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SEIA CALSSA Title 24 Energy Code Compliance Manual Comments

Additional submitted attachment is included below.

August 3, 2018

Commissioner Andrew McAllister
Payam Bozorgchami and Energy Commission Staff
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Dockets 18-BSTD-02: 2019 Energy Code Compliance Manuals and Documents

Dear Commissioner McAllister, Mr. Bozorgchami and staff,

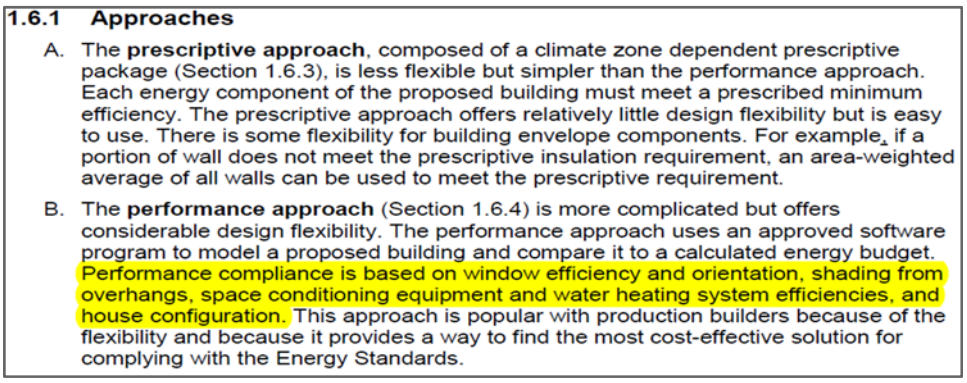
The Solar Energy Industries Association (SEIA®) and the California Solar & Storage Association (CALSSA) sincerely appreciate the efforts of the California Energy Commission (Commission) to collaborate with industry and stakeholders on carrying through the adoption of the Building Energy Efficiency Standards to the 2019 Energy Code Compliance Manuals and related documents. As we have through this process, SEIA and CALSSA are submitting joint comments and thank the Commission for the opportunity to provide input and guidance to the Commission.

The following comments are for the Draft Compliance Manual for residential applications.

A. Chapter 1, Introduction

1) Section 1.6.1 Approaches, item B

In this section and throughout the entire manual (such as in Chapter 2, on page 1; Section 2.2.2 on pages 4 and 5; Section 2.2.6 on page 7; Section 2.4.3 on page 20; and Section 2.4.4 on page 21;), there are listed examples of performance compliance options. We would like to suggest that solar PV, solar thermal, battery storage systems and / or community shared solar are added as examples. Please see the referenced excerpt following:



1.6.1 Approaches

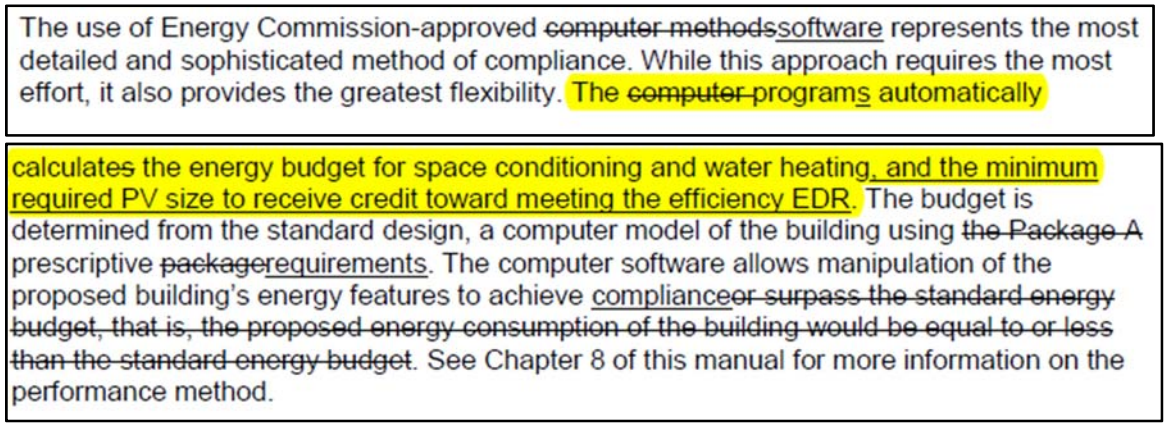
A. The **prescriptive approach**, composed of a climate zone dependent prescriptive package (Section 1.6.3), is less flexible but simpler than the performance approach. Each energy component of the proposed building must meet a prescribed minimum efficiency. The prescriptive approach offers relatively little design flexibility but is easy to use. There is some flexibility for building envelope components. For example, if a portion of wall does not meet the prescriptive insulation requirement, an area-weighted average of all walls can be used to meet the prescriptive requirement.

B. The **performance approach** (Section 1.6.4) is more complicated but offers considerable design flexibility. The performance approach uses an approved software program to model a proposed building and compare it to a calculated energy budget. Performance compliance is based on window efficiency and orientation, shading from overhangs, space conditioning equipment and water heating system efficiencies, and house configuration. This approach is popular with production builders because of the flexibility and because it provides a way to find the most cost-effective solution for complying with the Energy Standards.

This sentence could be rephrased to: "Performance compliance is based on window efficiency and orientation, shading from overhangs, space conditioning equipment and water heating system efficiencies (including solar thermal), PV system, battery storage and house configuration."

2) Section 1.6.4, page 19 Performance Approach

These paragraphs describe the automatic calculations necessary to calculate the efficiency EDR.



The use of Energy Commission-approved ~~computer methods~~software represents the most detailed and sophisticated method of compliance. While this approach requires the most effort, it also provides the greatest flexibility. The ~~computer~~ programs automatically calculates the energy budget for space conditioning and water heating, and the minimum required PV size to receive credit toward meeting the efficiency EDR. The budget is determined from the standard design, a computer model of the building using ~~the Package A~~ prescriptive ~~package~~requirements. The computer software allows manipulation of the proposed building's energy features to achieve compliance~~or surpass the standard energy budget, that is, the proposed energy consumption of the building would be equal to or less than the standard energy budget~~. See Chapter 8 of this manual for more information on the performance method.

We would propose the following new wording for the highlighted text: "The ~~computer~~ programs shall automatically calculate~~s~~ the energy budget for space conditioning and water heating, and the minimum required PV **system** size to receive credit toward meeting the efficiency EDR requirement."

B. Chapter 5, Section 5.9 Solar Water Heating

We would like to suggest a new example with a Question/Answer section for Solar Water Heating as follows. Please note that this will then require the existing examples number 5-12 and 5-13 on page 49 be renumbered to 5-13 and 5-14 respectively.

New Example 5-12 - Solar Water Heating

Question:

Can you clarify the continued role of solar water heating in the updated standards?

Answer:

Solar thermal technologies continue to meet the compliance requirements for water heating

in the 2019 Standards, just as they did in the 2016 and 2013 Building Energy Efficiency Standards. For multi-family buildings with central water heating, solar water heating remains a prescriptive measure for all climate zones and provides at minimum:

- 20% Solar Savings Fraction for zones 1-9
- 35% Solar Savings Fraction for zones 10-16

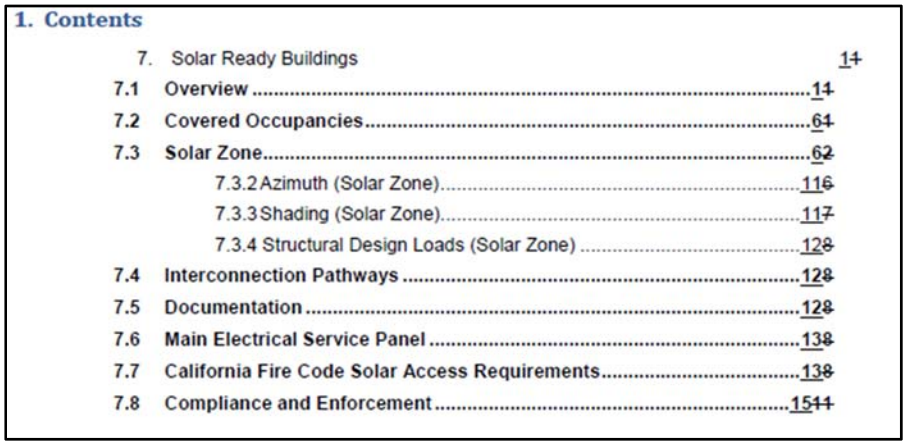
In practice the Solar Savings Fraction achieved can be far higher for buildings and note that any Solar Savings Fraction above the minimum prescriptive amount will still contribute additional credit in performance model calculation. Because solar water heating is a prescriptive measure, it is included in the standard building calculation for the energy code performance method; meaning that every multi-family building with central water heating must either have solar thermal or make up the difference with another measure. Therefore, solar water heating is an attractive, effective measure for new buildings.

C. Chapter 7, Photovoltaic, Battery Storage and Solar Ready Buildings

We recognize that the Commission is still working on a comprehensive revision of this section and would like to include the following as consideration to that work.

1) Overall structure of Chapter 7

While the entire Chapter 7 is under development by the Commission staff, we would like to suggest that the order of covered topics within the chapter are revised to facilitate its use. For instance, the Commission might consider reordering the table of contents to mirror how the different items are considered during design development. [For example, Documentation could precede Compliance and Enforcement. We can provide more guidance once the revised Chapter 7 is available; we also plan to submit technical comments on the substantive content.



1. Contents

2) Section 7.8 on page 7-13 for California Fire Code Solar Access Requirements

The wording in this section has been deleted in this draft version of the chapter; however, the diagrams for rooftop access pathways and fire setbacks remain and should be updated as a result of the 2016 Intervening Code Cycle Supplement adoption into the 2016 California Codes. The requirements are in the 2016 California Residential Code for one- and two-family dwellings (pp. 111-112) and the 2016 California Fire Code (pp. 107-109) for commercial and multi-family buildings. Further, the diagrams should either be moved into Section 7.8 Solar Zone or retained as a new section

7.9 with the original title (thus requiring renumbering of subsequent sections if the current section order is retained).

~~7.8 California Fire Code Solar Access Requirements~~

~~Under regulations established by the Office of the State Fire Marshal, the 2016 version of Parts 2, 2.5, and 9 of Title 24 include requirements for the installation of rooftop solar photovoltaic systems. These regulations cover the marking, location of DC conductors, and access and pathways for photovoltaic systems. They apply to residential and nonresidential buildings regbulated by Title 24 of the California Building Standards Codes. Provided below is a brief summary of the fire code requirements for residential buildings.~~

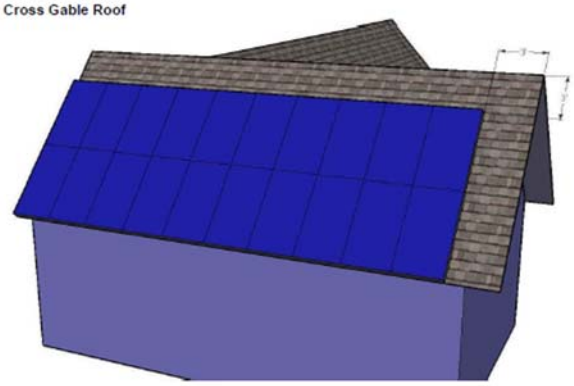
~~PV arrays shall not have dimensions in either axis greater than 150 feet. Residential buildings with hip, ridge/valley roof features shall provide a 3-foot access pathway away from applicable eave to hip/ridge/valley features. To provide adequate smoke ventilation, PV arrays shall not be located higher than 3 feet below the ridge. Builders shall refer directly to the relevant sections of Title 24 (most currently Part 2: Section 3111, Part 2.5 Section R331, and Part 9 Section 903.3) for detailed requirements.~~

~~In addition to the requirements in the fire code, the California Department of Forestry and Fire Protection – Office of the State Fire Marshal (CAL FIRE-OSFM), local fire departments (FD), and the solar photovoltaic industry previously developed a *Solar Photovoltaic Installation Guideline* to increase public safety for all structures equipped with solar photovoltaic systems. The intent of this guideline is to provide the solar photovoltaic industry with information that will aid in the designing, building, and installation of solar photovoltaic systems in a manner that should meet the objectives of both the solar photovoltaic industry and the requirements now set forth in the California Fire Code.~~

~~The entire Solar Photovoltaic Installation Guideline can be accessed at http://osfm.fire.ca.gov/pdf/reports/solarphotovoltaicguideline.pdf~~

Figure 7-1: The following illustrations demonstrate some acceptable solar access techniques.

Cross Gable Roof



D. Chapter 8, Performance Method

1) Section 8.2.1, Determining Compliance

The first sentence defining the efficiency EDR does not clarify that solar thermal can still be included but not solar electric generation. The second sentence defining the total EDR could also use some additional clarification.

8.2.1 Determining Compliance

Compliance requires meeting two different criteria:

- Proposed efficiency EDR must be equal or less than standard efficiency EDR, and
- Final EDR (efficiency, PV, battery storage) must be equal or less than final standard EDR.

The efficiency EDR is the building's efficiency without the effects of any solar generation. The total EDR includes the effects of solar generation and any battery storage. This means the building must be energy efficient and it must generate enough energy to offset the electricity used to operate the building.

We would like clarification as to the definition of "Final EDR" vs. "Total EDR" or if they are equivalent in meaning. Total EDR is used through this chapter.

We suggest the following revision to the second paragraph: *"The efficiency EDR is the building's efficiency including the effects of solar thermal DHW systems but without the effects of solar electric generation. The total EDR includes the efficiency EDR and adds the effects of both solar electric generation and any battery storage. This means the building must be energy efficient and it must generate enough energy to offset the electricity used."*

2) Section 8.2.2, Major Changes Affecting Standard Efficiency

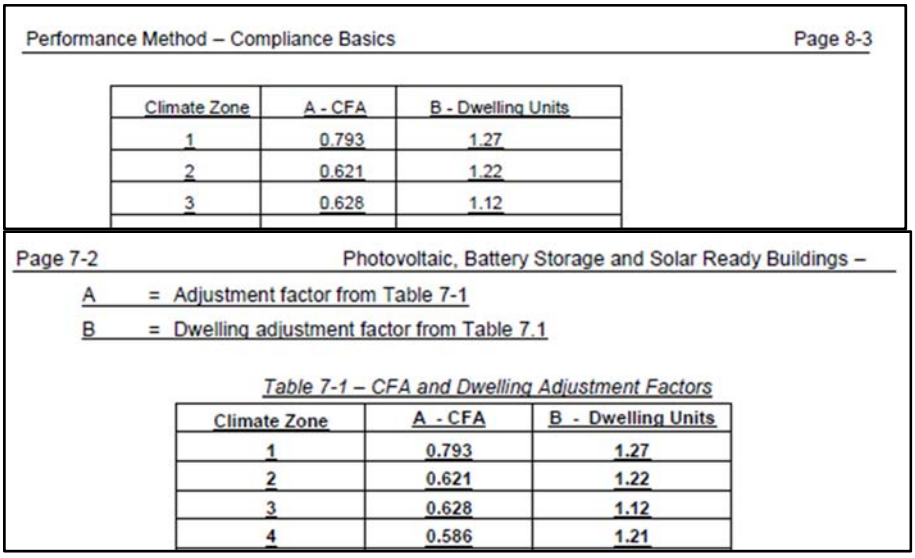
8.2.2 Major Changes Affecting Standard Efficiency

As stated below, the standard design efficiency is based on prescriptive requirements. Two major changes to the standards are quality insulation installation (QII) and solar generation. Although these features are not mandatory, a building without QII and solar electric generation will be much more difficult to achieve compliance.

We like to suggest the following changes: "*... are quality insulation installation (QII) and solar electric generation. For designs that utilize the exceptions path, compliance will be much more difficult to*

achieve for a building without QII and solar electric generation."

The table header 150.1-C is missing from page 8-3; however, this table is repeated in Chapter 7 and titled Table 7-1 – CFA and Dwelling Adjustment Factors; we ask for clarification on the correct table heading title in both chapters 7 and 8.



Performance Method – Compliance Basics Page 8-3

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12

Page 7-2 Photovoltaic, Battery Storage and Solar Ready Buildings –

A = Adjustment factor from Table 7-1

B = Dwelling adjustment factor from Table 7.1

Table 7-1 – CFA and Dwelling Adjustment Factors

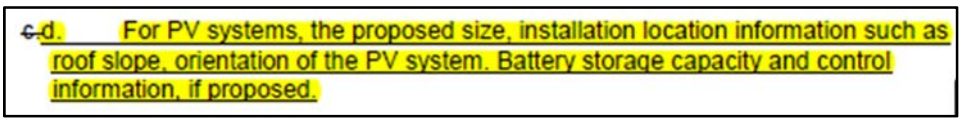
Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21

3) Section 8.3, Compliance Basics

Several subsections are misnumbered:

- 8.2.1 Compliance Process should be 8.3.1
- 8.2.2 Defining the Standard Efficiency should be 8.3.2
- 8.2.2.1 Standard Reports should be 8.3.2.1
- 8.2.3 Professional Judgment should be 8.3.3

For the subsection that should be numbered as 8.3.1d, on page 8-4, which is as follows:



~~c.~~d. For PV systems, the proposed size, installation location information such as roof slope, orientation of the PV system. Battery storage capacity and control information, if proposed.

We would like to request clarification as to how the PV system specifications will be used with the software. It would be helpful to further describe in more detail what are the related inputs into the software.

We suggest that the second sentence is revised to: *"If battery storage is proposed, the battery and control information should be described."*

For the subsection that should be numbered as 8.3.2, Defining the Standard Efficiency on page 8-5, the first full paragraph, the last sentence is as follows:

It is important to note the details of how the standard efficiency is determined. Deviations from the prescriptive requirements will be reflected in the compliance margin. For example, if the prescriptive requirements from Table 150.1-A or B include roof deck insulation in Option B for the applicable climate zone, and the proposed building is modeled without roof deck insulation, it will have a significant effect on the attic temperature and therefore receive a compliance penalty. (NOTE: if using prescriptive compliance, a roof with no roof deck insulation would require ducts inside the conditioned space.) In 2019, the standard efficiency includes QII and solar generated electricity. If not included in the proposed efficiency, compliance will be much more difficult to achieve.

We recommend the following revision: "*In 2019, the standard efficiency includes QII and solar electric generation. For designs that utilize the exceptions path, compliance will be much more difficult to achieve for a building without QII and solar electric generation.*"

Farther down page 8-5, the following paragraph could be clarified:

For multifamily buildings, when a central water heating system is proposed, the standard design is based on §150.1(c)8B, which specifies specific criteria for the recirculation system, and a minimum solar fraction that varies by climate zone, as well as whether a drain water heat recovery system is installed.

We recommend the following revision: "*...which specific the criteria for the recirculation …" and "...a minimum solar fraction (solar thermal DHW) that varies…".*

4) Section 8.5 Multifamily Buildings

a) Several subsections under Section 8.5 are misnumbered:

- Section 8.2.1 Whole Building Compliance Approach should be 8.5.1
- Section 8.2.2 Unit-by-Unit Compliance Approach - Fixed Orientation Alternative should be 8.5.2
- Section 8.2.3 Unit-by-Unit Compliance Approach - Multiple Orientation Alternative should be 8.5.3

b) We would like to suggest that a new Question / Answer example be included for the following question. We would be available to discuss further with the Commission staff.

How would compliance be achieved on 1) a unit-by-unit and 2) an individual unit compliance basis for solar and battery storage?

c) Section 8.2.3 (should be 8.5.3): We would like some clarification regarding how many models must be constructed to show the worst-case scenario still complies.

5) Section 8.6 Subdivisions and Master Plan, Page 8-11

a) Several subsections under Section 8.6 are misnumbered:

- Section 8.1.1 Individual Building Approach should be 8.6.1
- Section 8.2.1 Multiple Orientation Alternative: No Orientation Restrictions should be 8.6.2

b) We would like to suggest that a new Question / Answer example be included for the

following question. We would be available to discuss further with the Commission staff.

How would compliance be achieved using the four cardinal orientations when PV layouts are variable by orientation and reverse plans?

SEIA AND CALSSA have long supported the standards development and revision work to continue California as far along the journey to Zero Net Energy, and even Zero Carbon, for new homes and new buildings while optimizing the builders' and developers' opportunities to achieve the most cost-effective energy reductions. These pursuits will help meet the CEC's and the state's energy efficiency and renewable energy generation goals and contribute greatly towards California's clear leadership position in the pursuit of decarbonization of our great state.

We look forward to actively working with the Commission on the continuing efforts to improve the standards in the next development phase; particularly addressing high-rise residential and commercial buildings with similar opportunities for solar PV and thermal in new/revised requirements. SEIA and CALSSA would like to thank the Energy Commission staff on their continued effort to collaborate with industry and all the stakeholders in this process and applaud its commitment. We strongly believe that solar and storage will continue to play a positive and critical role in the building design and building standards compliance.

Sincerely,

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