Solar Ready Homes/Solar Oriented Developments
Residential Stakeholder Meeting

California Statewide Utility Codes and Standards Program

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Solar Ready Homes/Solar Oriented Developments

Outline

● Proposed Code Language
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

- **Section 101– Definitions and Rules of Construction**

  - **SOLAR ZONE** is a section of the roof that has been specifically designated and reserved for the future installation of a solar photovoltaic (PV) system, solar water heating system, and/or other solar generating system. The solar zone must meet specific minimum area and orientation requirements, must be kept free from roof penetrations, have minimal shading, and meet other requirements as specified in section 150(q).
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

- **SUBCHAPTER 7 (LOW-RISE RESIDENTIAL BUILDINGS – MANDATORY FEATURES AND DEVICES),**
- **SECTION 150 – MANDATORY FEATURES AND DEVICES**
  - *(q) Solar Readiness* – Buildings shall provide for the future installation of on-site solar photovoltaic (PV) or solar water heating (SWH). The building design documents shall show an allocated Solar Zone and the pathway for interconnecting the PV or SWH system with the building electrical or plumbing system.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

• 150.q (continued)
  • Allocated Solar Zone
  • Minimum Area and Orientation. The rooftop Solar Zone(s) shall meet the following minimum area and orientation requirement:
    • The Solar Zone shall have a minimum area of 250 ft². This area can be divided into two contiguous sections, with the smallest section having an area of no less than 80 ft², with both sections meeting the orientation requirements.
      - The Solar Zone shall be oriented between 150° to 270°.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

- **150.q.1.A (continued)**
  - Exception 1 to Section 150(q)1. For homes two stories or less that cannot meet the solar zone orientation requirement due to street orientation, lot orientation, or other factors, the allowable orientation range can be extended from 150° to 90°. but the solar zone area must increase by 20% to 300 ft² to reflect reduced solar performance.
  - Exception 2 to Section 150(q)1. For homes where the conditioned floor area is greater than 3,000 ft², and the conditioned floor area divided by the house footprint is greater than 2.5, the solar zone can be oriented between 90° and 270°.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

• 150.q.1.A (continued)
  • Exception 3 to Section 150(q)1. For homes where the conditioned floor area is less than 2,000 ft², and the conditioned floor area divided by the house footprint is greater than 2.5, the solar zone area requirement shall be reduced to 150 ft².
  • Exception 4 to Section 150(q)1. Buildings that are constructed with PV or SWH systems installed during construction may count the area of the installed system(s) towards the Solar Zone requirement.
B. Roof Obstructions. The Solar Zone(s) shall be kept clear of attic vents, plumbing vents, equipment, and other obstructions.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

- **150.q.1. (continued)**
  - C. Shading. The Solar Zone(s) shall be minimally shaded by vents, chimneys, architectural features, mechanical equipment or other obstructions that are on the roof or any other part of the building.
    - Any vent, chimney, or other architectural feature shall be a minimum distance of twice the height from the reserved roof area(s).
    - Exception 5 to Section 150(q)1: Any vent, chimney, or other architectural feature to the north of the reserved roof area(s) shall be exempt from the minimum shading requirement.
    - Exception 6 to Section 150(q)1: Shading from trees, utility poles, other buildings, and other non-building sources are not included in the minimal shading requirement.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

- **150.q.1. (continued)**
  - D. Fire Marshall Recommendations. The Solar Zone(s) shall be sited in compliance with section 2 of the California Department of Forestry and Fire Protection Office of the State Fire Marshal Solar Photovoltaic Installation Guideline/, which provides for roof access and smoke ventilation.
    - Structural Integrity. The as-designed roof dead load and live load for the Solar Zone(s) shall be clearly marked on the architectural drawings, and on EE-2 Solar Ready Compliance Form.
  - F. Documentation. The dedicated Solar Zone shall be clearly marked on the drawings and blueprints, and the drawings shall note the as-designed roof dead load and live load for the Solar Zone(s). A copy of the drawings (or comparable document showing the above information) shall be left for the homeowner’s reference.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

● 150.q. (continued)

● 2. PV and SHW Interconnection Pathways

● The building drawings shall indicate a pathway for routing electrical lines from the Solar Zone(s) to the electrical distribution panel. The documented pathway may run on the interior or exterior of the building.

● The building drawings shall indicate a pathway for routing plumbing lines from the dedicated Solar Zone(s) to the water heater location. The documented pathway may run on the interior or exterior of the building.
Solar Ready Homes/Solar Oriented Developments

Proposed Code Language

- **150.q. (continued)**
  - **3. Electric Panel Capacity**
    - A. Electric panel capacity shall have at minimum a bus-bar rated at 200 Amps.
    - B. The electric panel shall have reserved space for the future installation of two additional breakers for the solar photovoltaic installation.
PROPOSED SOLAR ORIENTED DEVELOPMENT CODE LANGUAGE
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN)
- CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 11
- CHAPTER 4, RESIDENTIAL MANDATORY MEASURES
  - Division 4.1 – Planning and Design
  - Section 4.106 – Site Development
    - 4.106.1 General. Preservation and use of available natural resources shall be accomplished through evaluation and careful planning to minimize negative effects on the site and adjacent areas. Preservation of slopes, management of storm water drainage, and erosion controls, and solar oriented development shall comply with this section.
Solar Oriented Development Code Language

- **Section 4.106 – Site Development (continued)**
  - 4.106.4 Solar Oriented Development.
  - Planning and design decisions, including street layout, lot orientation, master landscaping, design guidelines, HOA agreements, etc. have significant and long-term impacts on building energy use and onsite renewable energy generation. Projects shall evaluate planning and design opportunities to minimize building energy use and maximize onsite renewable energy generation potential.
  - Projects involving the design of a subdivision for which a tentative map is completed after January 1, 2014, pursuant to Section 66426 of the California Government Code (Subdivision Map Act), shall meet the following requirements:
Section 4.106.4 – Solar Oriented Development (continued)

A. MEET SUBDIVISION MAP ACT REQUIREMENTS. Comply with §6647.3 of the Subdivision Map Act, and provide, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision.
Solar Oriented Development Code Language

- **Subdivision Map Act §6647.3 Requirements:**
  - The design of a subdivision for which a tentative map is required pursuant to Section 66426 of the California Government Code (Subdivision Map Act) shall provide, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision. Examples of passive or natural heating opportunities in subdivision design include design of lot size and configuration to permit orientation of a structure in an east-west alignment for southern exposure. Examples of passive or natural cooling opportunities in subdivision design include design of lot size and configuration to permit orientation of a structure to take advantage of shade or prevailing breezes. In providing for future passive or natural heating or cooling opportunities in the design of a subdivision, consideration shall be given to local climate, to contour, to configuration of the parcel to be divided, and to other design and improvement requirements, and such provision shall not result in reducing allowable densities or the percentage of a lot which may be occupied by a building or structure under applicable planning and zoning in force at the time the tentative map is filed. The requirements of this section do not apply to condominium projects which consist of the subdivision of airspace in an existing building when no new structures are added. For the purposes of this section, "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors.
Section 4.106.4 – Solar Oriented Development (continued)

B. ANALYTICAL ASSESSMENT REQUIREMENTS. Projects shall perform an analytical assessment of solar oriented development measures relevant to the project, using a Commission approved tool or procedure, to inform determination of economic and environmental feasibility.

- Results shall be documented per §4.1.106(G).

- Note: Intent is to leave the specific tool/methodology loosely defined to enable the use of a diverse range of analytical tools currently available and allow alignment with similar analyses conducted for CEQA, SB375, etc.
Solar Oriented Development Code Language

- **Section 4.106.4 – Solar Oriented Development (continued)**
  - **C. CEQA EIR Mitigation Measures and Commitments.** Any project that is required to conduct an Environmental Impact Report (EIR) to comply with California Environmental Quality Act (CEQA) requirements shall evaluate siting, orientation and design as a potential energy mitigation measures, as allowed per CEQA Guidelines, Appendix F: Energy Conservation (effective March 2010, pursuant to SB 97).
  - Any siting, orientation and design energy mitigation measures identified shall be documented per §4.1.106(G).
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- **Section 4.106.4 – Solar Oriented Development (continued)**
  - **D. “Sustainable Community Strategies”**. Projects shall consider and incorporate to the extent feasible the local Metropolitan Planning Organization (MPO)’s "sustainable communities strategy (SCS)”, and if applicable, the “alternative planning strategy” practices and guidelines that impact solar oriented development issues.
  - Any relevant Sustainable Community Strategies relating to development layout, design and siting shall be documented per §4.1.106(G).
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- **CALGREEN**, Ch. 4.1 - Res. Mandatory Measures, Planning & Design
  - **Section 4.106.4 – Solar Oriented Development (continued)**
    - **E. Solar Ready Homes.** Site development shall take into consideration the Solar Ready Home requirements [proposed] in Title 24, Part 6 §150q. Site development, road orientation, and lot orientation shall enable realization of solar ready home orientation requirements.
    - **F. Solar Easements.** Pursuant to California’s Government Code section 65850.5, projects shall evaluate and incorporate to the extent feasible development-wide solar easements applicable to all plots within the subdivision in their plans. to protect the designated Solar Ready Solar Zone.
    - Solar easements shall be documented per §4.1.106(G).
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- **Section 4.106.4 – Solar Oriented Development (continued)**
  - **G. Documentation.** Document Worksheets WS-4 and WS-5 (Chapter 8 – Compliance Forms and Worksheets) shall be completed documenting the solar oriented development strategies incorporated into the design, or documenting the economic, environmental, social or technical factors making this unfeasible.
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- **CALGREEN, CHAPTER 8 – COMPLIANCE FORMS AND WORKSHEETS, RESIDENTIAL MANDATORY MEASURES**
  - WORKSHEET (WS-4) [draft]
  - SOLAR ORIENTED DEVELOPMENT MEASURES AND BEST PRACTICES

<table>
<thead>
<tr>
<th>Measure</th>
<th>Used (y/n)</th>
<th>Description or Reason Infeasible</th>
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<tbody>
<tr>
<td>Local climate, topography, parcel configuration, building HVAC needs, and other design requirements evaluated with respect to natural heating and cooling strategies, and solar energy generation.</td>
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<tr>
<td>Lot size and configuration permit east-west building orientation for southern exposure</td>
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<tr>
<td>Buildings oriented to optimize the use of solar energy with the long side of the house oriented within 30° of south.</td>
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<tr>
<td>Streets predominantly oriented east-west to provide southern building exposure and minimize east-west building exposure</td>
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<tr>
<td>Lot size and configuration permit building orientation to take advantage of shade or prevailing breezes</td>
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<td>Master landscaping plan/design guidelines provide summer shade, minimize desirable winter shading, and minimize shading of roofs to limit solar energy utilization.</td>
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<td>Analytical tools (e.g., building energy modeling, Subdivision Energy Analysis Tool, etc.) used to optimize street, lot and/or building layout.</td>
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Other (Describe)
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- WORKSHEET (WS-5) [draft]
- SOLAR ORIENTED DEVELOPMENT ANALYSIS DOCUMENTATION

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<thead>
<tr>
<th>Development Description</th>
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<tbody>
<tr>
<td>Neighborhood Name</td>
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<tr>
<td>County</td>
</tr>
<tr>
<td>City</td>
</tr>
<tr>
<td>Zip</td>
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<tr>
<td>Address or Parcel ID</td>
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Description of development

<table>
<thead>
<tr>
<th>Solar Oriented Development Analysis Tool Description</th>
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<tbody>
<tr>
<td>Name of Analysis Tool(s)</td>
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<tr>
<td>Narrative Description of Tool Capabilities</td>
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<tr>
<th>Analysis Description</th>
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<tbody>
<tr>
<td>Check Features Analyzed</td>
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<tr>
<td>Prototypical building energy use for each lot orientation</td>
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<tr>
<td>Building energy use for specific model homes proposed for each lot orientation</td>
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<tr>
<td>PV energy generation based on lot orientations and proposed roof configurations</td>
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<td>SWH energy generation based on lot orientations and proposed roof configurations</td>
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<tr>
<td>Landscape shading and urban heat island mitigation impacts</td>
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<td>Prevailing winds</td>
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<td>Other (describe)</td>
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<tr>
<th>Narrative Description of Analysis Results</th>
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<td>Continued on next page</td>
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### Neighborhood Lot Summary Details

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<tr>
<th>Lot Orientation Range</th>
<th># of Lots</th>
<th>Average Lot Size (ft2)</th>
<th>Average lot length parallel to street</th>
<th>Lot Orientation, if not perpendicular to street</th>
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<tbody>
<tr>
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<td>Cul-de-Sacs</td>
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Summary of Solar Oriented measures incorporated into the development
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN)
- CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 11
- Appendix A4, RESIDENTIAL VOLUNTARY MEASURES
  - Section A4.106 – Site Development
    - A4.106.1 Building orientation Orient buildings to optimize the use of solar energy with the long side of the house oriented within 30° of south. Solar Oriented Development.
    - A4.106.1.1 Tier 1. Perform an analytical assessment of the site design and layout to demonstrate that the proposed street and lot layout using prototypical building energy models with proposed solar generating technologies results in [7%] less energy use compared to an identical number of the same homes (no change in energy efficiency measures or design) with the same solar generating technologies laid out in a grid with equal percentage of homes facing due South, West, North and East, using the Commission approved tool or procedure.
Solar Ready Homes/Solar Oriented Developments

Solar Oriented Development Code Language

- CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGREEN)
- CALIFORNIA CODE OF REGULATIONS TITLE 24, PART 11
- Appendix A4, RESIDENTIAL VOLUNTARY MEASURES
  - Section A4.106 – Site Development (continued)
    - A4.106.1.2 Tier 2. Perform an analytical assessment of the site design and layout to demonstrate that the proposed street and lot layout using prototypical building energy models with proposed solar generating technologies results in [15%] less energy use compared to an identical number of the same homes (no change in energy efficiency measures or home design) with the same solar generating technologies laid out in a grid with equal percentage of homes facing due South, West, North and East, using the Commission approved tool or procedure.
Solar Ready Homes/Solar Oriented Developments

QUESTIONS & COMMENTS

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