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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) and TITLE 24, PART 11 (CALIFORNIA GREEN BUILDING STANDARDS)

2013 BUILDING ENERGY EFFICIENCY STANDARDS DOCKET NUMBER 12-BSTD-1

I. Introduction

This Initial Statement of Reasons ("ISOR") describes the purposes, rationales, and necessity of the California Energy Commission's proposed amendments to its energy efficiency standards for buildings, which would go into effect on January 1, 2014, if adopted by the Energy Commission and approved by the California Building Standards Commission.¹ This ISOR fulfills the requirements of California's Administrative Procedure Act (see Government Code section 11340 et seq.).

The Energy Commission welcomes comments on the ISOR and on the proposed building standards that the ISOR describes. Please see the accompanying Notice of Proposed Action ("NOPA"), also dated February 7, 2012, for instructions on how to submit comments electronically, on paper, and orally at Energy Commission hearings.

A. A Brief History of the Energy Commission's Building Standards

In 1975 the Department of Housing and Community Development adopted the state's first energy conservation standards for buildings, under the State Housing Law authority, which required basic levels of insulation. Also in that year the Energy Commission began operations, under the Warren-Alquist Act (Public Resources Code section 25000 et seq.) That Act gives specific directives 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. (Public Resources Code sections 25402(a)-(b), 25402.1, -25402.8.) The most important requirement is that the standards save building owners more

¹ The ISOR refers to the proposed standards in various ways, e.g., "2013 Building Energy Efficiency Standards," "proposed standards," and "2013 Standards"; in addition, it uses "amendments" or "proposed regulations" as a shorthand reference for new provisions, revisions to existing provisions, and deletions of existing provisions, in the Parts 1, 6, and 11 of Title 24 of the California Code of Regulations.

money in reduced bills for electricity and natural gas than any additional construction costs that the standards impose. The building standards must also meet the requirements of the Administrative Procedure Act (e.g., that they carry out the purpose of the enabling statute, that they are clear, and that they have been adopted in an open public process in which alternatives are thoroughly considered) and the California Environmental Quality Act (“CEQA”, Public Resources Code section 21000 et seq.), which requires that state agency actions not cause undue environmental harm. These requirements help ensure that the Standards promote the State’s goal to have a reliable, economic, and environmentally-sound energy supply (see, e.g., Public Resources Code sections 25001, 25300(a)-(b)).

In 1976 the Commission adopted its first building standards, which addressed space heating and cooling, water heating, and windows, in addition to insulation. Since then the Commission has updated the standards in conjunction with the Building Standards Commission’s publication of all the State’s building codes, usually every three years. The updates incorporate the most advanced developments in energy conservation (e.g., new lighting technologies, new types of roofs that reflect unneeded heat) to ensure that new construction in California will be as energy-efficient as possible, consistent with the requirement that the standards be cost-effective for consumers. Today, the Standards contain energy efficiency – and, as recently required by statute, water efficiency 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 Energy Commission’s building energy efficiency standards are contained in two parts of Title 24 of the California Code of Regulations. Administrative regulations, such as how the standards’ requirements are integrated with local governments’ building permit processes, are in Part 1 of Title 24, and the substantive requirements for building construction are in Part 6 of Title 24. In addition, voluntary, or “reach” guidelines for sustainable building practices that are more protective of the environment than the minimum standards are in Part 11 of Title 24, the California Green Building Standards. The Energy Commission is responsible for the Energy Chapters (separate chapters are published for residential and nonresidential buildings) of the California Green Building Standards.

B. How the Standards Work

The standards are divided into several sections, some of which apply to all buildings and all types of construction, and some of which apply only to specified subsets.

The first division in the standards is between administrative regulations in Part 1 of Title 24, and substantive regulations in Part 6 of Title 24. The former describe procedural requirements, such as what information must be on building permit applications; the latter describe how buildings must be constructed. (In addition, there are voluntary, or “reach,” Green Building Standards in Part 11, which are described further below.)

The substantive, how-buildings-must-be-constructed regulations in Part 6 are further subdivided. In general, each building must (1) comply with various mandatory requirements, *and* (2) meet an energy goal. In turn, meeting the energy goal can be accomplished *either* (a) by demonstrating, under the “performance” compliance approach, that the building will consume no more energy that is set forth in an “energy budget”, which is established on an energy-use-per-square-foot basis; *or* (b) by installing a package of specified measures (e.g., R-30 ceiling insulation, high-performance windows) in the “prescriptive” compliance approach. The energy budget and the prescriptive requirements vary among different building types (which are nonresidential (e.g., retail, office), low-rise residential, high-rise residential, and hotel/motel) and among 16 different “climate zones” within the state. There are also differences between construction of brand-new buildings, on the one hand, and additions, alternations, and repairs to existing buildings, on the other hand. The (1) mandatory, (2)(a) energy budget, and (2)(b) prescriptive provisions, and the different types of buildings and construction, appear in Part 6 as follows:

Subchapter 1 describes the scope of the standards (which building types and which types of construction) are covered. It also sets forth the definitions and the rules of construction that apply to Part 6.

Subchapter 2 contains mandatory requirements for all buildings.

Subchapters 3 through 5 apply to new nonresidential, high-rise (3 or more stories) residential, and hotel/motel buildings, thus:

Subchapter 3 contains additional mandatory requirements for new nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 4 contains still more mandatory requirements for new nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 5 sets the performance (energy budget) and prescriptive (package of measures) compliance approaches for new nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 6 establishes the requirements for additions, alterations, and repairs to existing nonresidential, high-rise residential, and hotel/motel buildings.

Subchapter 7 contains the mandatory requirements for new low-rise residential buildings.

Subchapter 8 sets for the performance (energy budget) and prescriptive (package of measures) compliance approaches for new residential buildings.

Subchapter 9 establishes the requirements for additions and alterations to existing low-rise residential buildings. (Repairs to such buildings are not covered by the standards.)

C. Summary of the Changes Proposed in This Rulemaking Proceeding

If adopted and approved, the 2013 Standards will be a major stride forward in energy efficiency. It is the policy of the state that by the year 2020 all new residential buildings should be “zero net energy” – that is, that all the energy required to operate their heating, cooling, water, and lighting systems, and their appliances – should be produced on-site, or, if some energy is needed from electricity and natural gas utilities, that the buildings produce an equivalent amount of energy for delivery to the system (*2008 Energy Action Plan; 2007 Integrated Energy Policy Report, 2008 California Long-Term Energy Efficiency Strategic Plan.*)

This will require both (1) that buildings be highly energy-efficient, so that as little energy as possible is needed, and (2) that buildings have on-site energy production systems, such as rooftop solar equipment. The proposed 2013 standards move towards this goal by requiring that the next generation of new buildings use around one-third less energy than is required by the current standards.

The 2013 Standards focus on several key areas to improve energy efficiency, including measures designed to reduce energy use during critical peak demand periods; they also will enable future solar system installations. The most significant efficiency improvements for residential buildings are for windows, wall and floor insulation, and testing for Heating, Ventilating, and Air-Conditioning (“HVAC”) systems; for nonresidential buildings, the most significant improvements are proposed for lighting controls, windows, HVAC equipment, and building “commissioning” (“building commissioning” is the pre-occupancy process of thoroughly testing and adjusting a building’s energy systems to ensure that they function properly.) In addition, for the first time, efficiency requirements for “process loads” (energy use for the commercial or industrial processes

that go on inside the building, as opposed to energy use to make the building itself habitable), such as commercial refrigeration, data centers, kitchen exhaust systems, and compressed air systems, are included in the nonresidential Standards. The 2013 Standards also include expanded criteria for pre-occupancy acceptance testing of HVAC, water, and lighting systems in both residential and nonresidential buildings, as well as new requirements for code compliance data to be collected in a Commission-managed repository.

Furthermore, enabling residential and small commercial buildings to respond to critical electricity peak demand events by reducing air conditioning loads is a new aspect of the 2013 Standards. Capabilities to enable remote utility communication of critical events and automatic demand response to reduce critical peak air conditioning loads are proposed as requirements for all thermostats controlling “unitary” heating and air conditioning systems. Facilitating future solar electric and solar thermal system installations is another new element of the 2013 Standards.

Finally, the 2013 Standards also include updates to the energy efficiency divisions of the California Green Building Standards. (These voluntary guidelines contained in Title 24, Part 11, of the California Code of Regulations, go beyond the mandatory standards in Part 6. They were developed and adopted in response to policy directives from the Governor. See *CALGreen, The 2010 California Green Building Standards Code Are you ready?*, pp. 2-3, available at: <http://www.documents.dgs.ca.gov/bsc/CALGreen/The-CALGreen-Story.pdf>.) A set of prerequisites has been established for the residential “Reach Standards”, which include efficiency measures that should be installed in any housing project striving to meet advanced levels of energy efficiency. The residential Reach Standards have also been updated to require additional energy efficiency or on-site renewable electricity generation to meet a specific threshold of expected electricity use. Both the residential and nonresidential Reach Standards include guidelines for building additions and alterations as well as for new construction.

II. Description of the Proposed Regulations and of The Reasons for Their Adoption

A. The Purpose, Rationale, and Necessity of the Proposed Amendments in General

The Legislature has found that

electrical energy is essential to the health, safety and welfare of the people of this state and to the state economy, and that it is the responsibility of state government to ensure that a reliable supply of electrical energy is maintained at a level consistent with the need for such energy for protection of public health and safety, for promotion of the general welfare, and for environmental quality protection.

[T]he present rapid rate of growth in demand [for electric energy] is in part due to wasteful, uneconomic, inefficient, and unnecessary uses of power and a continuation of this trend will result in serious depletion or irreversible commitment of energy, land and water resources, and potential threats to the state's environmental quality.

(Pub. Resources Code, §§ 25001, 25002.) Accordingly,

It is further the policy of the state and the intent of the Legislature to employ a range of measures to reduce wasteful, uneconomical, and unnecessary uses of energy, thereby reducing the rate of growth of energy consumption, prudently conserve energy resources, and assure statewide environmental, public safety, and land use goals.

(Pub. Resources Code, § 25007.)

Improvements in energy efficiency are among, if not, the cheapest and most environmentally-friendly methods to address the problem of balancing the state's electricity demand and supply. Thus existing law (e.g., Public Resources Code Sections 25213, 25402, 25402.1, 25402.4, 25402.5, 25402.8, and 25910) requires the Energy Commission to adopt these standards that prescribe minimum efficiency levels for buildings (as well as outdoor lighting and irrigation systems that are regarded as being "outside" of buildings). The benefits of these regulations may be enumerated as follows (see Gov. Code, § 11346.2, subd.(b)(1)):

- A reliable electrical system;
- Mitigation of wasteful, uneconomic, inefficient, and unnecessary uses of electricity;
- Reduction in the trend of increasing electricity consumption;
- Protection of energy, land and water resources, and the state's environmental quality;
- Creation of jobs; and
- Reduced energy costs for consumers and businesses.

The standards setting the minimum efficiency levels must be feasible and cost-effective. (Pub. Resources Code, § 25402, subd.(b)(3).) Past rulemakings have described the feasibility and cost-effectiveness of each of the efficiency standards previously adopted by the Energy Commission, and this ISOR describes the feasibility, cost-effectiveness, and other key features of the proposed 2013 amendments to the current 2008 Building Energy Efficiency Standards.

B. The Specific Purpose, Rationale, and Necessity of Each Section of the Proposed Amendments

1. TITLE 24, PART 1, CHAPTER 10 (ADMINISTRATIVE REGULATIONS), ARTICLE 1 – ENERGY BUILDING REGULATIONS

The specific purpose, rationale, and necessity of each section of the proposed amendments, in accordance with Government Code section 11346.2, subd. (b)(1), is provided below.

SECTION 10-102 – DEFINITIONS

The proposed regulations add new definitions, delete obsolete definitions, and modify existing definitions, in order to reflect and be consistent with related changes to the Standards and intervening changes in other relevant law, to clarify or eliminate ambiguities, and to simplify regulatory language.

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

The proposed regulations add third-party verifiers to the section title to clarify that there are administrative requirements related to this specific group of professionals that are documented in this section. In addition:

Subsection 10-103(a)1: The existing subsection has requirements for a "Certificate of Compliance", which is required to ensure that buildings document compliance with the Standards.

Specifically, the proposed changes:

Clarify the format, content, informational order, and signature authority for the Certificate of Compliance, in order to improve code compliance and enforcement;

Add documentation requirements for nonresidential building commissioning, in order to help ensure that a building's energy efficiency features are realized in the design, construction, and installation of the project;

Add requirements to submit all nonresidential compliance documents to a data registry (As provided elsewhere in the standards, a “data registry” is a web service hosted by a HERS provider or other entity approved by the Commission. This web service receives and stores the official versions of Standards compliance documents.) This requirement will provide better access to these records by local enforcement agencies and the third-party verifiers required to review specific construction and installation aspects of the building; and

Add requirements for data registries to submit the Certificate of Compliance to an Energy Commission electronic document repository. This additional compliance document and data storage process will improve the Energy Commission’s ability to track code compliance and specific building design alternatives, which will allow the Energy Commission to propose more effective regulations in the future.

Subsection 10-103(a)2: The proposed regulations clarify building permit application processes and enforcement agency authority, as they apply to the building standards, in order to improve code compliance and enforcement. In addition, the proposed regulations allow the enforcement agency to create simplified compliance documents for small addition and alteration projects, which will eliminate unnecessary burdens for builders as well as provide flexibility to the local enforcement agencies and improve their code enforcement procedures.

Subsection 10-103(a)3,4,5: The existing subsection contains requirements for Installation Certificates, Certificates of Acceptance and Certificates of Field Verification and Diagnostic Testing, all of which deal with ensuring that various types of building equipment and systems are installed and operate in accordance with the standards and operate as they are intended to. The proposed regulations clarify the content, signature authority and submission requirements for these certificates in two basic ways.

First, new definitions are added for “Documentation Author” and “Field Technician” to better explain the compliance documentation signature responsibilities. The Documentation Author is the person who completes the Certificate of Compliance documentation and the Field Technician is the person who physically performs the required acceptance tests. The Field Technician must also now sign the Certificate of Acceptance. A requirement is added for the Installation Certificate to be signed by the professional (as specified by Division 3 of the Business and Professions Code) accepting responsibility for the construction and installation of the efficiency measures. These proposed modifications will improve code compliance and enforcement. Adding signature requirements for each of the job disciplines involved in the measure’s installation and testing will make the professionals accountable for their work and allow the building departments to better enforce the testing requirements in the regulations.

Second, the proposed regulations add requirements for data registries to submit the Installation Certificates, Certificates of Acceptance and Certificates of Field Verification and Diagnostic Testing to an Energy Commission electronic document repository. This process will improve the Energy Commission’s ability to track code compliance and specific building design alternatives. By keeping track of how buildings are specifically implementing the Standards, the Energy Commission can better analyze building trends, the costs of measures, and the constructability of specific technologies. This information will improve the Energy Commission’s Standards development process, which will allow the Energy Commission to propose more effective regulations in the future.

Subsection 10-103(b)1: The proposed regulations make nonsubstantive changes for clarification. With these clarifications, builders will better understand their obligation to provide information to building owners on the buildings’ energy efficiency features. Owners that have documentation on the energy-related features of their buildings are more likely to value the buildings’ energy assets and provide the means to maintain these assets over time. The clarifications to this section not only improve code compliance but also increase the likelihood that buildings designed, constructed and renovated under the Standards continue to be energy

efficient during their operations.

Subsection 10-103(d)2: The proposed regulations clarify that the enforcement agency inspection duties apply to additions and alterations to existing buildings, as well as to newly constructed buildings. These inspection duties also apply to nonresidential building repairs. These clarifications will improve the effectiveness of the Standards.

SECTION 10-106 – LOCALLY ADOPTED ENERGY STANDARDS

The proposed regulations remove and reorganize language to simplify the requirements for local government agencies when they adopt local energy efficiency ordinances. These modifications will improve the ability of local governments to quickly learn these requirements and apply them to promulgate cost-effective and environmentally sound local energy efficiency ordinances.

SECTION 10-109 – COMPLIANCE SOFTWARE, ALTERNATIVE COMPONENT PACKAGES, EXCEPTIONAL METHODS, DATA REGISTRIES AND RELATED INPUT SOFTWARE, AND ELECTRONIC DOCUMENT REPOSITORIES

The proposed regulations add compliance software, exceptional methods, data registries and related input software, and electronic document repositories to this section title to clarify that there are administrative requirements related to these compliance processes.

This section has been reorganized into subsections, in order to help readers understand (a) the submittal requirements for compliance software, alternative component packages, and exceptional methods, (b) the Energy Commission’s processes for dealing with those matters, and (c) the administrative requirements for data registries and repositories. (“Compliance software” are the computer programs certified by the Energy Commission to implement the performance compliance path for the Standards. “Alternative components packages” are sets of prescriptive requirements that match the expected building energy use of the prescriptive compliance approach documented in the Standards. “Exceptional methods” analyze a design, material, or device that cannot be adequately modeled using the public domain compliance software. “Data registries” and the “data repository” are discussed above, under Subsection 10-103(a)1.) The modifications to this section clarify the requirements to obtain Energy Commission approval for compliance software, alternative component packages and exceptional methods, thereby reducing the costs of submitting these for Energy Commission approval. A subsection is added to explain the submittal requirements for data registries and explain how both data registries and data repositories will be approved by the Energy Commission. This new subsection explains the administrative requirements for data registries and repositories, which will enable these data and document archival and retrieval services to be implemented successfully, thereby improving the Energy Commission’s ability to require use of these compliance documentation services as a key part of the code compliance process.

SECTION 10-110 – PROCEDURES FOR CONSIDERATION OF APPLICATIONS UNDER SECTIONS 10-104, 10-106, 10-108 AND 10-109

The proposed regulations clarify that the Energy Commission does not charge fees for the review of locally adopted energy standards.

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

The proposed regulations add a requirement to include visual transmittance data on all fenestration labels. They also introduce additional fenestration rating requirements for the National Fenestration Rating Council, which acts as the supervisory entity for the Energy Commission’s fenestration certification program. These requirements will improve code compliance and enforcement by making sure that code-related performance metrics are effectively displayed on all fenestration products.

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

The proposed regulations make nonsubstantive changes for clarification. A requirement is added for the Cool Roof Rating Council (CRRC), which acts as the supervisory entity for the Energy Commission’s roofing product certification program, to provide an annual report to the Energy Commission that summarizes compliance with its requirements as a supervisory entity. These requirements will provide the Energy Commission information needed to judge the effectiveness of the CRRC at maintaining roofing energy-related product performance. Since the CRRC is certifying cool roof products for use in code compliance, the CRRC’s success will improve the effectiveness of the Standards.

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

The proposed regulations remove the language pertaining to the requirements for local authorities to follow a public process and notify the Commission in regards to the adoption of a local outdoor lighting ordinance. Removing these requirements simplify the Standards, thereby improving code compliance and enforcement.

2. TITLE 24, PART 6 – EFFICIENCY STANDARDS

All numbering of Part 6 sections has been modified to accommodate additions to the Standards language. For example, Section 100 has been changed to Section 100.0 and Section 102 has been changed to Section 100.2. These numbering changes will allow additional subsection requirements to be introduced when needed. Due to this renumbering, it is no longer necessary to reserve code sections for future use, since the new numbering scheme accommodates a vast number of section and subsection divisions. Several reserved code sections are removed in these proposed regulations.

a. SUBCHAPTER 1 – ALL OCCUPANCIES—GENERAL PROVISIONS

SECTION 100.0 – SCOPE

The proposed regulations add a subsection that clarifies the scope of the Part 6 Standards for “covered processes,” which are energy-related activities covered in Part 6 that are not related to the space conditioning, lighting, service water heating, or ventilating of a building for human occupancy. These clarifications will allow for code compliance and enforcement of the new requirements for covered processes. In addition, the proposed regulations add an exception to the standards, in the mixed occupancy subsection, which allows the lighting provisions of Part 6 to be met for only one of the occupancy types within the building if specific conditions are met. This exception simplifies code compliance and thereby improves the effectiveness of the Standards.

SECTION 100.1 – DEFINITIONS AND RULES OF CONSTRUCTION

The proposed regulations add new definitions, delete obsolete definitions, and modify existing definitions, in order to reflect and be consistent with related changes to the Standards and changes in other relevant law, to clarify and eliminate ambiguities, and to simplify regulatory language. Where such an amendment needs specific discussion, it is described below under the heading of the substantive requirement to which it pertains.

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

SECTION 110.0 – SYSTEMS AND EQUIPMENT—GENERAL

The proposed regulations make nonsubstantive changes for clarification. A new section title is introduced for solar-ready buildings, which are explained in Section 110.10.

SECTION 110.1 – MANDATORY REQUIREMENTS FOR APPLIANCES REGULATED BY THE APPLIANCE EFFICIENCY REGULATIONS

The proposed regulations better specify the appliance design and performance data needed to prove compliance with the Title 20 regulations, to be consistent with the Title 20 regulations and to clarify when the Title 20 regulations are relevant to these Part 6 regulations. This clarification will improve the ability for building owners and their agents to understand when the equipment and appliance regulations in Title 20 apply to their buildings, thereby improving compliance with the Standards.

SECTION 110.2 – MANDATORY REQUIREMENTS FOR SPACE-CONDITIONING EQUIPMENT

First, the proposed regulations update the space-conditioning equipment efficiency requirements to match current federal equipment efficiency standards. This update is required by federal law. Second, the proposed regulations add requirements for upgradable setback thermostats that facilitate demand response (demand response is the adjustment of electrical demand by the user in response to fluctuations in price of electricity due to changes in overall system demand). This update improves the opportunity for building owners to manage their energy costs. Finally, requirements are added for evaporative or open cooling towers to be installed with makeup water controls (these controls maximize the use of water within cooling towers, by measuring the concentration of specific chemicals in the water and only replacing tower water if these concentrations become too high), flow meters, overflow alarms, and drift eliminators (drift eliminators prevent water in open cooling towers from getting windswept), in order to increase the water efficiency of this equipment.

SECTION 110.3 – MANDATORY REQUIREMENTS FOR SERVICE WATER-HEATING SYSTEMS AND EQUIPMENT

The proposed regulations eliminate an exception to the requirements for automatic hot water shut off controls for hot water distribution systems serving single dwelling units. This exception is not needed, as the shut off control technology is available and cost-effective for all types of residential dwelling units. Removing this exception simplifies the language and will therefore improve compliance with the Standards.

The proposed regulations also add requirements for shower heads: they must (1) use no more water than the currently-proposed federal standard and (2) include individual valves for each shower head where there are multiple shower heads in a single shower. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the water and energy use of buildings, which in turn improves the state's economic and environmental health.

SECTION 110.6 – MANDATORY REQUIREMENTS FOR FENESTRATION PRODUCTS AND EXTERIOR DOORS

The proposed regulations add an exception that states that neither fenestration products (basically, windows and skylights) nor exterior doors are subject to air leakage requirements if they are "field fabricated," which means that the product, in this case a fenestration product, is constructed at the building site rather than in a manufacturer's factory. This will clarify that the air leakage requirements for fenestration products can only be implemented if they are factory built. This new exception will improve the ability of site-built fenestration products to comply with the Standards.

The proposed regulations reduce the threshold for when National Fenestration Rating Council ("NFRC") ratings are required for field fabricated fenestration products from 10,000 square feet to 1,000 square feet of fenestration area. Requiring NFRC ratings on all but the smallest field fabricated fenestration projects will improve the energy performance of fenestration that is site-built, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

The proposed regulations also add a provision to the existing requirement that fenestration products be rated according to NFRC procedures; the new provision requires that visual transmittance be included among the product characteristics that must be tested and labeled. Including visual transmittance performance data on fenestration product labels will allow the building industry to more easily specify products that comply with the daylighting requirements of the Standards, thereby lessening costs and improving code compliance.

SECTION 110.7 – MANDATORY REQUIREMENTS TO LIMIT AIR LEAKAGE

The proposed regulations make nonsubstantive changes for clarification. Detailed specifications are added for the design and construction of building envelopes with a continuous air barrier. These improved specifications will allow builders to understand the installation requirements for air barriers when they are required, and will therefore improve code compliance.

SECTION 110.8 – MANDATORY REQUIREMENTS FOR INSULATION, ROOFING PRODUCTS, AND RADIANT BARRIERS

The proposed regulations add radiant barriers to this section title to clarify that there are requirements related to this building envelope component in this section. The proposed regulations also make nonsubstantive changes for clarification. The calculation is revised for the “aged solar reflectance” (the estimated solar reflectance of a specific roofing product after three years of operation.) The revised equation will improve estimates of the cool roof metric that is the basis of code requirements, thereby improving the effectiveness of the Standards. Finally, the proposed regulations add specifications for the maximum emittance of radiant barriers and for radiant barrier products to be certified by the Department of Consumer Affairs. By requiring radiant barriers to limit the amount of heat transferred into the building space, this building product will serve the purpose intended in the Standards. Clarifying the specifications and required certification for radiant barriers will improve the quality of this product when used to meet the Part 6 code requirements, thereby improving the effectiveness of the Standards.

SECTION 110.9 – MANDATORY REQUIREMENTS FOR LIGHTING CONTROL DEVICES AND SYSTEMS, BALLASTS, AND LUMINAIRES

The proposed regulations add “and systems” to this section title to clarify that there are requirements related to lighting control systems that are documented in this section. The proposed regulations reorganize this section and delete obsolete language to simplify and clarify the Standards.

Subsection 110.9(a): The proposed regulations remove the existing language providing instructions to lighting product manufacturers. These instructions are no longer necessary in Title 24, Part 6 because these lighting products are now regulated under the Title 20 Appliance Efficiency Regulations. Lighting control classifications and requirements for lighting product certification in accordance with Title 20 are also added to be consistent with the new Appliance Efficiency Regulations. Removing the obsolete language, adding new lighting control classifications and requiring lighting product certification are necessary to make the requirements for these lighting products consistent with Title 20, which will improve compliance with these regulations.

Subsection 110.9(b): The proposed regulations add requirements for lighting control systems to be fully functional and meet the same criteria that self contained lighting control devices must meet in accordance with Title 20. This requirement clarifies that lighting control systems continue to be regulated by Title 24, Part 6 even though there are new lighting equipment regulations in Title 20. Time switch lighting controls, daylighting controls, dimmers, occupant sensing controls and part-night outdoor lighting controls (controls that reduce or turn off outdoor lighting for a portion of the night) are now required to meet the criteria listed in this subsection before they can be used to meet Title 24, Part 6 requirements.

Subsection 110.9(c-k): The proposed regulations remove the existing language for lighting control requirements that are no longer needed due to the reorganization of this code section and

due to the new lighting control requirements in Title 20. These code changes clarify the Standards, thereby improving code compliance and enforcement.

Subsection 110.9(c): The proposed regulations clarify the required functionality of track lighting integral current limiters (electrical current limiters that are built directly into the track lighting fixture) and add lighting control acceptance requirements for these devices. These requirements improve the effectiveness of the Standards by ensuring that track lighting integral current limiters used for code compliance will, in fact, be installed such that proper operations can realize the expected energy savings.

Subsection 110.9(d): The proposed regulations add this entire subsection. The required functionality of supplementary overcurrent protection panels (electrical panels that provide a limited amount of overcurrent protection for track lighting systems, designed exclusively for specific track lighting products) are relocated from Section 130(d) to this subsection and edited for clarity. These modifications clarify the required functionality and installation location of supplementary overcurrent protection panels. The proper installation of supplementary overcurrent protection panels must now be verified. This requirement improves the effectiveness of the Standards by ensuring that supplementary overcurrent protection panels used for code compliance will, in fact, have the required functionality to meet the efficiency requirements.

Subsection 110.9(e): The proposed regulations clarify the required functionality of residential high efficacy LED lighting. These clarifications will improve code compliance.

Subsection 110.9(f): The proposed regulations add language to clarify that the ballast requirements for residential recessed luminaires in this subsection apply only to compact fluorescent lamps. The proposed regulations remove language in this section related to power adjustment factors because these are no longer used in any lighting efficiency requirements or compliance processes in the Standards. These modifications improve the simplicity and clarity of the Standards, thereby improving code compliance.

SECTION 110.10 – MANDATORY REQUIREMENTS FOR SOLAR READY BUILDINGS

The proposed regulations add this new section to specify the mandatory requirements for buildings to be designed and constructed with adequate access for future solar thermal and solar electric system installations. Subsections are added to convey the building occupancy types covered in this section, to specify the solar zone requirements for each of these building occupancy types, to specify how interconnection pathways must be indicated on construction documents, to specify the solar ready documentation requirements, and to specify the requirements for the capacity and reserved space of main electrical service panels. These requirements will allow building owners to install future solar thermal and solar electric systems more cost-effectively, which will help minimize fossil-fuel use in buildings.

c. SUBCHAPTER 3 -- NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL BUILDINGS-MANDATORY REQUIREMENTS

The proposed regulations modify this subchapter title to clarify that all mandatory requirements for nonresidential, high-rise residential, and hotel/motel buildings are included in this subchapter, not just those requirements related to space conditioning and water heating.

SECTION 120.0 – GENERAL

The proposed regulations modify this section (and its title) to clarify that all mandatory requirements for nonresidential, high-rise residential and hotel/motel buildings are included in this section, not just those requirements related to space conditioning and water heating.

SECTION 120.1 – REQUIREMENTS FOR VENTILATION

The proposed regulations make nonsubstantive changes for clarification.

Occupant sensor ventilation control devices (devices that sense human occupancy based on motion detection technology, then control ventilation rates according to the requirements in this code section) have been added to allow another possible approach to reduce outdoor air flow rates when specific building spaces are unoccupied. The addition of another type of ventilation control device that can be used to meet the demand ventilation control requirements make the regulations easier to comply with.

The proposed regulations add requirements for the control of outdoor air flow rates in space conditioning systems, such that the system must measure and control outdoor air flow within 10% of the required air flow rates. These requirements improve the effectiveness of the Standards by ensuring that the outdoor air required for occupant health and safety in buildings is delivered by the space conditioning systems.

SECTION 120.2 – REQUIRED CONTROLS FOR SPACE-CONDITIONING SYSTEMS

The proposed regulations make nonsubstantive changes for clarification.

Sensor and control requirements are added for specific building types so that cooling and heating temperature setpoints and ventilation rates will be automatically adjusted during unoccupied periods.

The specifications for automatic demand shed controls (controls that can receive an electronic signal to reduce energy use and react to this signal by automatically adjusting setpoint temperatures and turning off non-critical equipment) include new requirements for these controls to be disabled by authorized facility operators and include the ability for an operator to issue a single manual command (such as increasing cooling setpoint temperatures) that is automatically distributed to all appropriate temperature controllers. Requirements are added for direct expansion equipment to include fault detection and diagnostics for economizer operations (the ability to identify when its economizer is not operating properly and diagnose the probable reason for this malfunction).

The expanded requirements for occupancy sensors and controls, and for automatic shed controls, and the new requirements for economizer fault detection and diagnostics will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use and peak electricity demand of buildings, with resulting economic and environmental benefits.

SECTION 120.3 – REQUIREMENTS FOR PIPE INSULATION

The proposed regulations update the pipe insulation requirements to match the federal efficiency standards. This update is necessary under law.

SECTION 120.4 – REQUIREMENTS FOR AIR DISTRIBUTION SYSTEM DUCTS AND PLENUMS

The proposed regulations add a requirement to meet American National Standards Institute (“ANSI”) and Sheet Metal and Air Conditioning Contractors’ National Association (“SMACNA”) duct construction standards, which improves the consistency between Title 24, Part 6 and the California Mechanical Code (Title 24, Part 4).

SECTION 120.5 – REQUIRED NONRESIDENTIAL MECHANICAL SYSTEM ACCEPTANCE

The proposed regulations clarify an exception to the air economizer acceptance requirements to better convey that the construction inspection steps in the acceptance process must be completed even if the economizer is factory installed, calibrated and tested.

Construction inspection and functional testing requirements are added for supply air temperature reset controls, condenser water reset controls, and energy management control systems. This section references the Nonresidential Appendix (NA-7), where the details of these inspection and testing requirements are delineated. These clarifications and additions will improve compliance

with the Standards by ensuring that the efficiency measures are installed and operate as intended.

SECTION 120.6 – MANDATORY REQUIREMENTS FOR COVERED PROCESSES

The proposed regulations modify this section title to clarify that all mandatory requirements for all “covered processes” – that is, energy-related activities covered in Part 6 that are not related to human occupancy – are now included in this section. Within the text of the section, requirements for refrigerated warehouses have been moved to the first subsection, and subsections have been added for commercial refrigeration, enclosed parking garages, process boilers, and compressed air systems; the substantive changes are discussed immediately below.

Subsection 120.6(a): The proposed regulations make nonsubstantive changes for clarification.

The proposed regulations also clarify the exceptions to the scope of this subsection to exclude quick chilling and quick freezing condensers and compressors from these refrigerated warehouse efficiency requirements if they make up more than 20% of the total refrigerated system capacity. These clarifications improve the effectiveness of the Standards by clarifying the specific types of refrigeration systems to which these regulations apply.

The proposed regulations also increase the refrigerated warehouse insulation requirements and add a requirement for all evaporator fans serving compressors that are not variable speed to include the ability to reduce fan speed by at least 40% while the compressor is not running. Requirements are also added for refrigeration systems to include condensing temperature reset controls, for fan-powered condensers to meet a minimum efficiency, and for air infiltration barriers to be installed in refrigerated warehouses. These requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of refrigerated warehouses.

Construction inspection and functional testing requirements (also known as “acceptance tests”) are added for electric resistance under-slab heating systems, evaporators, evaporative condensers, air-cooled condensers and variable speed compressors. These new acceptance tests improve compliance with the Standards by ensuring that the efficiency measures are installed and operate as intended.

Subsection 120.6(b): The proposed regulations add this commercial refrigeration subsection. Requirements are created for condenser speed controls, fan-powered condenser efficiency, compressor system controls, display case lighting controls, and refrigeration heat recovery in commercial refrigeration. By including commercial refrigeration systems in the standards and adopting cost-effective energy efficiency requirements for them, these proposed regulations will result in economic and environmental benefits.

Subsection 120.6(c): The proposed regulations add this enclosed parking garage subsection. Requirements are created for mechanical ventilation systems to modulate ventilation rates in response to the automatic detection of specified levels of contaminants in the air. When contaminant levels are below a specified limit, ventilation systems must be shut-off, saving energy during times when there is no automobile activity in the parking garage. The new efficiency requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of enclosed parking garages.

Subsection 120.6(d): The proposed regulations add this process boiler subsection. Requirements are created for process boilers (which serve a load that is not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy) to be equipped with a combustion air shut-off device, for fan motors to be variable speed or to limit demand based on airflow rate, and for process boilers to limit the amount of excess oxygen used in the combustion process. The new efficiency requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings with process boilers.

Subsection 120.6(e): The proposed regulations add this subsection to add requirements for compressed air systems for (1) trim compressors (compressors with variable speed capability so that they can be operated to specifically meet the compressed air load), compressed air storage, and system controls, and (2) construction, inspection and functional testing. These new efficiency requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings with compressed air systems.

SECTION 120.7 – MANDATORY INSULATION REQUIREMENTS

The proposed regulations add this section to specify the mandatory requirements for building envelope insulation. Minimum levels of roof, wall, and floor insulation are new mandatory requirements. These additional mandatory requirements will improve code compliance and enforcement because building designers and building officials will understand that no insulation below these minimum levels can be installed in California buildings.

SECTION 120.8 – BUILDING COMMISSIONING

The proposed regulations add this section to consolidate the mandatory requirements for building commissioning, which is a quality assurance process that ensures that buildings are designed and operate initially as the owners intended. The current building commissioning requirements in Title 24, Part 11 that pertain to energy systems covered in Part 6 are relocated to this code section to improve the organization of all energy efficiency code requirements in Title 24. In addition, requirements are added for design review, which is a secondary review of the construction drawings and specifications that seeks to improve compliance with existing Title 24 regulations, encourage adoption of best practices in design, and encourage designs that are constructable and maintainable. These building commissioning requirements, including design review, will improve compliance with the standards and will provide building owners with more information about their building's energy efficiency features.

SECTION 120.9 – MANDATORY REQUIREMENTS FOR COMMERCIAL BOILERS

The proposed regulations add this section to specify the new mandatory requirements for commercial boilers. Requirements are added for boilers to be equipped with a combustion air shut-off device, for fan motors to be variable speed or to limit demand based on airflow rate, and for commercial boilers to limit the amount of excess oxygen used in the combustion process. The new efficiency requirements will increase the stringency of the Standards, thereby minimizing the energy use of buildings.

d. SUBCHAPTER 4 -- NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND MOTEL/MOTEL OCCUPANCIES—MANDATORY REQUIREMENTS FOR LIGHTING SYSTEMS AND EQUIPMENT, AND ELECTRICAL POWER DISTRIBUTION SYSTEMS

The proposed regulations add “and electrical power distribution systems” to this section title to clarify that there are requirements related to these systems that are documented in this section.

SECTION 130.0 – LIGHTING CONTROLS AND EQUIPMENT—GENERAL

The proposed regulations reorganize this section and delete obsolete language to clarify the effectiveness of the Standards. Subsections within this section have been renumbered and reorganized for clarity. In addition:

Subsection 130.0(a): The proposed regulations clarify that electrical power distribution systems are regulated under this code section (see Subsection 130.5) and remove installation requirements that are now contained in subsection 130.0(d). These modifications improve the organization of the Standards, thereby making the requirements easier to understand and comply with.

Subsection 130.0(b): The proposed regulations combine the requirements for residential lighting from two existing subsections into this new subsection. Fire station dwelling accommodations are added as a residential building space type that must meet the residential lighting requirements. These modifications improve the organization of the Standards, thereby making the requirements easier to understand and comply with.

Subsection 130.0(c): The proposed regulations clarify that requirements for luminaire (light fixture) classification and luminaire power (light fixture wattage) are contained in this subsection. Luminaire classifications are used either to assign classes of lighting systems to be incandescent if they have components that would allow incandescent lamps to be used in the fixture, or to exclude lighting systems from being classified as LED lighting systems if they do not have all of the functionality of LED systems. The criteria that must be used to determine luminaire power are clarified and simplified, and a new scheme to classify luminaires is added. Language is added to clarify that screw-base adaptors (sockets in light fixtures that allow screw-in bulbs to be installed), and LED screw-based lamps cannot be used to meet the lighting efficiency requirements of Title 24, Part 6. Language is clarified to differentiate the requirements for transformers serving dynamic loads from the requirements for transformers serving static loads. These language clarifications will improve code compliance by making the requirements easier to understand and implement in lighting system designs.

Track lighting integral current limiters (current limiters that are built directly into the track lighting fixture) now require an installation field inspection, and a test requirement is modified for LED lamps, such that LEDs must now adhere to a nationally recognized test standard. These additions and modifications will improve code compliance by ensuring that LED lamps are specified correctly in the design process and that luminaire controls are installed correctly.

Subsection 130.0(d): This subsection is added, to clarify that all lighting controls must comply with the applicable requirements in Section 110.9 and be installed according to manufacturer instructions. These are not new requirements; they have been relocated here from Section 110.9 for clarity.

SECTION 130.1 – INDOOR LIGHTING CONTROLS THAT SHALL BE INSTALLED

The proposed regulations reorganize this section and delete obsolete language to clarify the Standards. Subsections within this section have been renumbered and reorganized for clarity. In addition:

Subsection 130.1(a): The proposed regulations reorganize the language in this subsection for clarity. The amount of lighting allowed to be installed in a building area without controls is reduced, which increases the stringency of the Standards and in turn minimizes the energy use of buildings.

Subsection 130.1(b): The proposed regulations reorganize the language in this subsection for clarity. In addition:

The general lighting threshold (measured in watts per square foot) has been reduced, which means that the multi-level lighting control requirements of this subsection now apply to more spaces in more buildings. The requirements for multi-level control steps and light uniformity are modified to be appropriate to specific lighting technologies. A requirement is added for multi-level lighting controls to meet at least one of the five listed control types. These modifications and new requirements increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

An exception is added for classroom lighting because the Energy Commission determined it was not technically feasible to require the same type and level of controls for classrooms as is required in the other building space types covered by the requirements of this subsection. This

exception improves the effectiveness of the Standards by promulgating only cost-effective efficiency requirements.

Subsection 130.1(c): The proposed regulations reorganize the requirements for shut-off controls into this subsection. This improves the organization of the Standards, thereby increasing its effectiveness.

Subsection 130.1(d): The proposed regulations reorganize the requirements for daylighting controls into this subsection. A requirement is added for daylighting controls in parking garages, which increases the stringency of the Standards, thereby minimizing the energy use of parking garages.

Subsection 130.1(e): The proposed regulations reduce the building size threshold (measured in square feet) for when demand responsive lighting controls are required, and add an option for meeting these requirements. The building size threshold reduction increases the stringency of the Standards, thereby increasing the number of buildings with the control capability to reduce loads during peak electricity periods, and in turn minimizing the energy costs of these buildings.

SECTION 130.2 – OUTDOOR LIGHTING CONTROLS AND EQUIPMENT

Subsections within this section have been renumbered and reorganized for clarity. In addition:

Subsection 130.2(a): The proposed regulations modify this subsection to apply only to incandescent luminaires and clarify that the luminaire wattage shall be determined in accordance with the luminaire power and classification requirements in Section 130.0. Exceptions to the requirements in this subsection are removed. These modifications update the Standards to reflect the current state of lighting technologies, where mercury vapor lighting will be eliminated by federal regulations and incandescent technology remains as the only relatively inefficient means of outdoor lighting that requires regulation. The existing exceptions to these requirements are no longer necessary because efficient technologies are now readily available for these special outdoor lighting applications. These modifications clarify and simplify the Standards and increase their stringency, thereby improving code compliance and minimizing the energy use of buildings.

Subsection 130.2(b): The proposed regulations modify this subsection to improve clarity. In addition:

The cutoff requirements are replaced with requirements for Backlight (light applied to the back of a subject being lit), Uplight (light applied from below a subject being lit), and Glare ratings. The new requirement for backlight, uplight and glare (collectively referred to as “BUG”) ratings reflects a change in industry metrics for outdoor lighting applications. These modifications improve the effectiveness of the Standards by using current industry metrics in the outdoor lighting design requirements.

The threshold luminaire wattage is reduced for when the light distribution requirements of this subsection apply. The existing exceptions to these requirements are removed because they are no longer necessary, given that efficient technologies are now readily available for these special outdoor lighting applications. These modified requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

Subsection 130.2(c): The proposed regulations reorganize this subsection and make modifications to improve clarity. Exceptions are removed that are no longer necessary because efficient technologies are now readily available for these special outdoor lighting applications. Requirements are added for outdoor lighting to be switched independently from other electrical loads and for certain outdoor luminaires to be controlled by multi-level motion sensors (where light fixtures have a low light level for periods when no motion is detected, and a higher light level for when motion is detected), part-night lighting control devices (controls that reduce or turn off

outdoor lighting for a portion of the night) or centralized time-based zone lighting controls (where lighting in multiple zones can be scheduled to turn on and off from a central location). These modified requirements increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

SECTION 130.3 – SIGN LIGHTING CONTROLS

The proposed regulations clarify the requirements for sign lighting controls in this section. The requirements for indoor signs are separated from the requirements for outdoor signs. An exception for specific types of sign lighting is eliminated because control technologies are now readily available for these types of sign lighting. These modifications clarify and simplify the Standards, thereby improving code compliance.

SECTION 130.4 – REQUIRED NONRESIDENTIAL LIGHTING CONTROL ACCEPTANCE

The proposed regulations clarify the requirements for nonresidential lighting control installation inspections and acceptance testing. These clarifications improve code compliance by ensuring that lighting controls are installed and tested according to the requirements in the Standards.

SECTION 130.5 - ELECTRICAL POWER DISTRIBUTION SYSTEM

The proposed regulations add this entire subsection to set requirements for service metering, disaggregation of electrical circuits, maximum voltage drop, receptacle circuit controls, demand response signals and energy management control systems. These new requirements will reduce the costs for building owners to submeter their energy end use loads and control building power during peak demand periods, thereby minimizing the energy costs of buildings.

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

SECTION 140.0 – PERFORMANCE AND PRESCRIPTIVE COMPLIANCE APPROACHES

As described in more detail in the Introduction, the building standards contain two basic requirements that all buildings must meet, with the second requirement having two general approaches that can be used: the first requirement is a set of mandatory measures, and the second is an overall energy goal for each building type. The overall energy goal, in turn, may be met either by demonstrating that the building's energy use will be lower than a specified "energy budget," or by installing a set of "prescriptive" measures." These two alternate compliance options are called the "performance compliance approach" and the "prescriptive compliance approach", respectively, in the Standards.

The proposed regulations modify this section's title to clarify that it is the performance and prescriptive compliance approaches that are described in this section. Within the section:

A reference to the Joint Appendix is added in a note to explain the zip code basis of all climate zone descriptions. Using a zip code basis rather than the metes and bounds used in previous Standards to identify the appropriate climate zone of a building location will make it easier for building owners and energy consultants to comply with, and building officials to enforce, the Standards.

The proposed regulations clarify that buildings must comply with all mandatory measures as well as either the prescriptive or performance compliance approaches. These clarifications will improve compliance with the Standards.

SECTION 140.1 – PERFORMANCE APPROACH: ENERGY BUDGETS

The proposed regulations delete existing language that is extraneous and clarify the explanations of the energy budgets used in the performance approach. These modifications simplify the

language, thereby improving the effectiveness of the Standards.

SECTION 140.2 –PRESCRIPTIVE APPROACH

The proposed regulations add prescriptive requirements for “covered processes,” by adding a subsection that references the code section 140.9, where the prescriptive requirements are detailed. The addition of this subsection makes it clear that the prescriptive approach includes these new covered process requirements, thereby improving compliance with the Standards.

SECTION 140.3 – PRESCRIPTIVE REQUIREMENTS FOR BUILDING ENVELOPES

Building “envelopes” are the components that make up the “outside” of the building and thus separate the occupied interior from outside conditions: walls, roofs, doors, windows, and the like. The proposed regulations add prescriptive requirements (i.e., those that must be met by all, or specified, buildings within the scope of the subchapter (i.e., nonresidential, high-rise residential, and hotel/motel), if the prescriptive compliance approach is used)) for specified types of envelope components, as follows.

The proposed regulations add or increase the minimum reflectance requirements for specified types of roofs. Reflectance requirements provide a minimum level of roofing product reflectivity, which reduces solar heat gains to buildings. First, the proposed regulations increase the minimum reflectance requirements for low-sloped roofs on nonresidential buildings. Second, the proposed regulations add reflectance requirements for steep-sloped roofs on high-rise residential and hotel/motel buildings. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

Requirements are added for minimum levels of fenestration product (glass envelope component) visual transmittance (which measures how much light comes through fenestration products). These changes will require nonresidential buildings to use windows and skylights that provide more daylight into the building, thereby reducing the need for electrical lighting. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

Envelope air barrier requirements, which limit the amount of outside air that is unintentionally introduced into a building through cracks in the building envelope, are added for buildings in specified climate zones. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

Daylighting requirements are increased and simplified for large enclosed spaces in low-rise buildings. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

The proposed regulations introduce area-weighted performance requirements for fenestration product U-factors (which measure how rapidly heat gets transferred through building components), for relative solar heat gain coefficients (which measure how much heat is gained when the sun shines on fenestration products), and for visual transmittance (explained above). Currently, those requirements must be met for each separate fenestration product (each window, for example). Area-weighted performance requirements allow building designers to meet these requirements averaged over, for example, all of the windows in a building, so that some windows will exceed the requirements for individual windows and some will not, as long as the average performance of all windows taken together is no worse than the performance would have been had each individual window meet its own prescriptive requirements. The modifications will provide more flexibility to building owners and designers in complying with these envelope requirements, which will improve the effectiveness of the Standards.

The Envelope Tradeoff Procedure is removed as an alternative prescriptive compliance approach. This procedure was very complex and, as such, was difficult to use and enforce. Instead, alternative envelope measures can be used in the performance compliance approach. Eliminating this complex procedure will improve enforcement of the Standards.

SECTION 140.4 – PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

Space conditioning systems, such as furnaces and air conditioners, are the mechanical equipment that heat and cool the interior spaces in buildings for occupant comfort, and that ensure that indoor air quality is adequate to protect health. The various subsections in this section contain requirements that all, or specified types of, space conditioning systems must meet in the buildings within the scope of the subchapter.

Subsection 140.4(c): Currently, this subsection contains requirements for a small subset of systems (variable air volume fans and motors where motor size is ten horsepower or larger). The proposed regulations replace those with more expansive requirements for all single and multiple zone space conditioning systems in a new subsection 140.4(m). The new requirements are consistent with newly proposed national ASHRAE Standards and, as such, have the support of national product manufacturers.

In addition, a requirement is added for fractional fan and pump motors to be electronically-commutated (a specific motor type that is inherently energy efficient) or meet a minimum specified level of energy efficiency.

Both sets of new requirements in this subsection cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

Subsection 140.4(d): This subsection current requires a specific type of space conditioning systems to have zonal controls, so that different parts of buildings can be heated or cooled differently, or not at all), thereby allowing more efficient use of the systems than would be possible if they could be adjusted only on a whole-building basis. The subsection also contains various exceptions to the requirements. The proposed regulations expand the criteria necessary to meet an exception to the space-conditioning zone control requirements so that direct digital control systems intended to qualify for this exception must now include two-stage heating controls. This code change increases the specificity of the required heating controls to better implement the intent of this code section, thereby improving the effectiveness of the Standards.

Subsection 140.4(e): This subsection currently requires specified types of space conditioning systems to have economizers, which use outside air to meet indoor cooling requirements when the local climate conditions are appropriate. All of the proposed regulations in this subsection increase the stringency of the standards, either by tightening, or by expanding the scope of, the requirements. The changes are as follows:

The proposed regulations reduce the size threshold for when space conditioning systems must include an economizer.

An exception to the economizer requirements for computer rooms is removed to clarify that computer rooms, now included as a covered process in Section 140.9(a), cannot use the exception designed for spaces that must meet specific humidity levels required for the process loads in these spaces. The computer room requirements in Section 140.9(a) include economizer requirements that would otherwise conflict with this current exception.

The proposed regulations update the allowable economizer and equipment efficiency trade-offs (which provide a prescriptive alternative to the economizer requirements by substituting higher

efficiency space cooling equipment). These updates are necessary to include the appropriate levels of cooling system performance that are equivalent in expected annual energy usage to the annual energy use expected from the new economizer requirements in each climate zone.

The economizer high air shut-off control requirements are modified to (1) provide more climate zone specific requirements for some economizer types; (2) specify the air shut-off control requirements for a new type of economizer (a fixed-enthalpy, fixed dry bulb economizer); and (3) to prohibit the use of economizer controls that use enthalpy alone as the control parameter (e.g. fixed enthalpy, electronic enthalpy, differential enthalpy economizers).

Criteria are added for air economizers and return air dampers in the areas of warranty, drive mechanism, damper reliability testing, damper leakage, adjustable setpoint controls, relief air system and damper control sensor location, accuracy, and calibration. Each of these new specifications clarifies the required functionality, manufacturer testing and support of economizers selected and installed to meet the Standards.

Requirements are added for all space conditioning systems that must include economizers to use integrated economizer controls (economizer controls that are interlocked with mechanical cooling controls, such that the economizer is used to the greatest extent possible, when appropriate, before mechanical cooling is used). Requirements are also added for direct expansion systems to stage or modulate cooling capacity, such that reduced cooling capacity must be delivered with a corresponding reduction in electrical power demand.

All of the new requirements in this subsection cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

Subsection 140.4(i): The proposed regulations add prescriptive requirements for chillers to adhere to the ASHRAE 90.1 Path B efficiency requirements, which are the more stringent of the two optional paths provided in the ASHRAE standard that is referenced as a mandatory requirement in Section 110.2(a). By setting the Path B chiller efficiencies as the prescriptive requirement, it reduces the energy budget that must be met either by meeting these prescriptive efficiency levels or through use of the performance compliance approach. This will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

Subsection 140.4(j): The proposed regulations clarify the language in this section, without making substantive changes, in order to improve compliance with the Standards.

Subsection 140.4(m): The proposed regulations add this subsection, which describes the requirements for variable airflow capability in multiple zone and single zone HVAC systems. The new requirements are consistent with newly proposed national ASHRAE Standards and, as such, have the support of national product manufacturers. These new requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

SECTION 140.6 – PRESCRIPTIVE REQUIREMENTS FOR INDOOR LIGHTING

The proposed regulations reorganize this section and remove redundant language to improve clarity; the proposed regulations also delete requirements that are no longer relevant to this code section because they are proposed to be “mandatory” rather than “prescriptive” (see Section 130.0 and 130.1). Substantive changes to individual subsections are as follows:

Subsection 140.6(a): The proposed regulations increase the amount of watts per square foot of portable lighting that does not need to be included in the calculation of the total building lighting power density. The allowable watts per square foot for office lighting are also reduced. The

combination of allowing slightly more portable lighting and allowing less overall lighting power densities results in more energy efficient lighting systems in nonresidential buildings. These code changes will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

The language that requires interlocks between multiple lighting systems is modified to clarify that these requirements apply to no more than two lighting systems serving the same building space. These clarifications will improve compliance with the Standards.

The Power Adjustment Factors (PAFs) are used in the Standards to provide credit for specific lighting controls within the calculation of allowable lighting power densities. PAFs for daylighting controls are removed because daylighting controls have been changed from prescriptive to mandatory requirements, and the PAFs only apply to prescriptive lighting power density levels. The applications of PAFs for other lighting controls are simplified. Explanations of PAFs available in Table 140.6-A are expanded to articulate the available credits for all lighting control applications recognized in the Standards. Because PAFs only apply to permanent lighting installations, criteria are added for when furniture mounted general lighting can be considered permanently installed. Requirements are added for installation certificates to verify that the PAFs used in code compliance match the PAFs for the lighting controls actually installed. These modifications will improve the effectiveness of the Standards by simplifying and explaining the PAF credits and when they can be used, and by improving the verification of code compliance.

The requirements for refrigerated cases are revised to be consistent with the Title 20 Appliance Efficiency Regulations.

Elevator lighting is no longer included in the calculation of the allowable building lighting power density, to be consistent with ASHRAE/IESNA Standard 90.1, 2010.

Subsection 140.6(b): The proposed regulations clarify the indoor lighting power trade-offs allowable in the prescriptive compliance approach. Lighting power trade-offs provide flexibility in prescriptive lighting code compliance by allowing more lighting in one area of the building if there is less lighting in another area. The changes to this code section clarify when this lighting power trade-off option can be used, which will improve code compliance.

Subsection 140.6(c): The proposed regulations clarify the language that explains how to calculate the allowed indoor lighting power density (the watts per square foot of lighting power allowed), using the area category method, the complete building method, or the tailored method. These three alternative methods for calculating the allowable lighting power density provide prescriptive compliance options that provide flexibility in how the lighting efficiency requirements can be implemented. These clarifications will improve code compliance.

The equations that must be used to calculate the room cavity ratio (a metric used to determine the ability of a light fixture to deliver light to a work plane in a specific building space) are now organized into a summary table for easy reference.

The watts per square foot of lighting power allowed for specific building types and function areas are reduced. These lighting power density reductions will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state's economic and environmental health.

The additional power credit provided to display lighting has been modified to account for different light fixture mounting heights. More credit is now allowed for display lighting mounted high on a side wall rather than display lighting mounted low on a side wall, since a light fixture mounted high on a wall will also provide some general lighting to the space. These modifications make the language meet the intent of this subsection, which is to allow additional lighting power credit for specific lighting applications that also contribute to the provision of general indoor lighting,

thereby improving the effectiveness of the Standards.

The term used for the lighting parameter that is a measure of the light falling on a horizontal surface, which is used to determine the allowable lighting power in a prescriptive compliance option, is updated from “illuminance” to “illuminance level”, or “LUX”. The parameter has not changed, just the term used for this parameter has changed, to be consistent with the new 10th Edition of the Illuminating Engineering Society’s Lighting Handbook.

Subsection 140.6(d): The proposed regulations add this new subsection, which describes a requirement for the installation of automatic daylight controls in secondary daylight zones. Automatic daylight controls have sensors that measure how much light is entering a building space from windows or skylights and reduce the amount of electrical lighting accordingly. The secondary daylight zone is the area of the building located a horizontal distance from the window equal to twice the vertical distance between the floor and the top of the window. Requiring daylight controls for these portions of the building that are not directly adjacent to the windows will allow the daylight entering these spaces to be used in place of electrical lighting. These new requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

SECTION 140.7 – REQUIREMENTS FOR OUTDOOR LIGHTING

The proposed regulations re-write the preamble of this section to clarify what each subsection includes, and adds a reference to the criteria for determining the correct type of outdoor lighting zone, contained in Section 10-114.

All language specific to local ordinances are removed, most notably the additional amount of outdoor lighting power that was allowable in local ordinances. This additional outdoor lighting power is not needed to provide adequate outdoor light and has, to date, not been included in any local ordinances. Removing this language simplifies the Standards, thereby making them more effective.

Additional lighting power allowances for water feature lighting are removed because efficient lighting technologies are now readily available for these special lighting applications. Additional lighting power allowances for general hardscape (paved areas like streets and sidewalks) lighting power and other specific outdoor lighting applications (building entrances and exits, vehicle service station canopies, and outdoor dining areas) are reduced. These reductions in outdoor lighting power allowances will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings, which in turn improves the state’s economic and environmental health.

SECTION 140.9 – PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

The proposed regulations add this section to describe the prescriptive requirements for covered processes. New subsections are added for computer rooms, commercial kitchens and laboratory exhaust systems, described further below. These three covered processes are the only ones that will have prescriptive requirements in the Standards. The other covered processes will have mandatory requirements, as explained above in Section 120.6.

Subsection 140.9(a): The new requirements in this section apply to computer rooms that are included in nonresidential building design and construction projects. The proposed regulations cover the topics of economizers, prevention of reheat, humidification, fan power consumption, fan control and air containment. These new requirements will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings with computer rooms

Subsection 140.9(b): The new requirements in this section apply to commercial kitchens that are included in nonresidential building design and construction projects. The proposed regulations cover the topics of exhaust system replacement air, exhaust airflow rates, kitchen ventilation and kitchen exhaust system acceptance. These new requirements will cost-effectively increase the

stringency of the Standards, thereby minimizing the energy use of buildings with commercial kitchens.

Subsection 140.9(c): The new requirements in this section apply to laboratory exhaust systems that are included in nonresidential building design and construction projects. The proposed regulations establish a requirement that exhaust systems be capable of reducing zone exhaust and makeup airflow rates when the laboratory exhaust hoods are not operating. This new requirement will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of buildings with laboratory exhaust systems.

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

SECTION 141.0 – ADDITIONS, ALTERATIONS, AND REPAIRS TO (1) EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, OR HOTEL/MOTEL OCCUPANCIES, (2) EXISTING OUTDOOR LIGHTING FOR THESE OCCUPANCIES, AND (3) INTERNALLY AND EXTERNALLY ILLUMINATED SIGNS FOR THESE OCCUPANCIES

Subsection 141.0(a) [additions, which is construction that adds floor space to existing buildings]: The proposed regulations make nonsubstantive changes for clarification. The performance compliance approach for additions is modified to address the buildings that include both additions and alterations (see next subsection). Based on stakeholder comments, the Energy Commission made changes to the performance compliance approach for additions and alterations to make it more consistent with the prescriptive compliance approach, and to make the performance compliance approach easier to implement. Another exception (a case for which a specific requirement does not apply) is added to explain when the new solar zone requirements (see above Section 110.10) apply to additions. These modifications improve code compliance because they explain each type of compliance approach for additions, and the special cases that have unique requirements.

Subsection 141.0(b) [alterations, which is construction that changes, but does not add floor space to, existing buildings]: The proposed regulations make nonsubstantive changes for clarification. Another exception is added to explain when the new solar zone requirements (see above Section 110.10) apply to alterations. This exception clarifies the intent of the regulations, which will improve code compliance.

The proposed regulations modify the language for fenestration alterations to require conductive heat transfer (U-factor) and solar heat gain (SHGC) parameters to meet criteria established specifically for alterations. These U-factor and SHGC criteria are summarized in a new table in this subsection. These modifications account for the fact that there are limitations to what energy efficiency improvements can be accomplished cost-effectively in existing buildings.

The proposed regulations increase the roof reflectance requirements for low-slope roof alterations, but add a new exception to this requirement if specific levels of insulation are added to the roof. Exceptions are added that allow roof alteration projects to not meet these requirements if (1) the roof area is covered by building integrated solar systems, or (2) the roofing product used in the alteration meets or exceeds a specific thermal mass (a building material property that allows solar energy to be absorbed during the day and released at night). An exception to the roof alteration requirements for specific roof and recoating types is removed because there are roofing products now available that can meet these efficiency requirements. These requirements cost-effectively increase the stringency of the Standards, which will reduce the energy use of existing buildings, and in turn improve the state's economic and environmental health.

The proposed regulations remove one option for sealing altered space conditioning duct systems.

This option, which allowed compliance with the altered duct system requirements to be met by verifying that the altered duct system was 60% less leaky than the original system, has proved difficult to enforce in the field. The modified requirements now require that altered duct systems leak 15% or less, and if this level of duct sealing cannot be achieved, then all visible leaks must be sealed and verified with a smoke test (a process where smoke is introduced into the space conditioning supply air stream, then the duct system is visually inspected to see if the smoke exits the duct system through cracks, holes or seams). These requirements cost-effectively increase the stringency of the Standards, which will reduce the energy use of existing buildings, and in turn improve the state's economic and environmental health.

A requirement is added for space conditioning systems with economizers to have control systems that integrate economizer and cooling operations. This requirement will ensure that space conditioning systems use outside air for space cooling as much as possible, thereby cost-effectively increasing the stringency of the Standards, which will reduce the energy use of existing buildings, and in turn improve the state's economic and environmental health.

The threshold that determines when a lighting retrofit must comply with the Standards is reduced from 50% to 10% of altered luminaires (light fixtures) per space. This threshold reduction will have the impact of many more alterations needing to meet the lighting efficiency requirements, which will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of existing buildings, which in turn improves the state's economic and environmental health.

The proposed regulations for luminaire alterations is substantially modified both for clarity and to increase the stringency of the requirements. A new term is introduced, "Luminaire Modifications-In-Place," to describe changes to light fixtures where the fixture is not relocated and the electrical wiring for the fixture is not altered. The requirements for altered lighting systems are separated into two subsections, one for Luminaire Alterations and the other for Luminaire Modifications-In-Place. Two new summary tables are included, one for each subsection, and the summary tables list the requirements for each type of alteration or modification. Criteria are added for what constitutes a lighting system wiring alteration. The modified language clarifies the luminaire alteration requirements, thereby improving code compliance. These requirements also cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of existing buildings, which in turn improves the state's economic and environmental health.

Requirements are added for outdoor lighting systems, such that the mandatory requirements for newly installed outdoor lighting must be met if more than 10% of the existing outdoor lighting system is altered, and the prescriptive requirements for newly installed outdoor lighting must be met if an alteration increases the connected load (electrical power needs) of the existing outdoor lighting system. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of existing buildings, which in turn improves the state's economic and environmental health.

The performance compliance approach for alterations is modified to address the projects that include both additions and alterations. Based on stakeholder comments, the Energy Commission made changes to the performance compliance approach for additions and alterations to make it more consistent with the prescriptive compliance approach, and to make the performance compliance approach easier to implement.

SECTION 141.1 – REQUIREMENTS FOR COVERED PROCESSES IN ADDITIONS, ALTERATIONS, AND REPAIRS TO EXISTING BUILDINGS THAT WILL BE NONRESIDENTIAL, HIGH-RISE RESIDENTIAL, AND HOTEL/MOTEL OCCUPANCIES

The proposed regulations explain the requirements for covered processes in additions, alterations, and repairs to existing buildings. The current refrigerated warehouse language is moved into one subsection and other subsections are added for refrigerated warehouses, commercial refrigeration, enclosed parking garages, process boilers, and compressed air

systems. This section makes it clear that the covered process requirements apply to each existing building addition, alteration, or repair, thereby improving code compliance.

**g. SUBCHAPTER 7 -- LOW-RISE RESIDENTIAL BUILDINGS--
MANDATORY FEATURES AND DEVICES**

SECTION 150.0 – MANDATORY FEATURES AND DEVICES

Subsection 150.0(a): The proposed regulations add insulation requirements for attic access doors to minimize the heat transfer between the unconditioned attic and the conditioned house. This reduces the energy use of residential buildings. This requirement cost-effectively increases the stringency of the Standards, thereby minimizing the energy use of residential buildings, which in turn improves the state's economic and environmental health.

Subsection 150.0(c): The proposed regulations add an exception to the wall insulation requirements for existing walls that are already adequately insulated.

Subsection 150.0(f): The proposed regulations remove the language for air retarder wraps because it is duplicative with the revised subsection (150.0(g)) for vapor retarders.

Section 150.0(f) is now used to explain new requirements for hotel and motel guest room lighting and space-conditioning system controls. These system controls must be capable of turning off luminaires and half of the plug-in receptacles when the hotel room is not occupied. The space conditioning controls must be capable of resetting the room thermostat setpoint temperature either up (during cooling) or down (during heating) when the room is not occupied. These new requirements will enable lighting, receptacle loads and space conditioning to be reduced during unoccupied periods, thereby minimizing the energy use of guest rooms in hotel and motel buildings.

Subsection 150.0(g): The proposed regulations clarify the requirements for vapor retarders in exterior walls by adding specific references to Class I and Class II vapor retarders. Each vapor retarder "class" refers to a specific level of vapor resistance; these class differentiations are used in the California Building Code, as well as other national and international building codes. This modification clarifies the requirements for vapor retarder performance in a manner that is consistent with other state, national and international building standards.

Subsection 150.0(h): The proposed regulations add requirements for the location of outdoor condensing units and the installation of central forced-air furnaces to ensure proper operations. Condensing units must now be located five feet or more from a dryer vent and forced-air furnaces must be designed and installed to meet the manufacturer's maximum temperature rise (the temperature increase from the furnace inlet to the furnace outlet) specifications. These requirements improve the intent of the Standards to require design and construction of energy-related equipment and systems such that proper operations can be realized.

Subsection 150.0(j): The proposed regulations clarify the language that explains the hot water piping insulation requirements for recirculation (piping that includes a "loop", with a piping section for each hot water fixture extending from this loop) and non-recirculation systems, and remove redundant language and summary tables. All these non-substantive clarifications will improve code compliance. Requirements are added for all below grade hot water piping to be insulated, which will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of newly constructed residential buildings.

Subsection 150.0(k): The proposed regulations reorganize this section for clarity. In addition:

The method used to classify high efficacy luminaires (fixtures that efficiently deliver high quality light) is changed from an efficacy calculation to a default technology list. The new classification

allows the industry to understand code requirements based on the luminaire technology type, without the need to calculate the efficacy of specific luminaires. This modification improves the effectiveness of the Standards by simplifying code compliance.

Energy management controls systems (EMCS) and multi-scene programmable controllers must be capable of complying with the dimming lighting control requirements. EMCS must also be capable of complying with the vacancy sensing lighting control requirements. These new requirements improve the effectiveness of the Standards by reducing the installation costs for lighting control systems.

A minimum of one high efficacy luminaire in each bathroom, and vacancy sensors in garages, are now required. More efficient light fixtures and automatically turning off lights based on occupancy will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of newly constructed residential buildings.

Installation requirements for exhaust fans are moved to Section 110.7. These requirements belong in the section of the Standards that explains the mandatory features of all mechanical equipment, regardless of building type.

Requirements for single and multi-family outdoor lighting are now clearly differentiated from each other in the language. This will clarify the Standards, thereby improving compliance.

The criteria for when lighting in multi-family buildings must follow the outdoor lighting requirements are clarified. In previous Standards rulemakings it was established that outdoor site lighting saves energy cost-effectively. Somehow, apartment complexes were not explicitly mentioned in previous language. The proposed regulations explicitly state that outdoor lighting in apartment complexes is regulated.

Subsection 150.0(m): - The proposed regulations modify this subsection title to clarify that ducts, plenums, and fans serving ventilation systems are covered by the requirements in this subsection.

The current option of putting space conditioning ducts within the living space of a house (instead of insulating and sealing ducts typically located in the attic) now requires a field verification to ensure that the ducts are completely in conditioned space. This field verification will improve compliance with the Standards.

All space conditioning ducts in residential buildings must now be sealed to minimize duct leakage. Making this a mandatory requirement will ensure that all space conditioning systems that use ducts to transfer conditioned air will not lose efficiency through duct leakage. This requirement will cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of newly constructed residential buildings.

Air filters in space conditioning systems must be installed such that all air entering the system is filtered. A permanent label must be installed on the space conditioning system at the air filter location, listing the system air flow rate and the correct pressure drop for replacement filters. Air filters installed must now meet particle filtration efficiency and filter pressure drop criteria. Air filters installed must also be labeled with the particle filtration efficiency, the pressure drop, and the air flow rate the filter is designed for. Currently, air filters are often installed in space conditioning systems with no attention paid to the filter pressure drop or system air flow rate, and the result is that the system has too much pressure loss to deliver conditioned air at the expected rate. These air filtration requirements will improve the effectiveness of the Standards by improving the operation performance of space conditioning systems, which will allow these systems to operate at the design efficiencies required by the Standards.

For all space conditioning systems that use ducts to transfer conditioned air, these systems must

now be tested to confirm that they deliver air at or above a specified rate using fan power at or below a specified level. These space conditioning system requirements will improve the effectiveness of the Standards by improving the operation performance of space conditioning systems, which will allow these systems to operate at the design efficiencies required by the Standards.

The use of bypass ducts to deliver conditioned supply air directly to the space conditioning system return duct is now prohibited, in order to eliminate wasting energy. The use of bypass ducts is relatively common only in space conditioning systems that alter the air flows delivered to separate spaces in houses, in order to keep some spaces warmer or cooler than other spaces. Bypass ducts allow conditioned air to be delivered directly to the return side of the system, thereby “bypassing” the delivery of this conditioned air to the house, which reduced the efficiency of the space conditioning system. Prohibiting bypass ducts will improve the effectiveness of the Standards by improving the operation performance of space conditioning systems, which will allow these systems to operate at the design efficiencies required by the Standards.

Subsection 150.0(n): The proposed regulations add water heater installation requirements to enable the cost-effective future installation of high efficiency water heaters; the requirements deal with electrical receptacle proximity, venting, drainage, and fuel supply pipe sizing. These new requirements improve the ability of homeowners to include high efficiency water heaters in replacement or retrofit projects, thereby helping to reduce the energy used for water heating systems.

Subsection 150.0(o): The proposed regulations disallow the use of continuously operating central forced air system fans to provide the whole building ventilation compliance option of the mechanical ventilation requirements. Restricting the delivery of outside air for ventilation purposes to technologies that can provide this function efficiently cost-effectively increases the stringency of the Standards, thereby minimizing the energy use of newly constructed residential buildings.

Mechanical ventilation system installations must now be field verified. Ensuring that outside air is being delivered for ventilation purposes according to the criteria in the Standards will improve code compliance.

Subsection 150.0(q): The proposed regulations add new requirements for the maximum conductive heat transfer (the heat that transfers through solid materials) allowed for fenestration products (windows, skylights, glass doors) separating conditioned space from unconditioned space. These new mandatory requirements will improve the ability of building officials to enforce the Standards; building officials will quickly learn that all windows in residential buildings must meet or fall below this heat transfer threshold.

Subsection 150.0(r): The proposed regulations require that buildings meet the solar-ready requirements in Subchapter 3, which will allow home- owners to install future solar systems more cost-effectively, which in turn will help minimize fossil-fuel use.

**h. SUBCHAPTER 8 -- LOW-RISE RESIDENTIAL BUILDINGS—
PERFORMANCE AND PRESCRIPTIVE COMPLIANCE
APPROACHES FOR NEWLY CONSTRUCTED BUILDINGS**

The proposed regulations modify this subchapter title, and the title of Section 150.1, to clarify that the performance and prescriptive compliance approaches described in this subchapter apply only to newly constructed buildings (as opposed to additions, alterations, and repairs, which are dealt with in Subchapter 9, discussed below).

SECTION 150.1

Subsection 150.1(a): The proposed regulations change the basis of all climate zones from metes and bounds to postal zip codes. Using a zip code basis rather than the metes and bounds used in previous Standards will make it easier for building owners and energy consultants to comply with, and for building officials to enforce, the Standards.

The proposed regulations also clarify that new buildings must comply with all mandatory measures as well as either the prescriptive or performance compliance approach. These clarifications will improve compliance with the Standards.

Subsection 150.1(b): The proposed regulations delete existing language that is extraneous and simplify the explanations of the energy budgets used in the performance approach.

Subsection 150.1(c): The proposed regulations remove alternative packages from the prescriptive compliance approach. It has been difficult for the Energy Commission to maintain equivalency among the existing multiple prescriptive packages; in addition, the *performance* compliance approach provides even greater flexibility for home owners and builders than does the existence of multiple packages in the prescriptive approach. Thus removing alternative packages will not decrease flexibility, but it will ensure greater consistency of energy performance.

The proposed regulations add roof deck insulation (insulation added either directly underneath or on top of the wood panels that are attached to the roof joists) to the list of measures required in the prescriptive compliance approach. The minimum amount and type of insulation for wood-framed walls required in the prescriptive compliance approach is increased for all climate zones. The prescriptive wall insulation requirements for wood-framed walls is now a specific R-value (which varied by climate zone) of cavity insulation (the insulation that fits between the wall studs), and a continuous insulation layer added to the exterior side of the wall frame. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of newly constructed residential buildings, which in turn improves the state's economic and environmental health.

The two parameters that govern the amount of heat that enters a house through its windows and glass doors are the U-factor and SHGC (solar heat gain coefficient). The U-factor is a measure of the conductive heat transfer, or the amount of heat that conducts through the solid materials that make up the window or glass door. The SHGC is a measure of how much heat from the sun's rays passes through the glass panes. Both of these fenestration product parameters now have more stringent requirements, thereby reducing the amount of heat gain through windows and glass doors, cost-effectively minimizing the energy use of residential buildings, which in turn improves the state's economic and environmental health.

The proposed regulations increase the minimum aged solar reflectance (the estimated solar reflectance of a specific roofing product after three years of operation) for low-sloped roofs that is required in the prescriptive compliance approach for climate zones 13 and 15 only. This requirement cost-effectively increases the stringency of the Standards, thereby minimizing the energy use of low-slope residential buildings in the hottest California climate zones.

The proposed regulations add more detailed explanations of the requirements for field verification, and remove language related to obsolete requirements or to requirements that are now mandatory rather than prescriptive. An exception is added to the insulation subsection, which explains that alternative wall, ceiling, roof or floor constructions may be allowed if they have been approved by the Energy Commission. These clarifications simplify the language, provide additional compliance flexibility, and provide more explanations for what is expected to verify the construction and installation of efficiency measures, thereby improving code compliance.

The installation of whole house fans (a fan, typically installed in the attic, that pulls cooler outside

air through open windows, into the house, and forces warmer air out through attic vents), inspecting the quality of the insulation installation, verifying the proper refrigerant charge within the space conditioning system, and verifying the mechanical ventilation system performance are all added to the list of measures required in the prescriptive compliance approach. These requirements cost-effectively increase the stringency of the Standards, thereby minimizing the energy use of newly constructed residential buildings, which in turn improves the state's economic and environmental health.

Requirements for water heating systems are added such that systems serving multiple dwelling units must be equipped with a demand control system, split the recirculation system into two loops, and provide a specified percentage of the annual water heating energy with a solar thermal system.

Electric resistance water heating systems serving single dwelling units may be installed only if gas service is unavailable and if installed they must be inside the building envelope and provide half of the annual water heating energy with a solar thermal system.

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

SECTION 150.2 – ENERGY EFFICIENCY STANDARDS FOR ADDITIONS AND ALTERATIONS IN EXISTING BUILDINGS THAT WILL BE LOW-RISE RESIDENTIAL OCCUPANCIES

Subsection 150.2(a): The proposed regulations clarify which portions of the mandatory and prescriptive requirements for *new* buildings apply to additions, and they add criteria that additions must meet in order to be exempted from these requirements.

The requirements for second water heaters installed in building additions are modified to be consistent with the applicable requirements for building alterations.

Subsection 150.2(b): The proposed regulations clarify which portions of the mandatory and prescriptive requirements for *new* buildings apply to alterations, and they add criteria that alterations must meet in order to be exempted from these requirements.

An exception to the replacement fenestration requirements is added, such that if an alteration project has a limited amount of glazing area with acceptable thermal and solar gain performance, then the alteration project does not need to meet the replacement fenestration requirements. This proposed language improves the effectiveness of the Standards by limiting code compliance to the areas of alteration projects where there are substantive energy efficiency improvements possible.

Modifications are made to require duct sealing in all climate zones (the current standards require duct sealing only in some of the climate zones). This requirement cost-effectively increases the stringency of the Standards, thereby minimizing the energy use of existing residential buildings.

The proposed regulations add explanatory language to clarify the requirements to provide and verify the proper amount of refrigerant in space-conditioning systems. Language is added that explains how non-standard space conditioning systems (systems other than ducted split system central air conditioners and ducted split system heat pumps) can comply with these refrigerant verification requirements, given that the verification tests included in the reference appendix will not work for non-standard systems. These clarifications will improve code compliance by providing the information necessary for all types of space conditioning systems to meet the Standards.

The performance compliance approach for alterations is modified to address the projects that include both additions and alterations. Based on stakeholder comments, the Energy Commission made changes to the performance compliance approach for additions and alterations to make it more consistent with the prescriptive compliance approach, and to make the performance compliance approach easier to implement.

3. The Green Building Standards (TITLE 24, PART 11)

The existing text in the energy efficiency divisions of the Part 11 voluntary appendices have been entirely replaced by proposed language that includes a performance standard and a limited number of prerequisites. The residential and nonresidential performance standards each include two levels (specified as “Tier I” and “Tier II”) of advanced energy efficiency compared to the requirements in Title 24, Part 6. The prerequisites are mandatory measures for every building meeting the advanced levels of energy efficiency specified in these voluntary performance standards. The proposed language introduces new requirements in the voluntary performance standards for additions and alteration projects. These changes improve the clarity and organization of the performance-based advanced energy efficiency standards and will be easier for local jurisdictions to adopt these voluntary measures as mandatory requirements in local building codes. This will minimize the energy use of buildings and make significant strides toward the state’s zero net energy building goals.

III. DOCUMENTS REFERENCED IN THE ENERGY EFFICIENCY REGULATIONS

All of these documents are in the record of the Energy Commission’s rulemaking proceeding on the proposed standards and are available to the public.

ALTERNATIVE CALCULATION METHOD (ACM) APPROVAL MANUALS FOR THE 2013 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

The Residential and Nonresidential Alternative Calculation Method (ACM) Approval Manuals are adopted by regulation to support the Standards in Part 6. The ACM Approval Manuals contain requirements that developers of computer software must meet for the Energy Commission to approve their software for showing compliance with the Standards.

The ACM Approval Manuals are extensively revised to improve their clarity and organization. The ACM Approval Manuals include the information needed by the computer software vendors to understand how their software will be tested, what compliance reports need to be generated by the software, how compliance software programs are certified and decertified by the Energy Commission and what needs to be included in the application package provided to the Energy Commission for software certification. The detailed descriptions of the algorithms and modeling procedures used by the Energy Commission in the reference methods that are the basis of comparison in the compliance software certification processes are now documented in new ACM Reference Manuals. Each building energy simulation test that is included in the compliance software certification process is also described in the ACM Reference Manuals. The Residential and Nonresidential ACM Reference Manuals are not adopted by regulation, under the authority of Public Resources Code section 25402.1, subd. (e). Rather, they are developed after the adoption of the Standards and approved by the Energy Commission for use as reference material for compliance software vendors and other interested parties. These ACM Reference Manuals act as guidance documents for the performance compliance approach, similar to the way that the Energy Commission’s Residential and Nonresidential Compliance Manuals are guidance documents for the prescriptive compliance approach.

The proposed regulations separate the certification rules for compliance software from the detailed explanations of the modeling assumptions used in the reference method used as the

comparative basis in the compliance software certification process. The compliance software certification requirements are published in the ACM Approval Manual and adopted by reference in these Standards. This proposal results in the modeling assumptions published in the ACM Reference Manual to be modified on a continuous basis as model related compliance issues arise during the implementation of the Standards. This improves the effectiveness of the performance compliance approach to the Standards.

2013 RESIDENTIAL ALTERNATIVE CALCULATION METHOD (ACM) APPROVAL MANUAL

The most significant change for the Residential ACM Approval Manual is the new requirement for all compliance software to include the Compliance Manager, software developed by the Energy Commission to perform the performance compliance calculations and produce the compliance reports. The Compliance Manager develops the standard building design and the proposed building design based on the proposed building, computes annual energy budgets for both designs and generates the compliance reports. Vendors interested in including the Compliance Manager into third-party compliance software must meet the criteria documented in the Residential ACM Approval Manual.

These proposed changes to the implementation of the performance compliance approach improve the effectiveness of the Standards by eliminating multiple interpretations to modeling the prescriptive requirements in each candidate building design.

2013 NONRESIDENTIAL ALTERNATIVE CALCULATION METHOD (ACM) APPROVAL MANUAL

The most significant changes to the Nonresidential ACM Approval Manual are those indicated above, where the certification processes and vendor requirements are organized into the ACM Approval Manual and the detailed modeling procedures of the reference method and the required certification tests are documented in the ACM Reference Manual.

These proposed changes to the implementation of the performance compliance approach improve the effectiveness of the Standards by facilitating ongoing updates to the reference method if needed to improve the software implementations of the performance compliance approach.

REFERENCE APPENDICES FOR THE 2013 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS

The proposed regulations update the Reference Appendices that are organized into three sections: the Joint Appendices, Residential Appendices, and the Nonresidential Appendices. The proposed regulations make the following changes to the Reference Appendices:

JOINT APPENDICES

JA1 – Glossary: The proposed regulations add, modify and delete terms to reflect the updated Standards language.

JA2 - Reference Weather/Climate Data: The proposed regulations replace the city and county climate zone lookup table with a city, county and zip code climate zone lookup table. Using a zip code basis to identify the climate zone appropriate for specific building locations will allow more precise applications of the climate-specific requirements in the Standards. The lookup table is now sorted by city, making it easier to use. The proposed regulations remove an explanation of a weather data format that is no longer used in the Standards.

JA3 - Time Dependent Valuation (TDV) Data: The proposed regulations update all Time

Dependent energy Valuation (TDV) data. TDV data is used in the performance compliance approach to incorporate the time-varying costs of energy into the energy budgets.

JA4 - U-factor, C-factor, and Thermal Mass Data: The proposed regulations add, modify and delete data to reflect the updated Standards language. JA4 is no longer used by either the residential or nonresidential compliance software so many of the existing entries are eliminated. Only the heat transfer data for assemblies relevant to the prescriptive compliance approach are now included in this appendix.

JA5 – Reference Design For Upgradeable Setback Thermostats: The proposed regulations add this appendix to support the new mandatory requirements for thermostats.

JA6 – HVAC Fault Detection and Diagnostic Technology: The proposed regulations expand this appendix to include both charge indicator display and saturation pressure measurement sensor specifications. The new title of this appendix reflects this scope expansion. The specifications for the Saturation Pressure Measurement Sensors (SPMS) are provided as a substitution for the existing refrigerant pressure diagnostic technology, such that a non-intrusive procedure for a HERS rater to access the refrigerant pressure measurements during the refrigerant charge verification procedure is available.

JA7 – Data Registry Requirements: The proposed regulations add this appendix to reflect updates to the Standards language. This appendix covers the roles and responsibilities of authorized registry users, document registration requirements, electronic and digital signature requirements, data exchange requirements, and data registry approval. This appendix provides explicit requirements for functional and technical features for HERS provider Data Registries and other data registries that provide document registration services to the public.

JA8 – Qualification Requirements for Residential Luminaires Using LED Light Sources: The proposed regulations modify this appendix to reflect the changes to the lighting Standards. This appendix title is changed to be consistent with nationally recognized terminology. Existing test protocols are replaced with references to nationally recognized test standards. Existing language from the mandatory and prescriptive code sections for residential lighting are relocated here to organize all qualification requirements into one reference appendix.

JA9 – Qualification Requirements for Low Leakage Air Handling Units: The proposed regulations add this appendix to reflect updates to the Standards language and to national test standards for low leakage air handlers.

RESIDENTIAL APPENDICES

RA1 – Special Case Residential Field Verification and Diagnostic Test Protocols: The proposed regulations replace the existing RA1 appendix with explanations of residential field test protocols to reflect updates to the Standards language. The HVAC sizing methodology is removed because it is relevant only as documentation of the residential ACM reference method and will therefore be documented in the Energy Commission’s Residential ACM Reference Manual. A new process for special case test protocol approval is documented. Field verification and diagnostic test protocols are added for measuring HVAC system refrigerant charge.

RA2 – Residential HERS Verification, Testing and Documentation Procedures: The proposed regulations modify this appendix for clarity and to reflect updates to the Standards language. References are added to the Compliance new JA7 for data registry requirements and the revised RA1 for special case verification protocols. Roles are explained for the documentation author, installing contractor and HERS rater in the document registration procedures.

RA3 – Residential Field Verification and Diagnostic Test Protocols: The proposed regulations modify this appendix to clarify existing test protocols and reflect updates to the

Standards language. Significant revisions are made to the refrigerant charge and quality insulation installation test protocols. The verified duct design compliance description and the duct surface area, R-value and leakage verification protocols are reorganized and rewritten for clarity. A reference to the new JA9 appendix is added for low leakage air handler testing. New field verification protocols are added for duct designs, air filter devices, zonally controlled HVAC systems and mechanical ventilation. Specifications are updated or added for sensor accuracy and response times, flow capture hood airflow measurements, digital revenue meter measurements and charge indicator display devices.

RA4 – Eligibility Criteria for Energy Efficiency Measures: The proposed regulations modify this appendix for clarity and the solar water heating system eligibility criteria are expanded.

RA5 – Interior Mass Capacity: The proposed regulations remove this entire appendix. Interior mass capacity is no longer used in the Standards as a performance metric that requirements are based on.

NONRESIDENTIAL APPENDICES

NA1 – Nonresidential HERS Required Verification, Testing and Documentation Procedures: The proposed regulations modify this appendix to reflect updates to the Standards language. The document registration procedures are updated and references to new appendices JA7 for registry requirements and RA1 for special case verification protocols are added.

NA2 – Nonresidential Field Verification and Diagnostic Test Procedures: The proposed regulations modify the duct leakage protocols in this appendix to improve clarity and enforceability.

NA3 - Fan Motor Efficiencies: The proposed regulations update the efficiency data in this appendix to reflect updates to the Standards language.

NA4 - Compliance Procedures for Relocatable Public School Buildings: The proposed regulations make no substantive changes to this appendix.

NA5 - Envelope Tradeoff Procedure: The proposed regulations remove this entire appendix to reflect updates to the Standards language. The envelope tradeoff procedure is no longer specified as a prescriptive compliance option for nonresidential buildings.

NA6 - Alternate Default Fenestration Procedure to Calculate Thermal Performance: The proposed regulations modify this appendix, including a new calculation for the default visual transmittance.

NA7 – Acceptance Requirements for Nonresidential Buildings: The proposed regulations modify this appendix to reflect updates to the Standards language. Construction inspection and functional testing requirements are added and expanded for HVAC, lighting and covered process equipment and controls.

NA8 - Luminaire Power: The proposed regulations modify this appendix and the title is changed to accurately represent the content. Many legacy technologies are deleted because they are no longer commonly used. Updates are made to the description of several technologies to reflect changes to these lamp and ballast combinations.

NA9 – Nonresidential Fault Detection and Diagnostics: The proposed regulations add this new appendix to reflect updates to the Standards language. This appendix describes the system requirements of air-cooled unitary direct-expansion equipment related to unit controls, including the fault detection capabilities required for this equipment type.

NA10 – Nonresidential Documentation procedures: The proposed regulations add this new appendix to reflect updates to the Standards language.

The updates to the reference appendices reflect the proposed changes to the language and clarify areas where there are known compliance issues. The proposed regulations update this common reference material for the Standards to maintain its effectiveness.

IV. TECHNICAL, THEORETICAL, AND EMPIRICAL STUDIES , REPORTS, AND SIMILAR DOCUMENTS RELIED UPON

All of these documents are in the record of the Energy Commission’s rulemaking proceeding on the proposed standards and are available to the public.

GENERAL

- Initial Study/Proposed Negative Declaration for the 2013 Building Energy efficiency Standards for Residential and Nonresidential Buildings
- Department of Finance Standard Form 399, Economic and Fiscal Impact Statement, to comply with Gov. Code sections 11346.3 and 11346.5
- Methodology for Determining the Statewide Impact of Title 24-2013 Nonresidential Standards (Memo), Architectural Energy Corporation, January 17, 2012
- Nonresidential Savings Projection (Spreadsheet), Architectural Energy Corporation, February 2, 2012
- Efficiency Measures included in Analysis of Retrofit Savings Impacts for 2013 Standards (Memo), Architectural Energy Corporation, January 4, 2012
- Retrofit Impact Analysis (Spreadsheet), Architectural Energy Corporation, December 27, 2011
- Residential Impact Analysis Version 3 (Spreadsheet), Ken Nittler, EnerComp, December 20, 2011

SUBCHAPTER 2

- CASE Initiative “Upgradeable Setback Thermostats”, October 2011
- CASE Initiative “Solar Ready Homes and Solar Oriented Development”, September 2011
- CASE Initiative “Cooling Tower Water Savings”, October 2011
- CASE Initiative “Nonresidential Solar-ready Buildings”, September 2011
- CASE Initiative “Outdoor Lighting and Controls”, October 2011
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V. CONSIDERATION OF REASONABLE ALTERNATIVES, INCLUDING THOSE THAT WOULD LESSEN ANY ADVERSE IMPACT ON SMALL BUSINESS

For more than thirty-five years, legislative enactments and state energy policies have directed the Energy Commission to adopt cost-effective building standards to improve energy efficiency and

thereby improve the state's economy, energy security, and environment. (See, e.g., Public Resources Code sections 25007 and 25402(a)(1), (a)(3), & (b)(3); 2007 Integrated Energy Policy Report.) At this time the Commission is not aware of alternatives to the proposed regulations that would be more effective than the proposed regulations in achieving the energy-efficiency goals of these directives, or that would be equally effective and have a lower adverse impact on small businesses (or any other economic interests), and which were considered but rejected. (See Gov. Code, § 11346.2, subd. (b)(5)). As described below, a number of alternatives to the initially developed regulations were considered and accepted as part of the mandatory pre-rulemaking public participation process. (See Public Resources Code § 25402, subd. (c)(2)).

Any alternatives that lessen any adverse economic impacts, but likewise do not achieve the energy savings of the proposed regulations, would not be a reasonable fulfillment of the Energy Commission's statutory obligations. As described in the Informative Digest section of the companion Notice of Proposed Action, and in the accompanying *Nine-Point Criteria Analysis of Proposed Building Standards of the California Energy Commission*, the energy savings anticipated from these measures are being counted on and are required in order to achieve the State's policy goals of reducing greenhouse gas emissions and having new buildings that require zero net energy. .

However, it is quite likely that during the course of the rulemaking, the Commission will receive comments that are helpful in improving the proposed standards. Moreover, during the initial, informal stage of the rulemaking process, the Commission conducted an extensive public process, considered many suggestions from stakeholders about (1) alternatives that could improve the feasibility of the Commission's preliminary versions of the proposed regulations or could reduce their adverse impacts; (2) the technical and cost-effectiveness analyses of those preliminary proposals; and (3) the language in those proposals.

Many of the measures in the proposed Standards were developed by the Codes and Standards Enhancement (CASE) Program of California's Investor-Owned Utilities, a statewide program that is funded with a surcharge on energy bills and that is dedicated to the advancement of California's building and appliance energy efficiency standards. In 2010 and 2011 CASE representatives held numerous meetings with building industry stakeholders to vet potential code updates, identify industry concerns, and resolve issues. In the spring of 2011, the Energy Commission began a series of 13 pre-rulemaking public workshops for all interested parties to build upon and continue this process.

During the Commission's pre-rulemaking workshops, which focused on the feasibility and cost effectiveness of potential revisions to the Standards, the Commission received a large number of comments. Based on the comments the Commission developed Preliminary Draft Standards and held two more public workshops to obtain public comment on those; in turn, many more comments were received and in response to them the Commission produced the proposed regulations that accompany this ISOR.

Thus in the pre-rulemaking process there has already been an extraordinarily detailed consideration of suggested alternatives, most of which have been incorporated into the proposed regulations in order to increase flexibility and reduce costs for the building industries. The following material summarizes the major suggestions and the Commission's responses, including changing the Preliminary Draft Standards to arrive at the language of the proposed regulations.

In response to comments from the home builder industry, the preliminary draft proposed residential prescriptive requirements were modified to reduce the expected construction costs of the proposed efficiency measures.

In response to comments from the National Electrical Manufacturer Association (NEMA) and other lighting control manufacturers, the preliminary draft proposals for lighting control device and lighting control application requirements, and lighting control credits, were changed to make these

requirements technology-neutral and consistent with current lighting design practices.

In response to comments from the lighting product manufacturers, the American Lighting Association, NEMA, lighting designers, and other stakeholders, the preliminary draft proposal to restrict the use of luminaires with medium screw base sockets in residential applications was rejected.

In response to comments from lighting retrofit companies, the lighting alteration threshold in the preliminary draft proposal, which required compliance with lighting power budgets and lighting control requirements in existing buildings, was relaxed. The resulting proposed regulations will better accommodate the current practices of the lighting retrofit market.

In response to comments from NEMA, lighting designers and other stakeholders, the preliminary draft proposal for multi-level lighting control requirements was significantly modified, resulting in proposed regulations that are more technologically feasible.

In response to comments from window manufacturers and fenestration industry members, the preliminary draft proposal for nonresidential fenestration visual transmittance requirements was rejected. As a result, the proposed regulations accompanying this ISOR have a lower visual transmittance requirement, and they also allow a prescriptive compliance option that is consistent with national fenestration design standards.

In response to comments from building officials, the proposed regulations include modifications to the administrative requirements governing a local building department's ability to document compliance with the Standards. The proposed regulations provide the building departments with greater flexibility to create and use their own compliance documentation processes for simple building projects, which will result in lower permitting costs to homeowners and businesses.

In response to comments from thermostat manufacturers and the utilities, the requirements and specifications for the Upgradeable Setback Thermostats (USTs) were substantially modified. These included changes to the specifications for the UST external ports, user interface, addressability, return from event randomization, and communication protocols.

In response to comments from the Air-conditioning, Heating and Refrigeration Institute (AHRI) and from boiler manufacturers, the preliminary draft proposal for commercial and process boilers has been revised to include an exception for high efficiency commercial boilers, so that this efficient equipment does not need to meet the requirement to limit stack gas oxygen concentration.

In response to comments from AHRI and from HVAC manufacturers, the preliminary draft proposal for variable speed operations in unitary direct expansion equipment was rejected. The revised requirements for unitary direct expansion equipment can be met by all major equipment manufacturers, and they conform to proposed federal ASHRAE standards on the efficiency of this type of equipment.

In response to comments from the California Occupational Safety and Health Agency, the preliminary proposals for demand-controlled ventilation in laboratories, commercial kitchens, and parking garages were modified. These modifications improve the sensor redundancy, sensor location, sensor calibration, and sensor installation verification requirements in the standards, which will save energy and protect occupant health and safety.

In response to comments from the roofing industry, the preliminary draft's cool roof proposal was modified. The revised requirements for cool roofs are now applicable to a broader range of currently-available roofing products. The revised requirements also provide a prescriptive alternative for roof replacement projects that allows roof insulation to be installed instead of cool roofing materials, which will increase builder flexibility and thereby lower costs.

In response to comments from the solar industry, the home building industry, and building officials, the preliminary draft's mandatory requirements for solar-ready buildings was substantially modified. The revised requirements for solar-ready buildings allow greater flexibility in potential locations for future solar equipment. The revised requirements also provide additional exceptions for building sites that may not have adequate solar access.

In response to comments from building officials and the home builder industry, the preliminary draft's proposal to limit the length of hot water piping from the water heater to plumbing fixtures was modified, so that the requirements are easier to comply with and easier to verify during building inspections.

In response to comments from an electronic air filter manufacturer, the original proposal for a maximum air filter pressure drop requirement was eliminated, to allow more flexibility in system designs.

In response to comments from the HERS field verification and diagnostic testing industry, installation of Saturation Pressure Measurement Sensors (SPMS – sensing devices that measure the saturation pressure of the refrigerant used in space conditioning systems) was changed from a prescriptive requirement in the preliminary proposal, to an alternative in the proposed regulation that uses digital gages (mechanical devices that measure liquid pressure) in the space conditioning system refrigerant verification tests. This provides more flexibility to HERS raters when they complete the refrigerant charge verification procedures.

In response to HVAC industry comments expressing concern with the preliminary draft's protocol requiring that tests to verifying the proper amount of refrigerant within space conditioning systems be performed at outdoor temperatures of less than the manufacturer's recommended minimum temperature, the proposed regulations make this protocol available for use on a case-by-case basis, contingent upon a manufacturer's approval of the use of the protocol for its equipment.

In response to comments from commercial refrigeration system designers, supermarket engineers, and the U.S. Environmental Protection Agency, the preliminary draft's proposal that the *voluntary Green Building Standards* (Title 24, Part 11) limit CO₂ emissions from specified refrigeration systems (by requiring secondary CO₂ systems, which use CO₂ for refrigerant rather than other typical refrigerants that have high greenhouse gas emission characteristics) was rejected. These commenters urged the Commission to develop a comprehensive performance compliance approach to meet refrigeration system efficiency requirements, rather than specifying prescriptive requirements (such as for secondary CO₂ systems) that limit design flexibility and product choice. The Energy Commission plans to propose such an approach for the 2017 Standards update.

VI. FACTS, EVIDENCE, DOCUMENTS, TESTIMONY, OR OTHER EVIDENCE OF NO SIGNIFICANT ADVERSE IMPACT ON BUSINESS

The discussion in the immediately preceding Section V., on the consideration of alternatives, demonstrates that the Commission has already made extensive changes in preliminary versions of the proposed regulations in order to reduce impacts on businesses, especially small businesses. (See Gov. Code, § 11346.2, subd. (b)(6).) Of course, the proposed regulations will still increase the costs of construction – but those costs will generally be passed on to the people who purchase and own buildings. Furthermore, as is required by law, the people who ultimately pay the increased costs of construction – building purchasers and owners -- will save substantially *more* money on their energy bills. For owners and operators of commercial buildings, those savings will translate directly into increased profits (or expanded business operations, which in turn will create more jobs). In addition, businesses that provide energy efficiency products and services associated with the Standards' requirements will have sales and

service opportunities. Thus the proposed regulations are likely to result in the creation of new jobs and an increase in California business competitiveness.

VII. DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS

The proposed revisions to the Standards do not duplicate or conflict with any federal regulations. (See Gov. Code, 11346.2, subd. (b)(7)). There are no federal regulations that prescribe building standards for non-federal buildings.