



# **CALIFORNIA** 2010 **GREEN BUILDING STANDARDS** **CODE**

*CAL* **Green**

**California Code of Regulations  
Title 24, Part 11**

California Building Standards Commission



Effective Date: January 1, 2011  
(For Errata and Supplements, see History Note Appendix)

# TABLE OF CONTENTS

<p><b>CHAPTER 1 ADMINISTRATION ..... 1</b></p> <p>Section</p> <p>101 General ..... 1</p> <p>102 Construction Documents and Installation Verification ..... 3</p> <p>103 Building Standards Commission ..... 4</p> <p>104 Department of Housing and Community Development ..... 4</p> <p>105 Division of the State Architect ..... 4</p> <p>106 Office of Statewide Health Planning and Development ..... 5</p> <p><b>CHAPTER 2 DEFINITIONS ..... 9</b></p> <p>Section</p> <p>201 General ..... 9</p> <p>202 Definitions ..... 9</p> <p><b>CHAPTER 3 GREEN BUILDING..... 11</b></p> <p>Section</p> <p>301 General ..... 11</p> <p>302 Mixed Occupancy Buildings ..... 11</p> <p>303 Phased projects ..... 11</p> <p>304 Voluntary Tiers ..... 11</p> <p>305 <i>CALGreen</i> Tier 1 and <i>CALGreen</i> Tier 2 ..... 11</p> <p>306 Voluntary Measures ..... 12</p> <p><b>CHAPTER 4 RESIDENTIAL MANDATORY MEASURES ..... 13</b></p> <p>Division</p> <p>4.1 Planning and Design ..... 13</p> <p>4.2 Energy Efficiency ..... 15</p> <p>4.3 Water Efficiency and Conservation ..... 17</p> <p>4.4 Material Conservation and Resource Efficiency ..... 19</p> <p>4.5 Environmental Quality ..... 21</p> <p><b>CHAPTER 5 NONRESIDENTIAL MANDATORY MEASURES..... 25</b></p> <p>Division</p> <p>5.1 Planning and Design ..... 25</p> <p>5.2 Energy Efficiency ..... 27</p> <p>5.3 Water Efficiency and Conservation ..... 29</p> <p>5.4 Material Conservation and Resource Efficiency ..... 33</p> <p>5.5 Environmental Quality ..... 37</p>	<p>5.6 Reserved ..... 43</p> <p>5.7 Additions and Alterations to Existing Nonresidential Buildings ..... 43</p> <p><b>CHAPTER 6 REFERENCED ORGANIZATIONS AND STANDARDS..... 43</b></p> <p>Section</p> <p>601 General ..... 43</p> <p><b>CHAPTER 7 INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS... 45</b></p> <p>Section</p> <p>701 General (Reserved) ..... 45</p> <p>702 Qualifications ..... 45</p> <p>703 Verifications ..... 46</p> <p><b>CHAPTER 8 COMPLIANCE FORMS AND WORKSHEETS ..... 49</b></p> <p>WS-1 BASELINE WATER USE Baseline Water Use Calculation Table ..... 49</p> <p>WS-2 WATER USE REDUCTION 20 Percent Reduction Water Use Calculation Table ..... 50</p> <p>WS-3 WATER USE REDUCTION 30, 35 or 40 Percent Reduction Water Use Calculation Table ..... 51</p> <p><b>APPENDIX A4 RESIDENTIAL VOLUNTARY MEASURES ..... 55</b></p> <p>Division</p> <p>A4.1 Planning and Design ..... 55</p> <p>A4.2 Energy Efficiency ..... 59</p> <p>A4.3 Water Efficiency and Conservation ..... 63</p> <p>A4.4 Material Conservation and Resource Efficiency ..... 65</p> <p>A4.5 Environmental Quality ..... 69</p> <p>A4.6 Tier 1 and Tier 2 ..... 71</p> <p>A4.7 Residential Model Ordinance ..... 84</p> <p><b>APPENDIX A5 NONRESIDENTIAL VOLUNTARY MEASURES..... 87</b></p> <p>Division</p> <p>A5.1 Planning and Design ..... 87</p> <p>A5.2 Energy Efficiency ..... 95</p> <p>A5.3 Water Efficiency and Conservation ..... 130</p> <p>A5.4 Material Conservation and Resource Efficiency ..... 135</p>
--	--

A5.5 Environmental Quality ..... 141

A5.6 *CALGreen* Tiers 1 and 2 ..... 148

Nonresidential Checklists ..... 151

    Building Standards Commission (BSC)

    Division of the State Architect (DSA)

    Office of Statewide Health Planning and  
    Development (OSHPD)

**APPENDIX A6 REFERENCED STANDARDS.....**

Division

A6.1 Part 1 Standards for Compliance with  
    Building Commissioning ..... 177

A6.1 Part 1 Commissioning Sample Forms  
    and Templates ..... 177

**INDEX..... 177**

**HISTORY NOTE..... 181**

## APPENDIX A4

# RESIDENTIAL VOLUNTARY MEASURES

### Division A4.2 – ENERGY EFFICIENCY

#### SECTION A4.201 GENERAL

**A4.201.1 Scope.** For the purposes of energy efficiency standards in this appendix, the California Energy Commission will continue to adopt mandatory standards. It is the intent of this code to encourage buildings to achieve exemplary performance in the area of energy efficiency. Specifically, a green building should achieve at least a 15 percent reduction in energy usage when compared to the State’s mandatory energy efficiency standards.

#### SECTION A4.202 DEFINITIONS (Reserved)

#### SECTION A4.203 PERFORMANCE APPROACH

**A4.203.1 Energy performance.** Using an Alternative Calculation Method (ACM) approved by the California Energy Commission, calculate the annual Time Dependent Valuation (TDV) energy for each proposed building and compare it to the TDV energy budget (standard building) to achieve the following:

- || Tier 1. Exceed the 2010 *California Energy Code* requirements by 15 percent.
- || Tier 2. Exceed the 2010 *California Energy Code* requirements by 30 percent.

Field verify and document the measures and calculations used to reach the desired level of efficiency following the requirements specified in the Title 24 Reference Appendices.

#### SECTION A4.204 PRESCRIPTIVE APPROACH (Reserved)

#### SECTION A4.205 BUILDING ENVELOPE

**A4.205.1 Radiant roof barriers.** Radiant roof barrier is installed in Climate Zones 2, 4 and 8 through 15. The radiant barrier must be tested according to ASTM C-1371-98 or ASTM E 408-71(2002) and must be certified by the Department of Consumer Affairs. Radiant barriers must also meet installation criteria specified in Appendix D, Section RA 4.2.2 of the *California Energy Commission 2008 Residential Compliance Manual*.

**A4.205.2 Window shading.** Exterior shading at least 18 inches in depth is provided on south and west windows by at least one of the following methods:

1. Moveable exterior awnings or louvers
2. Porch or patio covers
3. Overhangs

#### SECTION A4.206 AIR SEALING PACKAGE

**A4.206.1 Reduced infiltration.** Infiltration is reduced and verified by third party testing to comply with requirements contained in the *California Energy Code*.

#### SECTION A4.207 HVAC DESIGN, EQUIPMENT AND INSTALLATION

**A4.207.1 Innovative systems.** Radiant, hydronic, ground source and other innovative space heating and cooling systems included in the proposed design shall be designed using generally accepted industry-approved guidelines and design criteria.

**A4.207.2 Commissioning.** A commissioning plan shall be developed to document specified building components meet the project design and performance goals.

**A4.207.2.1 Commissioning of HVAC Systems.** In addition to other items in the commissioning plan the following items, as appropriate, pertaining to the heating, ventilating and cooling systems shall be inspected and certified by an independent third party that is trained or certified to inspect and test building systems as specified in Section 702.2.

1. Verify compliance with the manufacturer’s recommended start-up procedures.
2. Verify refrigerant charge by super-heat or other methods specified by the manufacturer.
3. Burner is set to fire at the nameplate input rating.
4. Temperature drop across the evaporator is within the manufacturer’s recommended range.
5. Test and verify air flow to be within 10 percent of the initial design air flow.
6. Static pressure within the duct system is within the manufacturer’s acceptable range.
7. Verify that the whole house and exhaust ventilation systems meet Title 24 requirements.
8. Verify that the recommended maintenance procedures and schedules are documented and provided to the home owner.

**A4.207.2.3 Commissioning checklist.** Results of the commissioning inspection shall be included in the *Operation and Maintenance Manual* required in Section 4.410.1.

**A4.207.4 Gas-fired heating equipment.** Install gas-fired (natural or propane) space heating equipment with an Annual Fuel Utilization Ratio (AFUE) of .90 or higher.

**A4.207.5 Heat pumps.** If an electric heat pump must be used, select equipment with a Heating Seasonal Performance Factor (HSPF) of 8.0 or higher.

**A4.207.6 Cooling equipment.** When climatic conditions necessitate the installation of cooling equipment, select cooling equipment with a Seasonal Energy Efficiency Ratio (SEER) higher than 13.0 and an Energy Efficiency Ratio (EER) of at least 11.5.

**A4.207.7 Ducts location.** Install ductwork to comply with at least one of the following:

1. Install ducts within the conditioned envelope of the building.
2. Install ducts in an underfloor crawl space.
3. Use ducts with an R-6 insulation value or higher.
4. Install ductwork which is buried in the ceiling insulation.

**A4.207.8 Duct leakage.** Perform duct leakage testing to verify a total leakage rate of less than 6 percent of the total fan flow.

**A4.207.9 Whole house fans.** In Climate Zones 2, 4 and 8 through 15, install a whole-house fan with insulated louvers or an insulated cover.

**A4.207.10 Ceiling fans.** ENERGY STAR ceiling fans are installed in all bedrooms and living areas.

## SECTION A4.208 WATER HEATING DESIGN, EQUIPMENT AND INSTALLATION

**A4.208.1 Tank type water heater efficiency.** The Energy Factor (EF) for a gas-fired storage water heater is higher than .60.

**A4.208.2 Tankless water heater efficiency.** The Energy Factor (EF) for a gas-fired tankless water heater is .80 or higher.

**A4.208.3 Distribution systems.** Where the hot water source is more than 10 feet from a fixture, the potable water distribution system shall convey hot water using one of the following methods:

1. A central manifold plumbing system with parallel piping configuration (“home-run system”) is installed using the smallest diameter piping allowed by the *California Plumbing Code* or an approved alternate.
2. The plumbing system design incorporates the use of a demand controlled circulation pump.
3. A gravity-based hot water recirculation system is used.
4. A timer-based hot water recirculation system is used.
5. Other methods approved by the enforcing agency.

## SECTION A4.209 LIGHTING

**A4.209.1 Lighting.** Building lighting consists of at least 90 percent ENERGY STAR qualified hard-wired fixtures.

## SECTION A4.210 APPLIANCES

**A4.210.1 Appliance rating.** Each appliance provided by the builder meets ENERGY STAR if an ENERGY STAR designation is applicable for that appliance.

## SECTION A4.211 RENEWABLE ENERGY

**A4.211.1 New solar homes partnership.** Install a solar photovoltaic (PV) system in compliance with the California Energy Commission New Solar Homes Partnership (NSHP).<sup>1,2,3</sup> Install energy efficiency measures meeting either Tier I or Tier II below.

**Tier I.** Exceed the 2010 *California Energy Code* requirements by 15 percent.

**Tier II.** Exceed the 2010 *California Energy Code* requirements by 30 percent.

Solar water heating may be used to assist in meeting the energy efficiency requirements of either Tier I or Tier II.

1. In addition, for either Tier I or II, each appliance provided by the builder must be ENERGY STAR if an ENERGY STAR designation is applicable for that appliance.
2. Tier II requires a 30 percent reduction in the building’s space cooling (air conditioning) energy compared to the 2010 *California Energy Code*.
3. Information on NSHP incentives available through the California Energy Commission may be obtained at the “Go Solar California” website.

**A4.211.2 Solar water heating system.** A Solar Rating and Certification Corporation (SRCC) OG 100 solar collector or OG 300 solar water heating system is installed. The SRCC Solar Energy Factor (SE) shall be used to determine the Solar Fraction (SF), which shall be at least 0.5 as determined using the California F-Chart available at the “gosolarcalifornia” website or through the California Energy Commission.

**A4.211.3 Space for future solar installation.** A minimum of 300 square feet of unobstructed roof area facing within 30° of south is provided for future solar collector or photovoltaic panels. Rough-in penetrations through the roof surface within 24 inches (610 mm) of the boundary of the unobstructed roof area are provided for electrical conduit and water piping.

**A4.211.4 Future access for solar system.** A minimum one-inch (25.4 mm) electrical conduit is provided from the electrical service equipment to an accessible location in the attic or other location approved by the enforcing agency.



## APPENDIX A5

# NONRESIDENTIAL VOLUNTARY MEASURES

The measures contained in this appendix are not mandatory unless adopted by a city, county or city and county as specified in Section 101.7 and provide additional measures that designers, builders and property owners may wish to consider during the planning, design and construction process.

### Division A5.1 – PLANNING AND DESIGN

#### PREFACE

Given that land use and planning are largely regulated locally, cities, counties and cities and counties should consider reducing greenhouse gas emissions associated with development through local land-use practices in conjunction with enforcing the provisions of this code. Specific land use strategies a city, county or city and county may wish to consider include but are not limited to the following:

**Site selection.** Develop sites for buildings, hardscape, roads or parking areas consistent with the local general plan and regional transportation plan pursuant to SB 375 (Stats 2008, Ch. 728).

**Regional sustainable communities strategy.** Site selection and building design and use shall conform the project with the prevailing regional sustainable communities strategy or alternative planning strategy, whichever meets the greenhouse gas target established by the California Air Resources Board pursuant to SB375 (Stats. 2008, Ch. 728), including the general location of uses, residential densities and building intensities.

**Transit priority projects.** To qualify as a transit priority project, the project shall meet three criteria:

- (1) (a) contain at least 50 percent residential use, based on total building square footage and, if the project contains between 26 and 50 percent nonresidential uses, a floor area ratio of not less than 0.75; (b) provide a minimum net density of at least 20 dwelling units per acre; and (c) be within one-half mile of a major transit stop or high-quality transit corridor included in a regional transportation plan as described in Section 21155 of Stats. 2008, Ch. 728;
- (2) be consistent with the prevailing sustainable communities strategy or alternative planning strategy, whichever meets the greenhouse gas target established by the California Air Resources Board, including the general location of uses, residential densities and building intensities; and
- (3) have all necessary entitlements required by the applicable local government.

**Note:** For additional information, see Government Code Sections 65080, 65080.1 and 65400 and Public Resources Code Sections 21061.3 and 21155.

#### SECTION A5.101 GENERAL

**A5.101.1 General.** The provisions of this chapter outline planning, design and development methods that include environ-

mentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

#### SECTION A5.102 DEFINITIONS

**A5.102.1 Definitions.** The following words and terms shall, for the purposes of this chapter and as used elsewhere in this code, have the meanings shown herein.

**ALBEDO.** Synonymous with solar reflectance, which is a ratio of the energy reflected back into the atmosphere to the energy absorbed by the surface, with 100 percent being total reflectance.

**BIORETENTION.** A shallow depression that utilizes conditioned soil and vegetation for the storage, treatment or infiltration of storm water runoff.

**BROWNFIELD SITE.** Real property, the expansion, redevelopment or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant or contaminant, with certain legal exclusions and additions.

**Note:** See the full text at EPA's website.

**DEVELOPMENT FOOTPRINT.** The total area of the building footprint, hardscape, access roads and parking.

**GREENFIELDS.** Sites that are not previously developed or graded and remain in a natural state able to support agriculture, open space or habitat.

**Note:** Previously developed sites are those that previously contained buildings, roadways or parking lots or were graded or altered by direct human activities.

**GREYFIELD SITE.** Any site previously developed with at least 50 percent of the surface area covered with impervious material.

**FLOOR AREA RATIO.** Gross square footage of all structures on a site divided by gross square footage of the site.

**INFILL SITE.** A site in an urbanized area that meets criteria defined in *Public Resources Code* Section 21061.3.

**LOW IMPACT DEVELOPMENT (LID).** Control of stormwater at its source to mimic drainage services provided by an undisturbed site.

**LOW-EMITTING AND FUEL EFFICIENT VEHICLES.** Eligible vehicles are limited to the following:

1. Zero emission vehicle (ZEV), including neighborhood electric vehicles (NEV), partial zero emission vehicle

**A5.209.5.2.6** Compact fluorescent lamps that do not contain medium screw base sockets (E24/E26) ; or

**A5.209.5.2.7** Electronic ballasts with a fundamental output frequency not less than 20 kHz;

**Exception 1 to Section A5.209.5:** Unfiltered incandescent lamps that are not part of an electronic message center (EMC), an internally illuminated sign or an externally illuminated sign.

**Exception 2 to Section A5.209.5:** Exit signs. Exit signs shall meet the requirements of the *Appliance Efficiency Regulations*.

**Exception 3 to Section A5.209.5:** Traffic Signs. Traffic signs shall meet the requirements of the *Appliance Efficiency Regulations*.

**A5.209.6 Sign lighting controls.** All signs with permanently connected lighting shall meet the requirements below:

1. Automatic time switch control. All signs with permanently connected lighting shall be controlled with an automatic time switch control that complies with the applicable requirements of Section A5.209.1.
2. Photocontrol or outdoor astronomical time switch control. All outdoor signs shall be controlled with a photocontrol or outdoor astronomical time switch control.
 

**Exception:** Outdoor signs in tunnels and large covered areas that require illumination during daylight hours.
3. Dimming. All outdoor signs shall be controlled with a dimmer that provides the ability to automatically reduce sign power by a minimum of 65 percent during nighttime hours.

**Exceptions:**

1. Signs that are illuminated for less than 1 hour per day during daylight hours.
2. Outdoor signs in tunnels and large covered areas that require illumination during daylight hours.
3. Metal halide, high pressure sodium, cold cathode and neon lamps used to illuminate signs or parts of signs.
4. Demand Responsive Electronic Message Center Control. An Electronic Message Center (EMC) having a new connected lighting power load greater than 15 kW shall have a control installed that is capable of reducing the lighting power by a minimum of 30 percent when receiving a demand response signal that is sent out by the local utility.
5. EMCs required by a health or life safety statute ordinance or regulation, including but not limited to exit signs and traffic signs.

**A5.209.7 Nonresidential lighting control acceptance.** Before an occupancy permit is granted for a new building or space or a new lighting system serving a building, space or site is operated for normal use, all indoor and outdoor lighting con-

trols serving the building, space or site shall be certified as meeting the Acceptance Requirements for Code Compliance. A Certificate of Acceptance shall be submitted to the enforcement agency under Section 10-103(a) of Title 24, Part 1, that:

1. Certifies that plans, specifications, installation certificates and operating and maintenance information meet the requirements of Title 24, Part 6.
2. Certifies that automatic daylighting controls meet the applicable requirements of Sections A5.209.1 and A5.209.2.3.2.4.
3. Certifies that when a multilevel astronomical time switch is used to meet Exception 3 to Section A5.209.2.3.2.2 all general lighting in the skylit area is controlled by a multilevel astronomical time switch that meets the applicable requirements of Section A5.209.1 and that has an override switch that meets the requirements of Section A209.2.4.2.
4. Certifies that lighting controls meet the requirements of Sections A5.209.2.1 through A5.209.2.3 and Title 24, Part 6, Sections 131(e) and (f) and 146(a)2, as applicable.
5. Certifies that automatic lighting controls meet the applicable requirements of Sections A5.209.1 and A5.209.2.4.
6. Certifies that occupant-sensors meet the applicable requirements of Sections A5.209.1 and A5.209.2.4.
7. Certified that outdoor lighting controls meet the applicable requirements of Sections A5.209.1 and A5.209.3.

**SECTION A5.210 [OSHPD 1, 2 & 4]  
APPLIANCES**

**A5.210.1 Appliances regulated by the *Appliance Efficiency Regulations*.** Any appliance for which there is a California standard established in the *Appliance Efficiency Regulations* may be installed only if the manufacturer has certified to the Commission, as specified in those regulations, that the appliance complies with the applicable standard for that appliance.

**Note:** For certified appliances, go to [www.energy.ca.gov/appliances/database/](http://www.energy.ca.gov/appliances/database/).

**SECTION A5.211  
RENEWABLE ENERGY**

**A5.211.1 On-site renewable energy.** Use on-site renewable energy sources such as solar, wind, geothermal, low-impact hydro, biomass and bio-gas for at least 1 percent of the electric power calculated as the product of the building service voltage and the amperage specified by the electrical service overcurrent protection device rating or 1kW, (whichever is greater), in addition to the electrical demand required to meet 1 percent of the natural gas and propane use. The building project's electrical service overcurrent protection device rating shall be calculated in accordance with the 2010 *California Electrical Code*. Natural gas or propane use is calculated in accordance with the 2010 *California Plumbing Code*.

**A5.211.1.1 Documentation.** Using a calculation method approved by the California Energy Commission, calculate the renewable on-site energy system to meet the requirements of Section A5.211.1, expressed in kW. Factor in net-metering, if offered by local utility, on an annual basis.

**A5.211.1.2 Grid neutral.** Using the proposed annual electrical energy budget (kWh) as set forth by the Title 24, Part 6 of the *California Energy Code* and adding the additional annual energy consumption estimated for the appliances and equipment not covered by Title 24, Part 6 (e.g., kitchen and laundry equipment and appliances, swimming pool heaters and circulation pumps, industrial and art equipment, computers, etc.) calculate the site's annual electrical production and consumption ratio by dividing the proposed annual renewable electrical energy production (kWh) by the proposed annual electrical energy budget (kWh). The estimated plug loads shall be included in the annual electrical energy budget (kWh).

**Exceptions:**

1. Existing buildings with one year of occupancy or greater shall use actual data of the annual electrical energy consumption of the facilities. Using the data logged for the facilities, calculate the site's annual electrical production and consumption ratio by dividing the proposed annual renewable electrical energy production (kWh) by the actual annual electrical energy consumption (kWh).
2. The annual renewable electrical energy can be renewable energy produced off-site on a remote property owned by the applicant.

**A5.211.1.2.1 35 percent grid neutral.** A site's annual electrical production and consumption ratio is equal or greater than 0.35.

**A5.211.1.2.2 75 percent grid neutral.** A site's annual electrical production and consumption ratio is equal or greater than 0.75.

**A5.211.1.2.3 Grid neutral.** A site's annual electrical production and consumption ratio is equal or greater than 1.

**A5.211.3 Green power.** If offered by local utility provider, participate in a renewable energy portfolio program that provides a minimum of 50 percent electrical power from renewable sources. Maintain documentation through utility billings.

**A5.211.4 Prewiring for future rooftop solar.** Size and install conduit from the building roof or eave to a location within the building identified as suitable for future installation of controls and/or storage batteries.

**A5.211.4.1 Grid-connected system without storage.** Location within the building shall be of sufficient dimensions to accommodate an inverter and/or other controls as approved by the utility.

**A5.211.4.2 System for future energy storage.** If battery storage is anticipated, location within the building shall:

1. Be stable, weather-proof, insulated against very hot and very cold weather, and isolated from occupied spaces.
2. Be able to accommodate batteries, ventilation complying with the *California Fire Code*, an inverter with or without a charge controller (regulator) and, if grid-connected, other controls as approved by the utility.

## SECTION A5.212 ELEVATORS, ESCALATORS AND OTHER EQUIPMENT

**A5.212.1 Elevators and escalators.** In buildings with more than one elevator or two escalators, provide systems and controls to reduce the energy demand of elevators and escalators as follows. Document systems operation and controls in the project specifications and commissioning plan.

**A5.212.1.1 Elevators.** Traction elevators shall have a regenerative drive system that feeds electrical power back into the building grid when the elevator is in motion.

**A5.212.1.1.1 Car lights and fan.** A parked elevator shall turn off its car lights and fan automatically until the elevator is called for use.

**A5.212.1.2 Escalators.** An escalator shall have a VVVF motor drive system that is fully regenerative when the escalator is in motion.

**A5.212.1.3 Stairs as an alternative [DSA-SS].** In Public School and Community College buildings, locate stairs conveniently to encourage their use in lieu of elevators or escalators.

**A5.212.1.4 Controls.** Controls that reduce energy demand shall meet requirements of CCR, Title 8, Chapter 4, Subchapter 6 and shall not interrupt emergency operations for elevators required in CCR, Title 24, Part 2, California Building Code.

## SECTION A5.213 ENERGY EFFICIENT STEEL FRAMING

**A5.213.1 Steel framing.** Design steel framing for maximum energy efficiency. Techniques for avoiding thermal bridging in the envelope include:

1. Exterior rigid insulation;
2. Punching large holes in the stud web without affecting the structural integrity of the stud;
3. Spacing the studs as far as possible while maintaining the structural integrity of the structure; and
4. Detailed design of intersections of wall openings and building intersections of floors, walls and roofs.



## SECTION A5.211 RENEWABLE ENERGY

**CALGreen Section: A5.211.4 Pre-wiring for future rooftop solar.** Size and install conduit from the building roof or eave to a location within the building identified as suitable for future installation of controls and/or storage batteries.

**A5.211.4.1 Grid-connected system without storage.** Location within the building shall be of sufficient dimensions to accommodate an inverter and/or other controls as approved by the utility.

**A5.211.4.2 System for future energy storage.** If battery storage is anticipated, location within the building shall:

1. Be stable, weather-proof, insulated against very hot and very cold weather, and isolated from occupied spaces
2. Be able to accommodate batteries, ventilation complying with the California Fire Code, an inverter with or without a charge controller (regulator) and, if grid-connected, other controls as approved by the utility.

### **Intent:**

The intent of this provision is to facilitate the installation of photovoltaic panels on a building in the future, if it is not accomplished during the initial construction of the project.

**Change for 2012:** CBSC modified these provisions and their format in response to comments from the CEC to provide clarity to the code user concerning future installation and accommodation of commercial rooftop solar. Changes distinguish between installations that will require battery storage and those that will not.

### **Existing Law or Regulation:**

No statewide solar electricity building standards have been adopted for nonresidential new construction. Local jurisdictions may have adopted standards for solar installations. Some utilities and federal agencies offer rebate programs for the installation of photovoltaics to encourage their installation.

### **Compliance Method:**

Show in the construction documents the location and specifications for the conduit(s) to be installed, ready for future installation of solar panels and ancillary equipment on the project. For off grid installations, batteries for storage of electricity should be anticipated in extending conduit to an appropriate location in the building.

### **Enforcement:**

**Plan Intake:** The reviewer and/or plan checker should review the plans and specifications for the intended location of the conduit and the sizing to accomplish the purpose.

**On-Site Enforcement:** The inspector should review the permit set of plans and make sure that the specified conduit is installed in the location(s) shown.