose and rationale for this change is that it clarifies the cool roof requirements of the Standards and it is necessary to improve compliance with the regulations.

is separately controlled from the inside of the building, to comply with §150(k)13.

The specific purpose and rationale for this change is that it specifies the requirements of outdoor lighting for high-rise residential buildings and it is necessary to minimize the energy costs of these buildings.

Subdivision (d) for Luminaire Power was amended for clarity and renumbered as §130(d).

The specific purpose and rationale for this change is that it improves the organization of the Standards and it is necessary to promulgate effective regulations.

Subdivision (d)(1) for Luminaire Power for Line Voltage lamp Holders was amended: Edited for clarity, including the following: Expanded scope from addressing only medium screw-base sockets to addressing all line-voltage sockets; Established additional labeling requirement; Established wattage caps for recessed luminaries; Established method for luminaries allowing conversion between screw-based and pin-based sockets without changing the luminaries housing or wiring.

The specific purpose and rationale for this change is that it specifies luminaire power requirements for line voltage lamp holders and it is necessary to minimize the energy costs of these lighting components.

Subdivision (d)(2) for Luminaire Power for Ballasts was amended for clarity, including the following: Established method for determining wattage for specific luminaires that accommodates a range of wattages.

The specific purpose and rationale for this change is that it provides useful information for determining luminaire wattage and it is necessary to improve compliance with the regulations.

Subdivision (d)(3) for Luminaire Power for Line-Voltage Track was amended for clarity and established additional methods for determining luminaire power for line-voltage tracks.

The specific purpose and rationale for this change is that it provides useful information for determining luminaire wattage and it is necessary to improve compliance with the regulations.

Subdivision (d)(4) for Luminaire Power for Transformers was amended for clarity and established additional methods for determining luminaire power for luminaires with transformers.

The specific purpose and rationale for this change is that it provides useful information for determining luminaire wattage and it is necessary to improve compliance with the regulations.

Subdivision (d)(5) for Luminaire Power for LED Lighting was amended for clarity, including the following: Established methods for determining luminaire power for LED lighting systems.

The specific purpose and rationale for this change is that it provides useful information for determining luminaire wattage and it is necessary to improve compliance with the regulations.

Subdivision (d)(5) for Luminaire Power for Miscellaneous Lighting was amended for clarity, and required pre-printed factory installed label.

The specific purpose and rationale for this change is that it ensures lighting power information is available for miscellaneous lighting products and it is necessary to improve compliance with the regulations.

GU-24 Socket, Lamps and Adapters was renumbered as subdivision (e) and was amended by adding requirements for lamps, luminaires, and adaptors utilizing GU-24 sockets.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of new buildings. This change is also necessary to ensure that only high efficacy GU-24 products are installed in California.

SECTION 131 – INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

Subdivision (a) for Area Lighting Controls was amended for clarity and reduced the exception in any area within a building that must be continuously illuminated from 0.5 to 0.3 W/ft^2

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (a) *for* Multi-Level Lighting Controls was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language for multi-level lighting controls and it is necessary to improve compliance with the regulations.

Subdivision (c) *for* Daylit Areaswas amended to establish requirements for lighting controls in skylit, primary sidelit, and secondary sidelit areas.

The specific purpose and rationale for this change is that it increases the daylighting requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (c) *for* Shut-off Controls was amended for clarity, including the following: Reduced the exception in any area within a building that must be continuously illuminated from 0.5 to 0.3 W/ft^2; Added requirement for offices ≤ 250 ft^2, multipurpose rooms < 1000 ft^2, and classrooms and conference rooms of any size to be equipped with occupant sensors.

The specific purpose and rationale for this change is that it increases the lighting shut-off control requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (e) *for* Display Lighting was amended to clarify specific types of display lighting that are required to be separately switched on circuits ≤ 20 amps.

The specific purpose and rationale for this change is that it clarifies the code language for display lighting and it is necessary to improve compliance with the regulations.

Subdivision (f) *for* Lighting Control Acceptance was amended and moved to (§134).

The specific purpose and rationale for this change is that it improves the organization of the Standards and it is necessary to promulgate effective regulations.

Subdivision (f) was amended to add Automatic Controls Required for Tailored Method with requirements for general lighting to be controlled separately from display, ornamental, and display case lighting.

The specific purpose and rationale for this change is that it improves the automatic control requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (g) was added for Demand Responsive Lighting Controls with requirements that demand responsive automatic lighting controls to reduce lighting power by minimum 15 percent be installed in retail buildings with sales floor areas > 50,000 square feet.

The specific purpose and rationale for this change is that it enables new buildings to respond to peak demand events by reducing lighting usage and it is necessary to reduce the societal costs of energy use during peak periods.

SECTION 132 – OUTDOOR LIGHTING CONTROLS AND EQUIPMENT

Subdivision (b) for Outdoor Lighting was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language for outdoor lighting and it is necessary to improve compliance with the regulations.

Subdivision (b) for Luminaire Cutoff Requirements was amended by adding an exception for replacement luminaires in specific conditions.

The specific purpose and rationale for this change is that it clarifies the code language for luminaire cutoff requirements and it is necessary to improve compliance with the regulations.

Subdivision (c) for Controls for Outdoor Lighting was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language for outdoor lighting controls and it is necessary to improve compliance with the regulations.

SECTION 133 –. SIGN LIGHTING CONTROLS

This is a new added section adding new requirements for the application of automatic time switch controls, photocontrols, outdoor astronomical time switch controls, dimming, and demand responsive electronic message center controls

The specific purpose and rationale for this change is that it increases the lighting shut-off control requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

SECTION 134 –REQUIRED NONRESIDENTIAL LIGHTING CONTROL ACCEPTANCE.

This is a new added section that moved current requirements for lighting control acceptance for indoor lighting controls from §130(f). The amendments also added new requirements for lighting control acceptance for outdoor lighting controls.

The specific purpose and rationale for this change is that it clarifies the requirements for lighting control acceptance testing and it is necessary to improve compliance with the regulations.

SUBCHAPTER 5
NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES— PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES FOR ACHIEVING ENERGY EFFICIENCY

SECTION 143 – PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

Subdivision (a): Envelope Component Approach (§143(a)) was amended to eliminate the

requirement that nonresidential buildings with low-slope roofs have cool roofs in Climate Zone 1 and added exception for the cool roof requirements for nonresidential buildings in Climate Zones 3 and 5. Added requirement that nonresidential buildings with steep-slope roofs have cool roofs in specified Climate Zones. The cool roof requirements for steep-slope roofs depend on the roofing material unit weight per square foot. Also increased the prescriptive insulation requirements for nonresidential and high-rise residential buildings, which are contained in Tables 143-A, 143-B, and 143-Cas specified by climate zone and building material.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the building envelope and it is necessary to minimize the energy costs of new nonresidential buildings.

Subdivision (b): Overall Envelope Approach was amended to improve the prescriptive method for making envelope tradeoffs by combining heat loss and heat gain into a single tradeoff equation based on annual TDV energy of space cooling and heating resulting from the envelope characteristics.

The specific purpose and rationale for this change is that it improves the methods used to comply with the prescriptive approach in the Standards and it is necessary to promulgate effective regulations.

Subdivision (c): Minimum Skylight Area was amended to expanded scope of the requirements, for skylights in spaces with ceiling heights > 15 feet when ceiling plan not provided and general lighting power density > 0.5 W/ft^2, to apply to spaces > 8,000 ft^2 (current Standards requirements are for spaces > 25,000 ft^2). . Replaced Table 143-F with a single minimum skylight area to sky lit area ratio of at least 3.3% or minimum skylight effective aperture of at least 1.1%. Added exception for churches.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

SECTION 144 – PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

Subdivision (b): Calculations were amended by referencing the 2005 ASHRAE Handbook, - Fundamentals Volume, Chapter 2930, Table 1.

The specific purpose and rationale for this change is update a Standards reference and it is necessary to promulgate effective reugulations.

Subdivision (c) Power Consumption of Fans was amended by adding that the final pressure drop is more than 245 pascals.

The specific purpose and rationale for this change is that it provides a metric equivalent for a pressure drop requirement and it is necessary to improve compliance with the regulations.

Subdivision (d) for Space Conditioning Zone Controls was amended to change EXCEPTION 1. This exception has been edited to clarify the zonal control requirements for systems with and without Direct Digital Controls.

The specific purpose and rationale for this change is that it clarifies the requirements for space-conditioning zonal controls with and without direct digital control systems.

Subdivision (f): Supply Air Temperature Reset Controls was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the requirements for reset controls and it is necessary to improve compliance with the regulations.

Subdivision (h): Heat Rejection Systems was amended for clarity.

Subdivision (j)(6): Hydronic System Measures was amended clarify the requirements for pressure sensor location and setpoints for specific systems.

The specific purpose and rationale for this change is that it clarifies the requirements for hydronic systems and it is necessary to improve compliance with the regulations.

Subdivision (j)(7): Hydronic Heat Pump (WLHP) Controls was added and sets forth the requirements for hydronic heat pumps connected to a common heat pump water loop with central devices for heat rejection and heat addition.

The specific purpose and rationale for this change is that it specifies the criteria for hydronic systems and it is necessary to promulgate effective regulations.

Subdivision (l): *Variable Air Volume Control for Single Zone Systems* was added to require that effective January 1, 2012, all unitary air conditioning equipment and air-handling units with mechanical cooling capacity at ARI conditions greater than or equal to 110,000 Btu/hr that serve single zones shall be designed for variable supply air volume with their supply fans controlled by two-speed motors, variable speed drives, or other equipment.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of single zone systems and it is necessary to minimize the energy costs of these systems.

Table 144-A: Economizer Tradeoff Table for Electrically Operated Unitary Air Conditioners (§144 amended the EER requirement for 2010 changed by increasing the tradeoff EER by the same percentage that the minimum efficiency is increased in ASHRAE 90.1 Addendum G

The specific purpose and rationale for this change is that it ensures that the mechanical equipment efficiencies equal national standards and it is necessary for consistency with federal regulations.

Table 144-B: Economizer Tradeoff Table for Electrically Operated Unitary Heat Pumps amended: the EER tradeoff values increased in proportion with the increase in minimum efficiency requirements that take effect 1/1/2010, per 90.1 Addendum G.

The specific purpose and rationale for this change is that it ensures that the mechanical equipment efficiencies equal national standards and it is necessary for consistency with federal regulations.

SECTION 145 – PRESCRIPTIVE REQUIREMENTS FOR SERVICE WATER HEATING SYSTEMS

This section was amended by adding a reference for Water Heating Recirculation Loops Serving Multiple Dwelling Units, High-Rise Residential and Hotel/Motel Occupancies to clarify that these building categories must comply with the requirements (§ 113) for central water heating systems.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

SECTION 146 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

This section was amended extensively for clarity; renumbered some subsections and tables.

The specific purpose and rationale for this change is that it improves the organization of the Standards and it is necessary to promulgate effective regulations.

Subdivision (a): Calculation of Actual Lighting Power Density was amended by eliminating requirement to include 0.2 W/ft^2 of portable lighting for office areas and added an exception for portable lighting to clarify that amount of portable lighting is not required to be considered in the calculation of actual lighting density in offices.

The specific purpose and rationale for this change is to simplify the documentation of compliance forms for portable lighting and it is necessary to improve compliance with the regulations.

Subdivision (a)(1) Multiple Interlocked Lighting Systems was amended to restrict the provision, that excludes from consideration any spaces other than the space with the highest wattage must be considered when a multiple interlocked lighting system is installed in specified types of spaces. Added the requirement that to qualify for this exclusion, requires lighting systems to be interlocked with a non-programmable double throw switch. Removed the option for systems controlled by a preset dimming system to qualify for the exclusion.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the Standards and it is necessary to improve compliance with the regulations.

Subdivision (a)(2): Reduction of Wattage through Controls was amended to change the percentage of power that the first stage of a multi-level occupancy sensor must be activated. Established Power Adjustment Factors for daylighting controls for primary sidelit, secondary sidelit, and skylit daylight areas, and changed the equation for calculating the effective aperture for skylights and added new equations for calculating the effective aperture for primary and secondary sidelit areas. Deleted Figure 146-A, Well Efficiency Nomograph, and replaced it with Tables 146-A and 146-B.

The specific purpose and rationale for this change is that it improves the methods used to comply with the prescriptive approach in the Standards and it is necessary to promulgate effective regulations.

Subdivision (a)(3): Lighting Wattage Excluded was amended to require specific separate lighting controls for some exceptions. Added a separate exception for lighting in a videoconferencing studio. Added exceptions for theatrical lighting used for religious worship and for lighting for automatic teller machines that are located inside parking garages.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the lighting wattage requirements and it is necessary to improve compliance with the regulations.

Subdivision (a)(4): Luminaire Power was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language in the luminaire power section of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b): Indoor Lighting Power Trade-offs was amended to move lighting power tradeoff requirements from various subsections to new subsection, and edited for clarity.

The specific purpose and rationale for this change is that it clarifies the code language for lighting power trade-offs and it is necessary to improve compliance with the regulations.

Subdivision (c): Calculation of Allowed Indoor Lighting Power Density was amended by changing the calculation of allowed indoor lighting power density.

The specific purpose and rationale for this change is that it clarifies the code language for calculating allowed lighting power density and it is necessary to improve compliance with the regulations.

Subdivision (c)(1): Complete Building Method was amended to add the allowance that the Complete Building Method may also be used for a tenant space where one type of use makes up a minimum 90 percent of the space. Clarified that retail and wholesale stores shall not use the Complete Building method. Added when Parking Garages combined with other type of use can use Complete Building Method.

The specific purpose and rationale for this change is that it clarifies a prescriptive compliance approach for nonresidential buildings and it is necessary to improve compliance with the regulations.

Subdivision (c)(3): Tailored Method was amended to change the mounting height above floor and the mounting distance of qualifying wall lighting and floor display lighting systems. Changed provisions for determining lighting power allowances for Very Valuable Displays.

The specific purpose and rationale for this change is that it clarifies a prescriptive compliance approach for nonresidential buildings and it is necessary to improve compliance with the regulations.

Table 146-(C) Lighting Power Adjustment Factors was moved and amended by adding a condition that to qualify for the Power Adjustment Factors, all dimming ballasts for linear fluorescent lamps shall be electronic and certified to the Energy Commission with a minimum Relative System Efficiency in accordance with Table 146-D. Changed the Power Adjustment Factors for daylighting controls credits to be consistent with the new definitions of daylighting areas.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Table 146-(D) Relative System Efficiency Table was added to establish relative system efficacy requirements for dimmable electronic ballasts to qualify for the power adjustment factor in Table 146-C.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Table 146-E: Complete Building Method Lighting Power Density Values was moved and amended by adding classroom building and library. Removed hotels to be consistent with the 2005 Standards that said that hotels shall not use the Complete Building Method. Removed retail and wholesale stores because they are made up of varying types of function areas, rather than one type of function area, that are more accurately addressed using the Area Category Method. Reduced the allowed lighting power for specific types of use.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Table 146-F: Area Category Method - Lighting Power Density Values was moved and amended to add the Primary Function Areas include refrigerated commercial and industrial storage, telephone rooms, scientific laboratories, offices greater than 250 square feet, parking areas, and parking ramps and entries. Reduced the allowed lighting power reduced for specific Primary Function Areas.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Table 146-G: Tailored Method Special Lighting Power Allowances was moved and amended to specific illumination categories, wall display power, allowed floor display power, and ornamental/special effects lighting. Eliminated allowances from the table for very valuable display power, which were covered by new provisions in§146(c).

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Table 146-H: Adjustments for Mounting Height Above Floor (Table 146-H) was moved and amended by changing adjustments to allowed power allowances due to luminaire mounting heights. Established separate columns for floor display and wall display adjustments.

The specific purpose and rationale for this change is that it provides consistency with various sections of the Standards and it is necessary to promulgate effective regulations.

Table 146-F: Illuminance Categories A Through G Lighting Power Density Values was moved.

The specific purpose and rationale for this change is that it improves the organization of the Standards and it is necessary to promulgate effective regulations.

SECTION 147 – REQUIREMENTS FOR OUTDOOR LIGHTING

The entire section was substantially restructured.

The specific purpose and rationale for this change is that it improves the organization of the Standards and it is necessary to promulgate effective regulations.

Outdoor Lighting Exceptions was amended to add new conditions to some exceptions. Added new exceptions for outdoor theme parks, outdoor theatrical and outdoor historic buildings.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the outdoor lighting requirements and it is necessary to improve compliance with the regulations.

Subdivision (a): *Outdoor Lighting Power Trade Offs* was added for clarity.

The specific purpose and rationale for this change is that provides criteria for complying with the outdoor lighting power requirements of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b): *Determining Outdoor Lighting Power* was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language in the luminaire power section of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (c): *Calculation of Actual Outdoor Lighting Power* was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language in the allowed outdoor lighting power section of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (d): *Calculation of Allowed Outdoor Lighting Power* was amended for clarity and to allow the allowed power to be the combined total of the general hardscape, specific applications, and local ordinance power allowances.

The specific purpose and rationale for this change is that it clarifies the code language in the allowed outdoor lighting power section of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (d)(1) :*General Hardscape Lighting Allowance* was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language in the allowed outdoor lighting power section and of the Standards it is necessary to improve compliance with the regulations.

Subdivision (d)(1)(A) : Hardscape was amended for clarity. Combined the hardscape for automotive and pedestrian use into one category. Defined illuminated hardscape area as any hardscape area that is within a square pattern around each luminaire or pole that is ten times the luminaire mounting height with the luminaire in the middle of the pattern. Established for each Lighting Zone, an Area Wattage Allowance (AWA), Linear Wattage Allowance (LWA), and Initial Wattage Allowance (IWA).

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (d)(2): Additional Lighting Power Allowance for Specific Applications was amended as part of the restructuring of the section, established additional lighting power allowances for specific applications that may be added to the hardscape allowances.

The specific purpose and rationale for this change is that it improves the organization of the Standards and it is necessary to promulgate effective regulations.

Subdivision (d)(3): Additional Lighting Power Allowance for Local Ordinance Requirements was amended to add a new sub section added for Additional Lighting Power Allowance for Local Ordinance Requirements. This is a restructuring of the application of lighting power allowances for local ordinance requirements for clarity. Additional lighting allowed power for local ordinance requirements may be layered on top of the hardscape allowances.

The specific purpose and rationale for this change is that it clarifies the process for applying for a lighting power allowance and it is necessary to improve compliance with the regulations.

Table 147-A: General Hardscape Lighting Power Allowance was restructured to combine hardscape for automotive and pedestrian use into one application., Established an Area Wattage Allowance (AWA), Linear Wattage Allowance (LWA), and Initial Wattage Allowance (IWA) for each respective lighting zone.

The specific purpose and rationale for this change is that it updates the outdoor lighting requirements of the Standards and it is necessary to minimize the energy costs of outdoor lighting.

Table 147-B: Additional Lighting Power Allowance for Specific Applications was restructured as follows: For specified applications established a wattage allowance per application, a wattage allowance per unit length, a wattage allowance per hardscape area, a wattage allowance per specific area; and a special security lighting allowance for retail parking and pedestrian hardscape. In developing these restructured allowances, the overall allowed lighting power allowance have been slightly reduced compared to the 2005 Standards

The specific purpose and rationale for this change is that it updates the outdoor lighting requirements of the Standards and it is necessary to minimize the energy costs of outdoor lighting.

Table 147-C: Alternative Power Allowance for Ordinance Requirements was restructured from an optional hardscape allowance, to be treated as an additional layer of lighting power that can be added to a site to accommodate when there are local ordinance illumination levels. 2005 only allowed for average illumination ordinances, while the restructured table allows for either average or minimum illumination ordinances. Some of the lighting power allowances have been slightly reduced compared to the 2005 Standards.

The specific purpose and rationale for this change is that it updates the outdoor lighting requirements of the Standards and it is necessary to minimize the energy costs of outdoor lighting.

Table 147-D: Multipliers for Special Security Requirements was eliminated as a separate table with special security lighting allowances for retail parking and pedestrian hardscape incorporated into Table 147-C.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

SECTION 148 – REQUIREMENTS FOR SIGNS

This section was amended for clarity.

The specific purpose and rationale for this change is that it clarifies the code language in the sign requirements section of the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b): Alternative Lighting Sources was amended to add minimum efficacies to specific alternative lighting sources.

The specific purpose and rationale for this change is that it updates the outdoor lighting requirements of the Standards and it is necessary to minimize the energy costs of outdoor lighting.

SUBCHAPTER 6
NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES—ADDITIONS, ALTERATIONS, AND REPAIRS

SECTION 149 – ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES AND TO EXISTING OUTDOOR LIGHTING FOR THESE OCCUPANCIES AND TO INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS

Subdivision (a)(2): Performance approach was amended to clarify the requirements for additions plus alterations under the performance approach. This clarification has not changed the proposed and standards budgets.

The specific purpose and rationale for this change is that it clarifies the requirements of the performance compliance approach to the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b)(1)(A): Alterations was amended for clarity and added an exception for a small amount of fenestration from the window to wall ratio calculations in high-rise residential and hotel/motel occupancies.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the requirements for alterations and it is necessary to improve compliance with the regulations.

Subdivision (b)(1)(B): Alterations was amended by adding cool roof requirements for altered roofs, including emittance and reflectance or alternatively SRI requirements for specific types of roofs. Added insulation requirements when roofs are altered with specific conditions. Clarified the Overall Envelope Approach option, which is available for altered roofs.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of renovated buildings.

Subdivision (b)(1)(E): Alterations was amended to clarify that PCTs shall be installed when a space conditioning system is altered by the installation or replacement of space conditioning equipment.

The specific purpose and rationale for this change is that it enables renovated buildings to respond to peak demand events by reducing mechanical equipment usage and it is necessary to reduce the societal costs of energy use during peak periods.

Subdivision (b)(1)(F): Alterations was amended to clarify cross references.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (b)(1)(G): Alterations was added to clarify that when the requirements of Section 131(c)2 are triggered by the addition of skylights to an existing building and the lighting system is not re-circuited, the daylighting control need not meet the multi-level requirements in Section 131(c)2A.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (b)(1)(H): Alterations was amended to clarify cross references.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (b)(1): Alterations was amended for clarity (formerly §149(b)(1)H). Clarification covers how specific lighting alterations are to meet Section 149(b) and other appropriate sections: Alterations that remove and re-install a total of 50 percent or more of the luminaires in an enclosed space; where new or moved wiring is being installed to serve added or moved luminaries; where conductor wiring from the panel or from a light switch to the luminaires is being replaced; where a lighting panel is installed or moved; where an existing enclosed space is subdivided into two or more spaces; and alterations that have less than 0.5 watts per square foot and increase the existing lighting power density to 0.5 watts per square foot or more.

The specific purpose and rationale for this change is that it clarifies the energy efficiency requirements for residential alterations to the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b)(2): Performance Approach was amended for clarity; maintains same intent as the 2005 Standards. Altered components that meet (or exceed) the prescriptive requirements for the altered component get full credit compared to the existing condition of the component. Altered components that fail to meet the prescriptive requirements for the altered component must be compensated for by other efficiency measures, thus maintaining equivalency between the prescriptive and performance approaches.

The specific purpose and rationale for this change is that it clarifies the criteria for performance compliance with the Standards and it is necessary to improve compliance with the regulations.

SUBCHAPTER 7
LOW-RISE RESIDENTIAL BUILDINGS – MANDATORY FEATURES AND DEVICES

SECTION 150 – MANDATORY FEATURES AND DEVICES

Subdivision (c): Wall Insulation was amended to add a provision that roofs and floors of bay windows must meet the wall insulation requirements of Package D to clarify that those components need not meet the higher insulation requirements for roofs and floors in the Standards.

The specific purpose and rationale for this change is that it clarifies the criteria for wall insulation in the residential Standards and it is necessary to improve compliance with the regulations.

Subdivision (j): Thermostats was amended to clarify that all new thermostats installed on unitary systems in residential and buildings shall meet the PCT requirements in §112(c).

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (k): Residential Lighting was amended for clarity, including: Definitions for both high efficacy and low efficacy luminaires; Clarified that for recessed luminaires with ballasts to qualify as high efficacy, the ballasts shall comply with Section 119.

The specific purpose and rationale for this change is that it provides new definitions and consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (k)(3): Luminaire Wattage was amended for clarity, including in residential kitchens, the wattage of electrical boxes finished with a blank cover shall be calculated as 180 watts of low efficacy lighting per electrical box.

The specific purpose and rationale for this change is that it clarifies the criteria for residential luminaire wattage and it is necessary to improve compliance with the regulations.

Subdivision (k)(5): Night Lights was amended to add a requirement that permanently installed night lights and night lights integral to a permanently installed luminaire or exhaust fan must meet minimum efficacies or maximum power requirements.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (k)(8): Lighting in Kitchens was amended for clarity and added an option that allows up to 50 or 100 watts to be exempt from the 50% high efficacy requirement provided specific conditions are met.

The specific purpose and rationale for this change is that it clarifies the criteria for lighting in kitchens and it is necessary to improve compliance with the regulations.

Subdivision (k)(9): Lighting Internal to Cabinets was amended by adding a provision that allots a specific, separate power allowance for illuminated cabinets.

The specific purpose and rationale for this change is that it clarifies the criteria for cabinet lighting and it is necessary to improve compliance with the regulations.

Subdivision (k)(12): Recessed Luminaires in Insulated Ceilings was amended for clarity and added requirements to guard against short ballast life by requiring manufacturer certification to comply with §119(n) and to require luminaires that make ballast maintenance and replacement to be readily accessible to building occupants from below the ceiling without requiring the cutting of holes in the ceiling.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (k)(13), Exception 1: Outdoor Lighting was amended by adding conditions for the current allowance of permanently installed outdoor low efficacy luminaires that are installed with specific controls, to be to continue to be available as long as there are not override or bypass switches that disable the control.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the outdoor lighting requirements and it is necessary to improve compliance with the regulations.

Subdivision (k)(13), Exception 2: Outdoor Lighting was mended by adding an exception that allows temporary override controls of the motion sensing function of outdoor low efficacy luminaires provided that the override switch automatically reactivates the motion sensor after the temporary override.

The specific purpose and rationale for this change is that it specifies the criteria for determining an exception to the outdoor lighting requirements and it is necessary to improve compliance with the regulations.

Subdivision (k)(14): Internally Illuminated Address Signs was amended by adding a requirement that internally illuminated address signs either comply with §148, or not contain a screw-base socket and consume no more than five watts of power.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of new buildings.

Subdivision (n): Water Heating Recirculation Loops Serving Multiple Dwelling Units was amended to add reference to clarify that residential buildings with central water heating systems must comply with the requirements § 113.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

Subdivision (o): Ventilation for Indoor Air Quality was amended to add a new requirement that all dwelling units shall meet the requirements of ANSI/ASHRAE Standard 62.2-2004 Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings and that window operation is not a permissible method of meeting that Standard.

The specific purpose and rationale for this change is that mechanical ventilation is required to provide air change rates in new homes to safe levels and it is necessary because the scope of the Standards includes the provision of adequate indoor air quality.

Subdivision (p): Pool Systems and Equipment Installation was amended to add a reference to clarify that residential pools must comply with the requirements in § 114 and added requirements for pump sizing, and plumbing design.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of residential pool systems and it is necessary to minimize the energy costs of new buildings.

Table 150-C: High Efficacy Luminaire Requirements was amended to add a separate efficacy requirement for luminaires that use 5 watts or less of power and established approaches for complying with this requirement for both LED and non-LED lighting.

The specific purpose and rationale for this change is that it provides consistency with related sections of the Standards and it is necessary to promulgate effective regulations.

SUBCHAPTER 8
LOW-RISE RESIDENTIAL BUILDINGS—PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES

SECTION 151 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES

Subdivision (b)(3): Multiple heating systems was added to clarify performance compliance for multiple heating systems and supplemental heating systems in spaces served by a primary heating system and added an exception for a supplemental heating system smaller than a specified size that is controlled by a timer.

The specific purpose and rationale for this change is that it clarifies the performance compliance approach for multiple heating systems and it is necessary to improve compliance with the regulations.

Subdivision (f): Prescriptive Standards/Alternative Component Packages (Component Packages) was amended in various subdivision to reference new Table 151-D and changed the cross reference to Residential Appendix RA4 instead of the ACM Manual to insure compliance with this section.

Subdivision (f)(3): Fenestration was amended to change the fenestration U-factors and Solar Heat Gain Coefficients (SHGCs) in the Component Packages in Tables 151-B, and 151-C to require more efficient windows. Added reference to Table 151-D (Component Package E) to allow for a prescriptive option for the combination of less efficient windows and higher furnace or heat pump efficiency.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of residential building envelopes and it is necessary to minimize the energy costs of new residential buildings.

***Tables 151-B, 151-C, 151-D* and Notes 8 and 9:** Fenestration was amended to change the fenestration U-factors and SHGCs in the Component Packages in Tables 151-B and 151-C to require more efficient windows. Added Table 151-D (Component Package E) to allow for a prescriptive option for the combination of less efficient windows and higher furnace or heat pump efficiency.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of residential building envelopes and it is necessary to minimize the energy costs of new residential buildings.

Subdivision (f)(3(A) Exception: Fenestration was amended to add an exception o allow small amounts of glass in doors and tubular skylights to not have to meet the prescriptive fenestration requirements.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the fenestration requirements and it is necessary to improve compliance with the regulations.

***Subdivision (f)(5*):** Thermal Mass was amended by clarifying requirements for integrated photovoltaic panels and building integrated solar thermal panels and adding EXCEPTIONS to 152(f)11.

The specific purpose and rationale for this change is that it clarifies the requirements for photovoltaic panels and building integrated solar thermal panels and it is necessary to improve compliance with the regulations.

***Subdivision (f)(7)*:** Space Heating and Space Cooling was amended to change the prescriptive requirements related to refrigerant charge, airflow and fan watt draw for low-rise residential air conditioners and heat pumps: a) eliminated the existence of a thermostatic expansion valve as an alternative to the prescriptive standard for refrigerant charge verification, and provided a new alternative for equipment with a charge indicator display as specified; to facilitate refrigerant charge verification added the installation of temperature measurement access holes; b) added a prescriptive requirement for minimum airflow at 350 cfm per ton and a requirement for installation

of a hole in the supply plenum for placement of a static pressure probe or a permanently installed static pressure probe; c) added a prescriptive requirement for maximum watt draw as function of airflow (watt/cfm) .

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of residential heating and cooling equipment and it is necessary to minimize the energy costs of new residential buildings.

***Subdivision (f)(8)*:** Domestic Water-heating systems was amended to reduce distribution losses, improve system performance, and update equipment calculations procedures.

The specific purpose and rationale for this change is to add and modify requirements for residential water heating necessary to limit water heating system inefficiencies.

***Subdivision (f)(9)*:** Thermostats was amended to add a reference to the requirement in §112(c) that all new thermostats installed on unitary systems in residential buildings shall be controlled by a PCT that will respond to price and emergency demand response signals.

The specific purpose and rationale for this change is that it enables new buildings to respond to peak demand events by reducing mechanical equipment usage and it is necessary to reduce the societal costs of energy use during peak periods.

***Subdivision (f)(11)*:** Roofing Products was amended to add requirements for residential buildings with low-slope or steep-slope roofs to have cool roofs in specific Climate Zones including and EXCEPTION to 152(f)11.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the residential building envelope and it is necessary to minimize the energy costs of new residential buildings.

SUBCHAPTER 9
LOW-RISE RESIDENTIAL BUILDINGS—ADDITIONS AND ALTERATIONS IN EXISTING LOW-RISE RESIDENTIAL BUILDINGS

SECTION 152 – ENERGY EFFICIENCY STANDARDS FOR ADDITIONS AND ALTERATIONS IN EXISTING BUILDINGS THAT WILL BE LOW-RISE RESIDENTIAL OCCUPANCIES

Subdivision (a)(1): Additions -Prescriptive Approach was amended to clarify the rules to improve compliance and enforcement of the Standards related to total fenestration area, west-facing glass areas, and additions greater than 1,000 sf and added two new Exceptions, one to section 152(a)(1)(B) and another to Section 150(o).

The specific purpose and rationale for this change is that it clarifies the energy efficiency requirements for additions to residential buildings and it is necessary to improve compliance with the regulations. The Exception section 152(a)(1)(B) has been added to clarify the west-facing glass area requirements for additions up to 1000 square feet. The other exception has been added to except additions of more the 1,000 square feet from indoor air quality requirements of Section 150(o).

Subdivision (a)(2): Performance Approach was amended to clarify the glass area requirement for existing plus addition plus alteration compliance when using the performance approach.

The specific purpose and rationale for this change is to clarify the glass area requirements when using the performance approach to compliance and it is necessary to improve compliance with the regulations.

Subdivision (b)(1)(A) Exception: Alterations was amended to clarify the west-facing glass area requirements for alterations that add less than 50 square feet of fenestration area.

The specific purpose and rationale for this change is that it clarifies the criteria for determining an exception to the Standards and it is necessary to improve compliance with the regulations.

Subdivision (b)(1)(B): Alterations was amended to clarify the replacement fenestration requirements that have the same orientation and tilt.

The specific purpose and rationale for this change is that it clarifies the requirements for replacement fenestration and it is necessary to improve compliance with the regulations.

Subdivision (b)(1)(C): Alterations was amended to clarify the requirements for new or replacement space-conditioning systems.

The specific purpose and rationale for this change is that it clarifies the requirements for space conditioning systems and it is necessary to improve compliance with the regulations.

Subdivision (b)(1)(F): Alterations is being amended by adding a new subdivision (F) to require a PCT when a system is altered by the installation or replacement of the air handler, outdoor condensing unit of a split system air conditioner or heat pump, cooling or heating coil, or the furnace heat exchanger.

The specific purpose and rationale for this change is that it enables renovated buildings to respond to peak demand events by reducing mechanical equipment usage and it is necessary to reduce the societal costs of energy use during peak periods.

Subdivision (b)(1)(G): Alterations is being renumber from subdivision (F).

Subdivision (b)(1)(H): Alterations - Prescriptive Approach is being added for residential roofing alterations to meet the specific cool roof reflectance and emittance or SRI criteria. Added alternatives for other measures that may exist or be added instead of the cool roof requirements.

The specific purpose and rationale for this change is that it increases the energy efficiency requirements of the Standards and it is necessary to minimize the energy costs of renovated buildings.

Subdivision (b)(2): Alterations - Performance Approach is being amended to add a revised subdivision (B) and new subdivision (C) and new notes. These amendments maintain the same intent as the 2005 Standards. Altered components that meet (or exceed) the prescriptive requirements for the altered component get full credit compared to the existing condition of the component. Altered components that fail to meet the prescriptive requirements for the altered component must be compensated for by other efficiency measures, thus maintaining equivalency between the prescriptive and performance approaches.

The specific purpose and rationale for this change is that it clarifies the criteria for performance compliance with the Standards and it is necessary to improve compliance with the regulations.

APPENDIX 1-A
STANDARDS AND DOCUMENTS REFERENCED IN THE ENERGY EFFICIENCY REGULATIONS

AMERICAN NATIONAL STANDARDS INSTITUTE: This is being amended to add the new reference-- ANSI/NSPI-5 2003 Residential Inground Swimming Pools (2003)

COOLING TOWER TECHNOLOGY INSTITUTE: This is being amended for –CTI STD-201-02 by updating to the 2004 standard from the 2000 standard.

The specific purpose and rationale for this change is that it updates Standards reference material and it is necessary to promulgate effective regulations.

NSF INTERNATIONAL: NSF/ANSI 50 2005 Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs (2005) is being added to Appendix 1-A

The specific purpose and rationale for this change is that it adds new reference material to the Standards and it is necessary to improve compliance with the regulations.

ALTERNATIVE CALCULATION METHOD (ACM) APPROVAL MANUAL FOR THE 2008 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

The Residential and Non-residential Alternative Calculation Method Approval (ACM) Manuals are adopted by regulation to support the Standards in Part 6. The ACM Manuals contain detailed requirements that developers of computer software must meet for the Commission to approve their software for showing compliance with the Standards. They also contain detailed information regarding compliance options, including specific calculation algorithms that have been approved for assessing the compliance credit or penalty due to installation of the compliance option.

The ACM Manuals include information from the appendices that detail building material characteristics data, weather data, and other information necessary for completing calculations for showing compliance with the Standards.

RESIDENTIAL ALTERNATIVE CALCULATION METHOD (ACM) APPROVAL MANUAL FOR THE 2008 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

The Residential Alternative Calculation Method (SCM) Approval Manual Approved has been substantially revised to reflect changes to be adopted in the 2008 Building Energy Efficiency Standards. Compliance software will be required to produce a revised Certificate of Compliance form (CF-1R). In addition, updated procedures and values for implementing Time Dependent Valuation (TDV) will be incorporated. A number of modeling algorithm and assumptions changes will be made, including new modeling rules for attics, slab perimeter losses, and water heating distribution systems. -The modeling and compliance procedures for air conditioner refrigerant charge and air flow will be revised to match recent research findings on the energy consequences

of these measures and to update air flow diagnostic testing protocols.

New compliance options are being established for evaporative cooling, evaporatively cooled condensers, and distributed ice energy storage systems. New procedures are being ~~be~~ required and new accuracy tests will be established for computer compliance software to match changes in the Standards, modeling algorithms, assumptions, and rules.

The specific purpose and rationale for these changes are to improve their clarity and organization and incorporate new efficiency measures initially introduced through compliance options, and improve the data needed for Standards calculations. The ACM Manuals also are revised to include more accurate modeling assumptions for attics, slab perimeter losses and water heating systems. These changes are necessary to implement the adopted 2008 Building Energy Efficiency Standards.

NONRESIDENTIAL ALTERNATIVE CALCULATION METHOD (ACM) APPROVAL MANUAL FOR THE 2008 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

The Nonresidential ACM Manual has been substantially re-written and reorganized to improve clarity and accuracy and to reflect changes to be adopted in the 2008 Building Energy Efficiency Standards. Procedures for implementing Time Dependent Valuation will be updated. All U-factors for building envelope assemblies will be required to be determined using extensive look-up tables in Joint Appendix IV. U-factors for unique assemblies that diverge from the table values will be required to be approved by the Commission. In addition, compliance rules which reference the prescriptive package requirements to generate the energy budget will be updated.

New compliance options are being established for distributed ice energy storage systems and thermal energy storage. New procedures are being required and new accuracy tests will be established for computer compliance software to match changes in the Standards, modeling algorithms, assumptions, and rules.

Section 2.3.6 of the Nonresidential ACM Manual has been amended to incorporate a more accurate method of calculating the heat flows through portions of the building envelope that are in direct contact with soil, such as slab floors on grade, basement walls, and basement floors.

The specific purpose and rationale for these changes are to improve their clarity and organization and incorporate new efficiency measures initially introduced through compliance options, and improve the data needed for Standards calculations. The ACM Manuals also are revised to include more accurate modeling assumptions for attics, slab perimeter losses and water heating systems. These changes are necessary to implement the adopted 2008 Building Energy Efficiency Standards.

REFERENCE APPENDICES FOR THE 2008 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

In 2005, the Commission adopted the Joint Appendices which were used as a common reference for all Standards documents. For the 2008 Standards, this document has been reorganized into three sections under the general heading of Reference Appendices. The three sections are the Joint Appendices, Residential Appendices, and the Nonresidential Appendices. The 2005 Residential and Nonresidential ACM Manuals included many appendices that were not indented for software certification; these appendices have now been transferred to the new Reference Appendices. New Appendices have been added and existing appendices have been revised to reflect the changes to be adopted in the 2008 Building Energy Efficiency Standards and to improve the clarity of the language. Below is the layout for the Reference Appendices:

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- Joint Appendices
  - JA1 - Glossary
  - JA2 - Reference Weather/Climate Data
  - JA3 - Time Dependent Valuation (TDV)
  - JA4 - U-factor, C-factor, and Thermal Mass Data
  - JA5 – Reference Design For Programmable Communicating Thermostats
  - JA6 – Charge Indicator Display
  - JA7 – Quality Insulation Installation Procedures for Medium-Density, Closed-Cell Spray Polyurethane Foam (SPF)
  - JA8 - Testing Of Luminaires And Lighting Systems

- Residential Appendices - (Former Residential ACM Manual References)
  - RA1 - HVAC Sizing
  - RA2 - Residential HERS Documentation and Enforcement Procedures
  - RA3 – Residential Field Verification and Diagnostic Test Specifications
  - RA3.1 – Procedures for Field Verification and Diagnostic Testing of Air Distribution Systems
  - RA3.2 - Procedures for Determining Refrigerant Charge for Split System Space Cooling Systems Without a Charge Indicator Light
  - RA3.3 - Air Handler Airflow (TBD)
  - RA3.4 - Procedures for Verifying the Presence of a Charge Indicator Light or High Energy Efficiency Ratio Equipment
  - RA3.5 - High Quality Batt Insulation Installation Procedures
  - RA3.6 - Field Verification and Diagnostic Testing of Photovoltaic Systems
  - RA4 – Eligibility Criteria for Energy Efficiency Measures
  - RA5 – Interior Mass Capacity

- Nonresidential Appendices - (Former Nonresidential ACM Manual References)
  - NA1 - Duct Efficiency Improvements Including HERS Required Field Verification and Diagnostic Testing for Duct Sealing
  - NA2 – Field Verification and Diagnostic Test Procedures
  - NA3 - Fan Motor Efficiencies
  - NA4 - Compliance Procedures for Relocatable Public School Buildings
  - NA5 - Envelope Tradeoff Procedure
  - NA6 - Alternate Default Fenestration Thermal Properties
  - NA7 – Acceptance Requirements for Nonresidential Buildings
  - NA8 - Illuminance Categories and Luminaire Power

The specific purpose and rationale for this change is that it updates the common reference material for the Standards and it is necessary to promulgate effective regulations.

TECHNICAL, THEORETICAL, AND EMPIRICAL STUDY, RE[PORT, OR SIMILAR DOCUMENTS

Documents and reports relied upon for the development of the 2008 Energy Efficiency Building Standards and the evidence that the Commission relies upon in making the determination of no significant impact on business is the following documents:

1. "Programmable Communicating Thermostats (PCT's)", Presentation by PIER and Southern California Edision

2. "Demand Responsive Control of Air Conditioning via Programmable Communicating Thermostats (PCTs)." Posted February 15, 2006

3. "Time Dependent Valuation of Energy for Developing Building Efficiency Standards 2008 Time Dependent Valuation (TDV)" - Methodology Report April 18, 2006

4. "Time Dependent Valuation of Energy for Developing Building Efficiency Standards 2008 Time Dependent Valuation (TDV) - Data Sources and Inputs" April 18, 2006

5. "Measure Template on Demand Response - Global Temperature Adjustment in Large Commercial Buildings", posted December 19, 2005

6. "DDC to the Zone Level Measure 4: Demand Control Ventilation (DCV)", July 13th, 2006 Workshop Report: ASHRAE 90.1 Addendum G

7. "Revision to the Residential ACM Calculation for Indoor Air Quality Ventilation" - PIER Research for the 2008 Residential Building Standards – March 2006 Workshop

8. "CASE Study for Residential Windows", Report prepared for CEC Workshops May 18-19, 2006

9. PGE CASE, "Final Report Insulation Requirements", March 20, 2007

10. PGE CASE "TDV LIGHTING CONTROLS SCHEDULE" DRAFT 2007-06-13

11. "Revisions to the Residential Software Manual (ACM)", presentation by Charles Eley, Architectural Energy Corp., 2007-06-15

12. "California Cool Roofs," presentation by California Energy Commission Staff, 2007-06-13

13. "Building Energy Efficiency Standards, Standards Process Summary," presented by Mazi Shirakh and Gary Flamm, 2007-06-13 &15

14. "Residential Cool Roof Requirements," presented by Bruce Wilcox, 2007-06-13

15. "Revisions to the Residential Standards and ACM Calculations," presented by Bruce Wilcox, 2007-06-13

16. "Revisions to the Residential ACM Calculations," presented by Bruce Wilcox, 2007-06-15

17. Air-conditioning Refrigeration Technology Inst, "Whole House Ventilation System Options – Phase I Similation Study Final Report" 2007-03-05

18. ARMA "2008 Cool Roofing Proposals And Cost Justification Report" 2007-04-24

19. ARMA "Measure Information Template - Inclusion Of Solar Reflectance" 2007-04-10

20. ARMA "Measure Information Template - Prescriptive Tradeoff Alternative Insulation of Insulation for Roof Reflctance", 2007-04-10

21. "Design/sizing Methology and Economic Evaluation of Central-Fan-Integrated
22. Supply Ventilation Systems", Armin F Rudd, 1998-08-23-28

22. "Clean Breathing in Production Homes", Armin Rudd & Joseph Lstiburek 2001-05/06

23. CEC Staff Document: Calcs For Cec 1.2wpercfm,2007-06-06

24. "Nonresidential Fenestration," presentation by Charles Eley, Architectural Energy Corp. 2007-02-26 & 27

25. PG&E CASE: "Final Report Refrigerated Warehouses," 02-2007

26. PG&E CASE: "Draft Report Requirements for Signs," 02-2007

27. PG&E CASE: "Workshop Report DDC to the Zone Level", 2007-02-13

28. PG&E CASE:" Demand_Responsive_Controls for_Indoor_Lightng," 2007-02-14

29. PG&E CASE:" Revised Report Outdoor_Lighting," 02-2007

30. Workshop Report, Mark Hydeman, Taylor Engineering, "Single Zone VAV Systems," 2007-02-27

31. PG&E CASE: " Revised Report Indoor Lighting and Proposed Additions/Revisions to Tailored Method, 02-2007

32. PG&E CASE: "Draft Report Residential Swimming Pools," 2007-02-19

33. "Central Hot Water Distribution Systems in Multifamily Buildings, Proposed Code Changes 2008," presentation by Nehemiah Stone and Owen Howlett, Heschong Mahone Group, 2006-07-12 & 13

34. PG&E "Hardwired Standby Loads CASE Study Lighting Controls," Prepared by Ecos Consulting, Conway & Silver, Energy Associates LLC, 2006-07-12

35. "62.2-2004: ASHRAE'S Residential Ventilation Standard," presented by Max Sherman, 2006-07-12

36. "Update on PCTs," presented by Mazi Shirakh, 2006-07-12

37. "2008 Standards Proposed Residential Lighting Changes," presented by Gary Flamm, 2006-07-12

38. "Comments on Title 24 Residential Lighting," presented by Noah Horowitz, National Resources Defense Council, 2006-07-12

39. PG& E CASE Study: "Residential Swimming Pools," Davis Energy Group, 2006-07-12

40. "2008 Standards Review of Lighting Changes Proposed by Staff," presented by Gary Flamm, 2006-07-12

41. "2008 Title 24 Non-Residential Ventilation Requirements," Steve Taylor and Mark Hydeman, Taylor Engineering, 2006-07-12

42. "Standard 90.1 Measures," presented by Charles Eley, Architectural Energy Corp. and Steve Hydeman, Taylor Engineering, 2006-07-13

43. PG& E CASE Study: 2008 Title 24 Nonresidential CASE Envelope Tradeoff Proposal, Heschong Mahone Group, 2006-07-13

44. PG& E CASE Study: 2008 Title 24 Nonresidential CASE Proposals, Heschong Mahone Group, 2006-07-13

45. PG& E CASE Study: 2008 Title 24 Nonresidential CASE Demand Response Building Plan Proposal, Heschong Mahone Group, 2006-07-13

46. "Furnace Fan Watt Draw and Airflow in Cooling Mode," and "Air Conditioner Airflow, Refrigerant Charge and TXVs," presented by Bruce Wilcox, John Proctor (Proctor Engineering Group), Ken Nittler (EnerComp, Inc.) amd Rick Chitwood (Chiteood Energy Management), 2006-07-12

47. PG& E CASE Study: 2008 Title 24 CASE Initiatives for DDC to the Zone Level, presented by Mark Hydeman, Taylor Engineering, 2006-07-14

48. PG& E CASE Study: 2008 Title 24 Nonresidential CASE Proposals, Demand Response Controls for Indoor Lighting, Heschong Mahone Group, 2006-07-13

49. "California Title 24-2008 Lighting Proposals," presented by James Benya, Benya Lighting Design, 2006-07-13

50. "Low Leakage Air Handlers and Low Leakage Ducts in Conditioned Spaces," presented by Ken Nittler and Bruce Wilcox, 2006-07-12

51. "Comments on Title 24 Residential Lighting," presented by Noah Horowitz, National Resources Defense Council, 2006-07-12

52. PG& E CASE Study: 2008 Title 24 Nonresidential CASE Sign Lighting Proposal, presented by M. Neils Engineering, Inc., 2006-07-12

53. "Solar Reflectance and Thermal Emittance for Residential and Nonresidential Roofs," presented by W. Lee Shoemaker, Cool Metal Roofing Coalition, 2006-07-13

54. "2008 Title 24 VAV Single Zone Unit Controls," presented by Taylor Engineering, 2006-07-12

55. PG&E CASE: "Draft Report Sidelighting-Daylighting Requirements," 2006-07-06

56. PG&E CASE: "Draft Report Requirements for Signs," 2006-07-07

57. "Measure Information Template - Residential Swimming Pools," PG&E, 2006-07-06

58. "Measure Information Template- Inclusion of Solar Reflectance and Thermal Emittance Prescriptive Requirements for Residential Roofs,: Cool Metal Roofing Coalition, 2006-06-10

59. PG&E CASE: "07-13-06 Workshop Report DDC to the Zone Level 2: Demand Shed Controls," Taylor Engineering, 2006-07-03

60. PG&E CASE: "07-13-06 Workshop Report DDC to the Zone Level 3: Hydronic Pressure Reset," Taylor Engineering, 2006-07-03

61. PG&E CASE: "07-13-06 Workshop Report DDC to the Zone Level Measure 5: Supply Air Temperature Reset," Taylor Engineering, 2006-07-04

62. PG&E CASE: "Draft Report Demand Responsive Controls for Indoor Lighting," 2006-07-07

63. "Suggested Modifications to the Residential Lighting Section of Title 24," Noah Horowitz, National Resources Defense Council, 2006-05-17

64. Measure Information Template – "Measure BLD-4 Added Requirement for Motion Sensing Controls for Lighting in Certain Rooms," 2006-06-28

65. July 13, 2006 Workshop Report "Non-Residential Ventilation Requirements," Steve Taylor, Taylor Engineering, 2006-07-03

66. PG&E CASE: "Draft Report Demand Responsive Building Plan," 2006-07-05

67. "Report on Applicability of Residential Ventilation Standards in California," Max Sherman and Jennifer McWilliams, Lawrence Berkeley National Laboratory, 06-2005

68. PG&E CASE: "Draft Report Updates to Skylighting Requirements," 2006-07-05

69. "Ventilation Behavior and Household Characteristics in New California Houses, Philip Prince and Max Sherman, Lawrence Berkeley National Laboratory, 04-2006

701. Design Guidelines, Advanced Variable Air Volume System Design Guide, CA Energy Commission, 10-2003, Pub. # 500-03-082-A-11

71. Measure Information Template – "Air Conditioner Air Flow, Refrigerant Charge and TXVS – Overview," based on field tests by Proctor Engineering Group and Robert Morris and Associates, 2005-09-21

72. "Appendix RJ – Charge Indicator Light," 2006-07-12

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75. PG&E CASE: "07-13-06 Workshop Report DDC to the Zone Level Measure 4: Demand Control Nentilation," Taylor Engineering, 2006-07-03

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77. Measure Information Template – "Fan Watt Draw and Air Flow," Bruce Wilcox, John Proctor, Rick Chitwood and Ken Nittler, 2006-07-12

78. Measure Information Template – "Measure BLD-1 Changes to Lighting Power Density Values," 2006-06-28

79. Measure Information Template – "Measure BLD-2 Changes to Lighting Power Density Values," 2006-06-28

80. Measure Information Template – "Measure BLD-3 Added Space Types and LPD Values to Section 146" 2006-06-28

81. Measure Information Template – "Air Conditioner Air Flow, Refrigerant Charge and TXVS – Multi-Zone Airflow Overview," based on field tests by Chitwood Energy Management and Robert Morris and Associates, 2005-09-21

82. Measure Information Template – "Central Hot Water Distribution Systems in Multifamily Buildings, " Heschong Mahone Group, 2006-06-23

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85. Residential_Multi-Zone_Airflow, Appendix RE, 2005 Residential ACM Manual

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91. "Inclusion of Solar Reflectance and Thermal Emittance Prescriptive Requirements for Steep-Sloped Roofs in Non-residential," presentation by Hashem Akbari of Lawrence Berkeley National Laboratory, May 18-19, 2007

92. Non-Residential CASE, Re: Insulation Proposal, PG&E Codes & Standards Program, May 18, 2006

93. Non-Residential CASE, Re: Indoor Lighting Proposals, presentation by PG&E, SCG and SDG&E Codes & Standards Program. May 18, 2006

94. Nonresidential CASE, Re: Outdoor Lighting Proposals, presentation by PG&E, SCG and SDG&E Codes & Standards Program, May 18, 2006

95. "Proposed Changes to Hot Water and Water Heating Calculations in the 2008 California Building Energy Efficiency Standards," presentation by Jim Lutz Lawrence Berkeley National Laboratory

96. "Low Slope Roof Costs Cool Roof Premiums," Philip Dregger, Pacific Building Consultants, Inc., 2006-05-19

97. PG&E Code Change Proposal, Re: Inclusion of Solar Reflectance and Thermal Emittance Prescriptive Requirements for Steep-sloped Nonresidential Roofs, 2006-05-18

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99. PG&E CASE: Study for Residential Windows. Prepared by Bill Mattinson and Ken Nittler, 2006-05-18

100. PG&E CASE: Draft Report Insulation Requirements. 2006-05-15

101. PG&E CASE: Draft Report Outdoor Lighting , 2006-05-16

102. Measure Information Template – "Revise ACM Distribution System Multipliers (Table RG-2) and Eligibility Requirements," Oak Ridge National Laboratory and Davis Energy Group, Inc., 2006-04-19

103. Measure Information Template – "Residential Evaporative Cooling," Southern California Gas Co., 2006-05-08

104. Measure Information Template – "Tankless Gas Water Heaters," Davis Energy Group, Inc., 2006-04-07

105. Measure Information Template – "PEX Parallel Piping Hot Water Distribution Systems," Davis Energy Group, Inc., 2006-04-19

106. Measure Information Template – "Water and Wastewater Tariffs," Lawrence Berkeley National Laboratory, 2006-05-11

107. "Suggestions for HVAC Efficiency Improvements for the 2008 California Buildings Energy Efficiency Standards," presentation by Robert Mowris & Associates, 2006-03-28

108. "Revision to the Residential ACM Calculation for Furnace Fan Modeling," presentation by Ken Nittler and Bruce Wilcox, 2006-03-28

109. "UZM Residential ACM Attic/Duct Models," presentation by Ken Nittler and Bruce Wilcox, 2006-03-28

110. "Revision to the Residential ACM Calculation for Indoor Air Quality,"

presentation by Ken Nittler and Bruce Wilcox, 2006-03-28

111. "Revision to the Residential ACM Calculation for Slab Heat Flow," presentation by Ken Nittler and Bruce Wilcox, 2006-03-28

112. "UZM Model," Bruce Wilcox and Ken Nittler, 2006-03-27

113. "Unconditioned Zone Model," Philip Niles, Larry Palmiter, Bruce Wilcox and Ken Nittler, 2006-03-27

114. "Revision to the Residential ACM Calculation for Slab Heat Flow," Bruce Wilcox and Ken Nittler, 2006-03-17

115. "Revision to Residential ACM Calculation for Furnace Fan Modeling," Bruce Wilcox and Ken Nittler, 2006-03-17

116. "Revision to the Residential ACM Calculation for Indoor Air Quality Ventilation," Bruce Wilcox and Ken Nittler, 2006-03-17

117. "Residential Housing Starts and Prototypes," Ken Nittler and Bruce Wilcox, 2006-03-27

118. "Proposal for 2008 Title 24 Global Temperature Adjustment (GTA)," Presentation by David S. Watson, Lawrence Berkeley National Laboratory, 2006-02-23

119. "2008 Title 24 Refrigerated Warehouse CASE Initiative," Presentation by Peter C. Jacobs, P.E. Architectural Energy Corporation 2006-02-22

120. "2008 Nonresidential Standards Lighting Change Proposals," Presentation by Martyn C. Dodd, EnergySoft, LLC, 2006-02-26

121. "Update on February 16, 2006 Programmable Communicating Thermostat Workshop," Presentation by Ron Hofmann, PIER DR R&D Program Advisor, California Energy Commission, 2006-02-22

122. "Programmable Communicating Thermostats (PCT's)," Presentation by PIER and Southern California Edison, 2006-02-23

123. "2008 Nonresidential Standards Mechanical Change Proposals, Presentation by Martyn C. Dodd, EnergySoft, LLC," 2006-02-22

124. Draft Measure Evaluation Report, "Nonresidential Fenestration," California Energy Commission, 2006-02-15

125. Southern California Edison CASE Draft Report, "Demand Responsive Control of Air Conditioning via Programmable Communicating Thermostats (PCTs)," 2006-02-14

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"Bi-level Stairwell Lighting," 2006-02-03
"Building Performance Monitoring," 2006-02-09

"Displacement Ventilation," 2006-02-02
"Fault Detection and Diagnostics for Air Handling Units and VAV Boxes," 2006-02-06
"Fault Detection and Diagnostics for Rooftop Air Conditioners," 2006-02-04
"Integrated Classroom Lighting," 2006-01-05
"LED Exterior Lighting," 2006-02-07
"LED Night Lighting in Bathrooms," 2006-01-05
"Load Shedding Ballasts," 2006-01-05
"Natural Ventilation for Cooling," 2006-02-09
"Under Floor Air Distribution," 2006-02-02

128. "Component Modeling Methodology for Predicting Thermal Performance of Nonresidential Fenestration Systems," ASHRAE, 2004

129. "Joint Workshop Comments of SCE_PGE_SDGE_SCG on PCT Requirements Development," 2006-02-16

130. "Draft Energy Commission Vision," Presentation from 2006-02-16 Staff Workshop

131. "Impacts of PCT to Residential Thermostat Industry," presentation by Dan O'Donnell, Director, Product Management Electronic Controls, Honeywell, 2006-02-16

132. "Programmable Communicating Thermostat (Updated)," Joint Statement by PG&E, SCE, SCG and SDGE, 2006-02-16

133. "Programmable Communicating Thermostat (PCT) Systems Integration (SI) Interfaces (I/F)," presentation by Ron Hofmann, California Energy Commission PIER Program Advisor, 2006-02-16

134. "Building Energy Efficiency Standards," presentation by Mazi Shirakh, Buildings and Appliances Office, California Energy Commission, 2002-02-16

135. "What is System Integration," presented by Grant Gilchrist, EnerNex Corporation, 2005-11-29

136. "How is System Integration Achieved:" presented by Erich Gunther, EnerNex Corporation, 2005-11-29

137. "PCT Presentation" by Ron Hoffman, PIER R&D Program Advisor, 2005-11-29

138. "Vision of a Demand Responsive Future," presented by Roger Levy, DRRC Program Outreach Manager, 2005-11-29

139. "Systems Integration Case Study," presented by David S. Watson, Lawrence Berkeley National Lab, 2005-11-29

140. PG&E CASE: Draft Report – "TDV (Time Dependent Valuation) Lighting Control Schedules," 2005-10-14

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142. "Life Cycle Cost Methodology" - Paper prepared for the Energy Commission by Architectural Energy Corporation, 2005-10-21

143. "Review of Literature Related to Residential Ventilation Requirements" - paper by Jennifer McWilliams and Max Sherman, Lawrence Berkeley National Laboratory, June 2005, Publication # LBNL-57236

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146. "Inclusion of Cool Ducts in Nonresidential Title 24 Mandatory Requirements," presented by Hashem Akbari, Lawrence Berkeley National Laboratory, 2005-10-25

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148. "PIER Lighting Technology Candidates for 2008 Title 24," presented by Don Aumann, California Lighting Technology Center, 2005-10-24 & 25

149. "2008 Title 24 PG&E Nonresidential CASE Reports Update," presented by Steve Blanc, PG&E, 2005-10-24

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157. "Insulation CASE Report," PG&E Codes & Standards Program, 2005-10-24 & 25

158. "TIER II," presented by Smita Gupta, California Energy Commission, 2005-10-24

159. "Residential Evaporative Cooling," SCGC and SDGE CASE Study, 2005-10-25

160. CASE Update: "Programmable Communicating Thermostats (PCT's)," presented by John McHugh, SCE Codes & Standards Program, 2005-10-24

161. "2008 Building Energy Efficiency Standards Objectives," presented by Bill Pennington, California Energy Commission, 2005-10-24

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166. "TDV Lighting Controls," analysis by Heschong Mahone Group, Inc. for PG&@, 2005-10-24

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CONSIDERATION OF REASONABLE ALTERNATIVES, INCLUDING THOSE THAT WOULD LESSEN ANY ADVERSE IMPACT ON SMALL BUSINESS

Prior to initiating this rulemaking, the Commission has held an extensive public process to identify proposals from the public for changes to the Standards, review the technical and cost effectiveness analysis of potential changes, and obtain public comment on multiple drafts of potential Standards language. The Commission held 15 full days of public workshops during this process. As a result of public comment during the scoping phase of the project, the Commission considered over 260 suggested ideas for Standards changes. Those ideas were reviewed and prioritized with particular emphasis placed on the following considerations:

- Whether or not the Commission made a commitment during the last update proceeding to address the proposed revision in this triennial update;
- The extent that public funds had been invested to develop the proposed revision for inclusion in this project;
- The extent of energy savings and demand reduction expected to be achieved by the proposed revision.

Based on that review the Commission chose 42 areas of proposed revision to extensively evaluate for feasibility and cost effectiveness. Many of the original 260 ideas were related in some respect to the 42 areas selected for extensive evaluation, and those ideas were also

considered in conjunction with the subsequent investigation of the 42 areas.
During the public workshops on the investigation of feasibility and cost effectiveness of the potential revisions to the Standards, the Commission received a large number of comments related to improvement of the conceptual approach of the potential revisions. Based on these comments the Commission developed draft Standards and held two public workshops to obtain public comment on the draft Standards. Numerous ideas for revision to the draft Standards were received, and the Commission extensively revised the draft Standards to respond to those comments. The proposed standards revisions are the result of this extended interactive process. During the course of this process the Commission also has received many letters, email and verbal comments on the potential standards and ideas for improving them. The proposed standards have been extensively shaped by response to those comments and ideas.

Many of the measures in the proposed Standards were originated, developed and/or sponsored wholly or in part by individuals or organizations, including but not limited to programmable communicating thermostats, automatic shed controls, demand response controls for lighting, cool roofs, refrigerated warehouses, improved thermal properties for windows, and increased insulation levels in nonresidential buildings

To respond to the comments of prominent lighting designers, energy compliance consultants and environmentalists, requirements for the Tailored Method of lighting compliance were modified to accommodate cost effective and energy efficient retail display lighting designs, and to provide flexibility and clarity. In response to comments from prominent lighting designers, energy compliance consultants and environmentalists, earlier versions of the requirements for daylight from windows were revised to make them more flexible and to add clarity.

In response to comments from lighting equipment manufacturers, lighting control manufacturers, lighting designers, industry organizations representing users of outdoor lighting, and building officials, earlier requirements for outdoor lighting were restructured for flexibility and clarity. In response to comments from the sign industry, equipment manufacturers, and building officials, earlier versions of the requirements for signs were rejected to add flexibility and clarity.

In response to comments from prominent lighting designers, energy compliance consultants, environmentalists, and the building industry, earlier versions of the requirements for residential lighting were modified to add flexibility and clarity and earlier versions of demand response lighting controls for retail lighting were rejected to increase energy savings. In response to comments from lighting equipment manufacturers, lighting control manufacturers, lighting designers, industry organizations, and building officials, earlier versions of the requirements for load shed ballasts, bi-level stairwell lighting, integrated classroom lighting, and LED exterior lighting were rejected to make the lighting requirements more achievable, narrow their scope, and provide clarity.

In response to comments from the thermostat manufacturers and the utilities, the requirements and specifications for the programmable communicating thermostats (PCTs) were substantially modified. These included changes to the specifications for the PCT external ports, user interface, addressability, return from event randomization and communication protocols. In response to comments from the insulation and metal building industries, the original proposal regarding the insulation requirements for nonresidential buildings has been modified to consider varying heat transfer rates in different climate zones and metal building constructability.

Comments on swimming pool requirements where provided by the Association of Pool & Spa Professionals and the California Solar Industries Association. The Association of Pool & Spa Professionals raised the concern that the pump performance curves would not work with larger pool sizes and that public pools required 24 hour reticulation. Based on their comments, the new performance requirements for swimming pool were changed to apply to residential pools only. The comments from the California Solar Industries Association raised the concern that pools served by solar water heating systems may not be able to meet the demand control

requirements. Those requirements where modified to include an exemption for pools heated with active solar systems.

In response to comments from Cal-OSHA, Californian Department of Health Services, and California Air Resources Board, the original indoor air quality proposal was substantially changed. The Commission's original proposal was to adopt the ASHRAE 62.1 indoor air quality requirements for nonresidential buildings. The 62.1 ventilation rates are lower than the Title 24 for some occupancies. Based on the feedback from the health agencies, the Commission dropped the ASHRAE 62.1 ventilation rate proposal and will retain the current Title 24 requirements. The Commission also modified the expansion of CO2 sensors and improved the acceptance requirements for these sensors.

In response to comments from the roofing industry, the original cool roof proposal was rejected. The revised requirements for cool roof are more widely applicable to the range of available roofing products. A new calculation variable will be introduced called the Solar Reflectance Index (SRI), which will take the solar reflectance and thermal emissivity into account in one equation and allow a tradeoff between the two material properties in the calculation. The revised requirements also provide a tradeoff between reflectance and emittance in the Overall Envelope compliance approach.

In response to comments from building officials, energy consultants, owners and architects, the Commission worked with the National Fenestration Rating Council and its members to significantly improve the procedures for verifying and issuing label certificates for site built fenestration products. In response to comments from the California Association of Building Energy Consultants CALBEC) and the California Association of Local Building Officials (CALBO), the revised Alternative Calculation Method Manuals include clarifications, simplifications, and expanded specifications for the performance budget descriptions.

In response to comments from the home builder industry and HERS raters, less intrusive methods for measuring adequate airflow and verifying refrigerant charge were proposed, and a new "charge indicator light" was proposed for a refrigerant charge verification credit. In response to the home builder industry, criteria for the maximum cooling capacity calculation were relaxed and the electrical input exception procedure was restructured to simplify and relax the criteria. In response to the home builder industry and HERS providers concerns, HERS documentation and enforcement procedures were restructured to emphasize retention of installation certificates and compliance documentation for purposes of improving enforcement of the standards. In response to building official comments, electronic document retention and archive retrieval database capabilities are added to the HERS provider registry requirements. In response to HERS provider comments, a standardized format is proposed for electronic data transfer between compliance software applications and HERS provider data registry. In response to HERS rater and provider concerns, the Commission clarified and restructured the Third Party Quality Control Program (TPQCP) requirements, and documentation procedures were added to better define the functional relationships between installers, TPQCP entities, HERS providers, and HERS raters.

At this time the Commission is not aware of alternatives to the Standards that would be more effective in achieving the Commission's goals and Legislative direction. It is quite likely that during the course of the rulemaking, comments will be received that the Commission will deem are helpful in improving the proposed standards and the Commission expects to revise the proposed standards to take advantage of those ideas.

FACTS, EVIDENCE, DOCUMENTS, TSTIMONY, OR OTHER EVIDENCE OF NO SIGNIFICNAT ADVERSE IMPACT ON BUSINESS

The Standards revisions will require cost effective energy efficiency measures for nonresidential buildings other than institutional occupancies. Some of the requirements will not increase costs relative to current good practice. However, often the requirements will result in an incremental

increase in construction costs. The Standards revisions will result in important reductions in energy bills over the economic life of the structures. These savings will be substantially greater than the incremental increase in costs due to the requirements. The homeowners and building owners who are the beneficiaries of these cost reductions will receive increased business profits due to reductions in operating costs. Businesses that provide energy efficiency products and services associated with the Standards requirements will have expanded business opportunities. As a result, there is the potential for creation of new jobs and an increase in California business competitiveness.

DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS

The proposed revisions to the Standards do not conflict with any federal regulations addressing the same issues. No federal regulations exist that prescribe building standards for non-federal buildings.