October 18, 2021

RE: Comments on 45-day Language for California's 2022 Building Code, Residential Code, and Fire Code

Dear California Building Standards Commission and State Proposing Agencies:

Thank you for the opportunity to provide comments on the 45-day language for the 2022 California Building Standards Code, specifically the Building Code, Residential Code, and Fire Code. Overall, we commend the Office of the State Fire Marshal in tracking proceedings for the 2024 International Fire Code and proposing provisions of that model code for adoption in California. However, we have concerns and suggestions regarding the proposed sections, specifically on roof assemblies, energy storage systems on properties of one- and two-family dwellings, elevated PV support structures, and more. Our suggestions are on the following pages.

Sincerely,

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California Building Code

Elevated PV support structures

RECOMMENDATION: For the California Building Code, we support the new section on Elevated PV Support Structures – and the associated new definitions – as Proposal G193-21 was approved As Submitted during the live ICC Group A Public Comment Hearings by near-unanimous vote (pending Online Governmental Consensus Vote).

Chapter 15 Requirements and the "Solar Roadmap" in Section 3111

For both the International Building Code (IBC) and the International Residential Code (IRC) as national model codes, the solar industry has worked to create "solar road maps." In the IBC, the "solar road map" is in Section 3111. In the IRC, the "solar road map" is in Section R324.

In both of these national model codes, the solar industry has deliberately left the topic of fire classification in the roofing chapters, where it belongs with other issues of fire classification for roofing systems and rooftop-mounted systems. Therefore, fire classification for rooftop-mounted photovoltaic panel systems is in IBC Chapter 15, and in IRC Chapter 9. The solar road maps include pointers to the sections that apply in these chapters.

All other requirements are either included in the solar road maps, or are referenced by pointers to other relevant sections of the model codes. In turn, IRC Section R907.1 includes a pointer back to the solar road map in Section R324.

Note that to solve a specific problem, it took us three cycles to remove structural PV requirements from IBC Chapter 15. The problem was that individual subsections of Chapter 15 are assigned to the Structural Committee and other sections of Chapter 15 to the IBC-Fire Safety Committee. We were experiencing confusion when the Structural Committee was asked to vote on fire provisions, and the IBC-FS was asked to vote on structural provisions. Our general request is to follow the 2021 model codes on these topics, rather than the prior version of the California codes.

GENERAL RECOMMENDATIONS for PV topics in the California Building Code:

In general, we have these specific requests:

1. Include references to correct UL standards, including correction of mistakes in the IBC model code in Chapter 15.
    a. For BIPV roof covering systems only, reference UL 7103 only in Sections (Including strike-outs of cross-references to these specific sections in the Referenced Standards Chapter 35 for UL standards referenced in error.)
    b. For PV panels or modules, reference "… with UL 1703 or with both UL 61730-1 and 61730-2"
    c. For rooftop-mounted PV panel systems, reference UL 2703 for fire classification only
2. In the California Building Code, maintain and improve Section 3111 as "the solar road map."
3. Remove redundant UL standards pointers that already exist in Section 3111.
4. Remove structural engineering requirements from Chapter 15.
5. For structural concerns, Section 3111.1 should point to Chapter 16 only, not Chapter 15. Chapter 16 can in turn have pointers to ASCE 7.
6. However, it is questionable whether Chapter 16 should have pointers to specific subsections within ASCE 7. We understand ICC staff and the ICC Correlating Committee can update pointers within an ICC model code as the section numbers are sometimes revised/updated each code cycle. However, If section numbers are revised/updated in ASCE 7, then ICC staff will not automatically update references to an external referenced standard.

RECOMMENDATION: Strike out all of the following, as it is incorrect and redundant with Section 3111.3.1, and structural requirements for PV should be removed from Chapter 15:

1. The section title is PV panel systems
2. The referenced standards are intended to apply to PV panels and modules
3. The UL 7103 standard is for BIPV roof coverings, not PV panels and modules
4. Portions of the charging language are redundant with R324 and not needed
5. If DSA-SS and DSA-SS/CC desire pointers to ASCE 7, those pointers should be in appropriate sections of Chapter 16.
6. The "Solar Roadmap" in Section 3111 already points to Chapter 16.
7. ASCE 7 Section 13.6.12 applies only to rooftop-mounted PV systems that are both ballasted and unattached, not to all rooftop-mounted PV systems.
8. We recommend complete strike-out of all language in this section.

(Formerly 1510.7.2) ***[DSA-SS, DSA-SS/CC] 1511.9 Photovoltaic (PV) panel systems.*** *Rooftop-mounted photovoltaic panels and modules shall be listed and labeled in accordance with UL 7103 or with both UL 61730-1 and UL 61730-2 and shall be installed in accordance with the manufacturer's instructions.*

~~1510.7.2.1~~ 1511.9.1 Installation. *Supports and attachments of photovoltaic panels to the roof structure, the panels, modules and components shall be designed for applied loads per this code, and shall comply with industry standards determined applicable by the enforcement agency. Seismic design requirements shall be determined from ASCE 7 Section 13.6.12. Wind design pressures shall be determined from ASCE 7 Section 29.4.3 or 29.4.4 using effective wind area per ASCE 7 Section 26.2. Calculations and drawings of the supports and attachments shall be submitted to the enforcement agency for review.*

RECOMMENDATION: Revise as follows (to correct mistake in the model code):

1507.16.6 Material standards.
Photovoltaic shingles shall be listed and labeled in accordance with UL 7103 ~~or with both UL 61730-1 and UL 61730-2~~.

RECOMMENDATION: Revise as follows (to correct mistake in the model code):

1507.17.5 Material standards.
~~BIPV roof panels~~ *BIPV roof panels* shall be ~~listed~~ *listed* and labeled in accordance with UL 7103 ~~or with both UL 61730-1 and UL 61730-2~~.

RECOMMENDATION: Strike out all of Section 1512, as it is redundant with Section 3111.3 (This section was removed from the model code):

~~SECTION 1512~~
~~PHOTOVOLTAIC PANELS AND MODULES~~

~~1512.1 Photovoltaic panels and modules.~~
~~Photovoltaic panels and modules installed on a roof or as an integral part of a roof assembly shall comply with the requirements of this code (see Section 3111) and the California Fire Code.~~

RECOMMENDATION: Revise as follows, to keep 1:12 maximum roof slope, and to clarify that these provisions apply only to ballasted, unattached PV systems; retain the first sentence of the proposed strike-out:

1613*A*.3 Ballasted photovoltaic panel systems. Ballasted, roof-mounted photovoltaic panel systems need not be rigidly attached to the roof or supporting structure. Ballasted, unattached *photovoltaic panel systems* shall be designed and installed only on roofs with slopes not more than one unit vertical in 12 units horizontal. ~~Ballasted non-penetrating systems shall be designed and installed only on roofs with slopes not more~~

~~than one unit vertical in 12 units horizontal. Ballasted nonpenetrating systems shall be designed to resist sliding and uplift resulting from lateral and vertical forces as required by Section 1605A, using a coefficient of friction determined by acceptable engineering principles. In structures assigned to Seismic Design Category C, D, E or F, ballasted nonpenetrating systems shall be designed to accommodate seismic displacement determined by nonlinear response history analysis or shake-table testing, using input motions consistent with ASCE 7 lateral and vertical seismic forces for nonstructural components on roofs.~~

~~Exception:~~ [DSA-SS] *Ballasted, unattached roof-mounted photovoltaic panel systems shall comply with ASCE 7 Section 13.6.12.*

RECOMMENDATION: Revise as follows, to strike out pointer to Section 1512 (Section 1512 should be deleted; the reference to Section 1512 should be deleted):

3111.3 Photovoltaic solar energy systems.
[DSA-SS, DSA-SS/CC, HCD-1, and HCD-2] Photovoltaic solar energy systems shall be designed and installed in accordance with this section, the California Fire Code, California Electrical Code, and the manufacturer's installation instructions ~~and Section 1512 of this code~~.

ENERGY STORAGE SYSTEMS in the California Building Code:
Fire window assemblies for energy storage system enclosures

Proposing State Agency: Office of the State Fire Marshal
Code: CA Building Code
Item: 7-7

The proposed language strikes out: "716.3.2.1.1.1 Energy storage system separation. Fire-protection-rated glazing is not permitted for use in fire window assemblies in fire barriers required by Section 1206 of the California Fire Code to enclose energy storage systems."

We would appreciate having a discussion with the State Fire Marshal's office on the intention of deleting this section and the opportunity to propose modifications if appropriate. Striking through language that prohibits fire-protection-rated glazing would make the code more lenient. However, the rationale in the ISOR implies that the code change would tighten the standards due to the alleged need to prevent radiant heat flow.

California Residential Code

Chapter 9 Requirements and the "Solar Roadmap" in Section R324

GENERAL RECOMMENDATIONS for PV topics in the California Residential Code:

In general, we have these specific requests:

1. Include references to correct UL standards:
   a. For BIPV roof covering systems only, reference UL 7103 only (not 61730-1 or 61730-2) in Sections R905.16.4 and R905.17.5.
   b. Referenced Standards Chapter 44 for the UL 61730-1 and 61730-2 standards should not include references to R905.16.4 or R905.17.5, as these sections are cross-referenced in error.
   c. For PV panels or modules, reference "… with UL 1703 or with both UL 61730-1 and 61730-2"
   d. For rooftop-mounted PV panel systems, reference UL 2703 for fire classification only
2. In the California Residential Code, maintain and improve Section R324 as "the solar road map."
3. Remove redundant UL standards pointers that already exist in Section R324.
4. Remove redundant code requirements from Chapter 9 that already exist in Section R324.

RECOMMENDATION: Keep Section R902.4, but strike out new sentence "Listed systems shall be installed in accordance with the manufacturer's installation instructions and their listing." as it is redundant with Section R324.3:

Proposed language by SFM – R902.4

R902.4 Rooftop-mounted photovoltaic *(PV)* panel systems. Rooftop-mounted photovoltaic *(PV)* panel systems installed on or above the roof covering shall be tested, listed and identified with a fire classification in accordance with UL 2703. *Listed systems shall be installed in accordance with the manufacturer's installation instructions and their listing.* Class A, B or C photovoltaic panel systems and modules shall be installed ~~*areas designated by this section,*~~ in jurisdictions designated by law as requiring their use or where the edge of the roof is less than 3 feet (914 mm) from a lot line.

RECOMMENDATION: Keep Heading Section R907 and Section R907.1 only, as a pointer to the "solar road map" in Section R324 – as in the model code. Do not move existing amendments from R918; strike them out:

Proposed language by SFM – R907

Item 9-3

Chapter 9, Roof Assemblies

[The SFM proposes to move existing amendments from R918 for Rooftop mounted photovoltaic panel systems to the appropriate section R907.]

R907.1 Rooftop-mounted photovoltaic *(PV)* panel systems. Rooftop-mounted photovoltaic panel systems shall be designed and installed in accordance with this section, Section R324 and ~~NFPA 70~~ *the California Electrical Code*.

RECOMMENDATION: Strike all of Section R907.2, as it is redundant with Section R902.4:

R907.2 Fire classification. *Rooftop-mounted photovoltaic panel systems shall have the fire classification as required by Section R902.4.*

~~***R918.1.3 Fire classification.*** *Rooftop-mounted photovoltaic panels and modules shall have the fire classification as required by Section R902.4.*~~

RECOMMENDATION: Strike all of Section R907.3, as it is redundant with Section R324.3:

R907.3 Installation. *Rooftop-mounted photovoltaic panel systems shall be installed in accordance with the manufacturer's installation instructions.*

~~***R918.1.4 Installation.*** *Rooftop-mounted photovoltaic systems shall be installed in accordance with the manufacturer's installation instructions.*~~

RECOMMENDATION: Strike all of Section R907.4:

1. The section title indicates "panels and modules."
2. UL 2703 is not a mandatory standard for PV panels systems.
3. For rooftop-mounted PV panel systems, a fire classification is required according to UL 2703.
4. Reference to manufacturer's installation instructions is redundant with Section R324.3.

R907.4 Photovoltaic panels and modules. *Photovoltaic panel systems mounted on top of a roof shall be listed and labeled in accordance with UL 2703 and shall be installed in accordance with the manufacturer's installation instructions.*

~~***R918.1.5 Photovoltaic panels and modules.*** *Photovoltaic panels and modules mounted on top of a roof shall be listed and labeled in accordance with UL 1703 and shall be installed in accordance with the manufacturer's installation instructions.*~~

RECOMMENDATION: Strike all of Section R907.5, as it is redundant with Section R324, and the California Residential Code should not be further dependent on the California Fire Code:

R907.5 Fire safety provisions for photovoltaic panels systems. *Solar photovoltaic panel systems installed upon a roof or as an integral part of a roof assembly shall comply with the requirements of this code and the California Fire Code.*

~~***R918.1.6 Fire safety provisions for photovoltaic panels/ modules.*** *Solar photovoltaic panels/modules installed upon a roof or as an integral part of a roof assembly shall comply with the requirements of this code (see Section R224) and the California Fire Code.*~~

Section R328 on energy storage systems

Proposing State Agency: Office of the State Fire Marshal
Code: CA Residential Code
Item: 3-8

The proposed language for section R328.7 states, "ESS installed in group R-3 and townhomes shall comply with the following." The State Fire Marshal's office should consider whether this charging language is needed and appropriate. R-3 is an occupancy classification used in the building code, not the residential code. If the State Fire Marshal's office believes charging language is appropriate, we suggest changing the language to "ESS installed in one- and two-family dwellings and townhomes…" Alternatively, the Residential Code could use the language "ESS installed in one- and two-family dwellings and townhouse units…" to account for the new definitions of townhouse units in the 2021 cycle. However, we do not believe the charging language is appropriate as the entirety of section R328 pertains to one- and two-family dwellings and townhomes.

The proposed language in section R328.7 #1 states, "Rooms and areas within dwellings units, sleeping units, basements and attached garages in which ESS are installed shall be protected by smoke alarms in accordance with Section R314." We suggest removing "basements" from the language. The model code approved at the Public Comment hearings for the 2024 International Fire Code does not include the word "basement." Including "basements" is unnecessary and

could open the door for confusion among jurisdictions and contractors as basements are part of the dwelling unit.

We suggest updating the proposed language in section R328.7 #2 to match the model code approved at the Public Comment Hearings for the 2024 International Fire Code. Language that requires heat alarms to be interconnected to smoke alarms is unnecessary and confusing because interconnection is already required by Section R314. If the interconnection requirement is included in R328.7 #2, but not the other requirements of R314, jurisdictions and installers could interpret the code to mean that only the interconnection requirement of Section 314 pertains to heat alarms and not the other requirements in R314. The language approved at the Public Comment Hearings for the 2024 International Fire Code was, "A listed heat alarm shall be installed in locations where smoke alarms cannot be installed based on their listing."

We suggest updating the proposed language in Section R328.8 on vehicle impact protection to match the model code approved at the Public Comment Hearings for the 2024 International Fire Code. The current proposed language matches the code approved at the ICC Committee Action Hearings, but we made changes to in a public comment to clarify the requirements and make editorial improvements.

We suggest striking out the provision in section R328.12 on toxic and highly toxic gases. The model code approved at the Public Comment Hearings for the 2024 International Fire Code did not include this provision as it was removed by the Fire Code Action Committee. While energy storage systems do not release toxic or highly toxic gases during normal use, inspectors and contractors cannot easily confirm that is the case. Additionally, "toxic and highly toxic gases" is not defined and opens the door for confusion between and within jurisdictions and installers.

Elevated PV support structures

RECOMMENDATION: For the California Residential Code, we support the new definition of Ground-mounted PV panel systems, as Section R324.7 already uses the newly defined term.

RECOMMENDATION: For the California Residential Code, we are unclear on the appropriateness of the definition and charging language for Elevated PV support structures. Questions:

1. **Should elevated PV support structures be included in the CRC because they are considered an accessory structure and could occur in the parking lot (or elsewhere) of a residential project? -- OR --**

2. **Are these structures not appropriate for the CRC because they are engineered structures and are not a one- or two-family dwelling or townhouse?**

RECOMMENDATION: For the California Residential Code, if Section R324.8 is included, the reference to "either R324.8.1 or R324.8.3" should be "either R324.8.1 or R324.8.2." This appears to be a typographical error.

Referenced standards

Proposing State Agency: Office of the State Fire Marshal
Code: CA Residential Code
Item: 44-8

The proposed language would set Edition 2 of UL 9540 as the referenced standard for energy storage systems. Referenced standards do not provide edition numbers, and we are concerned that setting Edition 2 of UL 9540 as the referenced standard would preclude jurisdictions from accepting energy storage systems listed to Edition 1 and Edition 3. Edition 3 of UL 9540 is slated to be in print by the time California Residential Code becomes effective or soon after. The requirements for lithium chemistries between Edition 1 and Edition 2 were largely unchanged, with the exception that Edition 2 erroneously requires the "for use in residential dwelling unit" marking for ESS installed inside the dwelling unit, which is not the intent of the marking.

For these reasons, we suggest setting the referenced standard to UL 9540-2020 and not providing an edition.

Proposing State Agency: Office of the State Fire Marshal
Code: CA Residential Code
Item: 44-9

The proposed language would set Edition 4 of 9540A as the referenced standard for the safety test method for energy storage systems. Since 9540A is not referenced in the California Residential Code, it should not be in the Referenced Standards section. Additionally, manufacturers have tested their energy storage systems to earlier editions of 9540A, and we are concerned that jurisdictions would reject 9540A test results for these systems if the referenced standard in the code is for Edition 4.

California Fire Code

Section 1207.11 on energy storage systems

Proposing State Agency: Office of the State Fire Marshal
Code: CA Fire Code
Item: 12-11

Section 1207.11.4 #1 should include basements as a location for which the aggregate rating of the ESS should not exceed 40 kWh. The model code approved at the Public Comment Hearings for the 2024 International Fire Code includes basements. The exclusion of "basements" in the CA Fire Code could create uncertainty to whether basements are allowable locations since utility spaces could be considered basements. Including basements in section 1207.11.4 #1 would remove this uncertainty and clearly allow ESS to be installed in a location approved at the Public Comment Hearings. With the strict limitations on where and how ESS can be installed in homes, basements – including British basements – may be the only viable installation location.

Additionally, the 45-day language does not update the section numbers for "Ventilation," "Toxic and highly toxic gases," and "Electric vehicle use" (Section 1206.11.8, 1206.11.9, and 1206.11.10 in the July 2021 supplement to the 2019 California Fire Code). We suggest updating the section numbers for ventilation and electric vehicle use, and we suggest removing the section on highly toxic gases. The model code approved at the Public Comment Hearings for the 2024 International Fire Code did not include this provision as it was removed by the Fire Code Action Committee. While energy storage systems do not release toxic or highly toxic gases during normal use, inspectors and contractors cannot easily confirm that is the case. Additionally, "toxic and highly toxic gases" is not defined and opens the door for confusion between jurisdictions and installers.

Proposing State Agency: Office of the State Fire Marshal
Code: CA Fire Code
Item: 12-12

In section 1207.11.6 #1, the proposed language has added "basements" as an installation location that requires a smoke alarm. While the addition of basements does not change the requirements (since basements are already considered "rooms and areas within dwelling units" and basements are included in section 907.2.11, a basement with an ESS must have a smoke alarm), the proposed language does not match the model code approved at the Public

Comment Hearings for the 2024 International Fire Code. We suggest considering whether adding basements in this section is necessary.

We suggest updating the proposed language in section 1207.11.6 #2 to match the model code approved at the Public Comment Hearings for the 2024 International Fire Code. Language that requires heat alarms to be interconnected to smoke alarms is unnecessary and confusing because interconnection is already required by Section 907.2.11. If the interconnection requirement is included in 1207.11.6 #2, but not the other requirements of Section 907.2.11, jurisdictions and installers could interpret the code to mean that only the interconnection requirement of Section 907.2.11 pertains to heat alarms and not the other requirements in Section 907.2.11. The language approved at the Public Comment Hearings for the 2024 International Fire Code was, "A listed heat alarm shall be installed in locations where smoke alarms cannot be installed based on their listing."

Proposing State Agency: Office of the State Fire Marshal
Code: CA Fire Code
Item: 12-13

We suggest updating the proposed language in Section 1207.11.7 on vehicle impact protection to match the model code approved at the Public Comment Hearings for the 2024 International Fire Code. The current proposed language matches the code approved at the ICC Committee Action Hearings, but we made changes to in a public comment to clarify the requirements and make editorial improvements.

Elevated PV support structures

RECOMMENDATION: For the California Fire Code, we support the new definition of Ground-mounted PV panel systems, as Section 1205.5 already uses the newly defined term.

RECOMMENDATION: For the California Fire Code, we are unclear on the appropriateness of the definition for Elevated PV support structures, as the charging language is found in the California Building Code, rather than the California Fire Code.

Referenced standards

Proposing State Agency: Office of the State Fire Marshal
Code: CA Fire Code
Item: 80-21

The proposed language would set Edition 2 of UL 9540 as the referenced standard for energy storage systems. Referenced standards do not provide edition numbers, and we are concerned that setting Edition 2 of UL 9540 as the referenced standard would preclude jurisdictions from accepting energy storage systems listed to Edition 1 and Edition 3. Edition 3 of UL 9540 is slated to be in print by the time California Fire Code becomes effective or soon after. The requirements for lithium chemistries between Edition 1 and Edition 2 were largely unchanged, with the exception that Edition 2 erroneously requires the "for use in residential dwelling unit" marking for ESS installed inside the dwelling unit, which is not the intent of the marking.

For these reasons, we suggest setting the referenced standard to UL 9540-2020 and not providing an edition.

Proposing State Agency: Office of the State Fire Marshal
Code: CA Fire Code
Item: 80-21

The proposed language would set Edition 4 of UL 9540A as the referenced standard for the safety test method for energy storage systems. Referenced standards do not provide edition numbers, and we are concerned that setting Edition 4 of UL 9540A as the referenced standard would preclude jurisdictions from accepting energy storage systems listed to other editions. We suggest setting the referenced standard as UL 9540A-2019.