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Solar Photovoltaic, Community Shared Solar, Battery Energy Storage, and Solar-Ready Buildings

Overview

Chapter 9 describes the compliance requirements for solar photovoltaic (PV) systems, battery energy storage systems (BESS), and solar readiness for newly constructed nonresidential, and hotel/motel buildings. The prescriptive PV and battery energy storage requirements for specific nonresidential buildings determine the standard design energy budgets for the performance compliance method. Additional total long-term system cost (LSC) or hourly source energy compliance credit is available for installation of PV and BESS that exceed the energy performance of the prescriptive requirements. For both prescriptive and performance compliance, the PV system must meet the requirements of JA11 Qualification Requirements for Photovoltaic Systems, and the battery storage system must meet the requirements of JA12 Qualification Requirements for Battery Storage Systems.

The Energy Code allows the requirements for photovoltaics to be met by community-shared solar electric generation. The community-shared solar program must be approved by the Commission. For more information, please see Community Shared Solar Electric Generation and Storage Systems.

The requirements for solar-ready buildings are mandatory measures for newly constructed nonresidential and hotel/motel buildings that do not have a PV system because the building either qualifies for an exception in Section 140.10(a) or complies with the PV requirements using community shared solar as specified in Title 24, Part 1, Section 10-115.

For information about requirements and compliance options for solar water heating systems, please see Chapter 4.

What's New for 2025

Prescriptive Measures

Photovoltaic (PV) and battery storage systems are now required for additional nonresidential building categories. See Prescriptive Requirements for Photovoltaic System for specific building types and details.

Additionally, the BESS rated energy capacity calculation is based on the conditioned floor area of the building rather than the size of the PV system, and the power capacity calculation is now based on a 4-hour charging and discharging time.

Changes were also made to the PV exceptions for multitenant buildings.

Performance Compliance

PV and battery storage system requirements also can be met by using the performance approach. See Energy Budget Calculations. A community-shared solar electric generation

system, or other renewable electric generation system, and/or community shared BESS can be used instead of onsite solar and/or BESS using either the performance compliance method. See Community Shared Solar Electric Generation and Storage Systems.

Prescriptive Requirements for Photovoltaic System

Photovoltaic System Size – Nonresidential and Hotel/Motel

Reference: Section 140.10(a)

To comply with the prescriptive requirements the following building types are required to have a PV system installed unless the building qualifies for an exception. Mixed-occupancy buildings, where 80 percent or more of the floor area is for one, or more, of these building types must comply. The PV system must meet the requirements of JA11 Qualification Requirements for Photovoltaic Systems.

Events & Exhibits Building is a Museum Building, Motion Picture or Performance Arts Theater Building, or other building that is comprised of Auditorium Area, Convention, Conference, Multipurpose and Meeting Area, or Civic Meeting Place Area.

Library Building is a building with building floor area used for repository of literary materials, and for reading reference such as books, periodicals, newspapers, pamphlets and prints.

Hotel/Motel is a building or buildings that has six or more guest rooms or a lobby serving six or more guest rooms, where the guest rooms are intended or designed to be used, or which are used, rented, or hired out to be occupied, or which are occupied for sleeping purposes by guests, and all conditioned spaces within the same building envelope.

Office Building is a building of CBC Group B Occupancy with building floor areas in which business, clerical or professional activities are conducted.

Financial Institution Building is a building with floor areas used by an institution which collects funds from the public and places them in financial assets, such as deposits, loans, and bonds.

Medical Office Building/Clinics is an occupancy Group B building or portion thereof used to provide medical care on less than 24 hour basis to persons who are not classified as nonambulatory or bedridden or rendered incapable of self-preservation of the services provided.

Restaurant Building is a building with building floor areas in which food and drink are prepared and served to customers in return for money.

Retail Store Building is a building with building floor areas used for the display and sale of merchandise except food.

Grocery Store Building is a building with building floor areas used for the display and sale of food.

School Building is a building used by an educational institution. The building floor area can include classrooms or educational laboratories, and may include an auditorium,

gymnasium, kitchen, library, multipurpose room, cafeteria, student union, or workroom. A maintenance or storage building is not a school building.

Warehouse Building is a building that is constructed for storage or handling of products. This space may or may not be conditioned. Refrigerated warehouses is a space greater than or equal to 3,000 square feet constructed for storage of handling of products where mechanical refrigeration is sued to maintain the space temperature at 55 degree F or less.

Religious Worship Building is a building that is comprised of Religious Worship Area.

Sports & Recreation Building is a building that is comprised of Exercise/Fitness Center and Gymnasium Area, or other area where recreational sports are practiced.

For all building types specified in Table 140.10-A, the PV capacity in kW_{dc} shall not be less than the smaller of the minimum rated PV capacity determined by Equation 140.10-A for photovoltaic direct current capacity, or the total of all available Solar Access Roof Areas (SARAs) multiplied by 18 W/ft² for steep-sloped roofs or multiplied by 14 W/ft² for low-sloped roofs in the equations below.

SARAs include the area of the building roof, covered parking areas, carports, and all other newly constructed structures that are capable of structurally supporting a PV system as specified by Title 24, California Code of Regulations, Part 2, (California Building Code or CBC) Section 1511.2.

SARA does not include any roof area with less than 70 percent annual solar access. The percent of annual solar access is determined for each point on the roof by dividing the total solar insolation (accounting for shading obstructions) by the total solar insolation if the same point on the roof were unshaded by those obstructions. For all roofs, all solar obstructions including those that are external to the building, and solar obstructions that are part of the building design, including architectural features and roof mounted equipment may be considered for the annual solar access calculations.

SARA also excludes any roof area that is not available due to state building code requirements, such as HVAC equipment setback and access (on low sloped roofs only) and fire setback and access pathways. Occupied roof areas are also specifically excluded from SARA but must be defined consistent with California Building Code (CBC) Section 503.1.4.

Some local building codes or ordinances require the roof to be used for specific purposes, such as for "living roofs." Areas of the roof that are required to be used for specific purposes can be removed from the SARA if the CEC's Executive Director has approved the SARA removal for the specific local code/ordinance. The enforcement agency must apply to the CEC for that approval.

The minimum rated PV system capacity is normally determined using the following equation (Equation 140.10-A):

$$kW_{PVdc} = \frac{(CFA \times A)}{1000}$$

Where,

- kW_{PVdc} = Minimum rated PV system capacity in kW
- CFA = Conditioned floor area in square feet.
- A = Capacity factor in W/ft² as specified in Table 140.10-A for the building type

When there is limited total Solar Access Roof Area, the minimum rated PV system capacity for the building may be reduced using the following equation.

$$kW_{PCdc,SARA} = \frac{(SARA \times B)}{1000}$$

Where,

- $SARA$ = Total kW of all available SARAs

B = 18 W/ft² for steep-sloped roofs or 14 W/ft² for low-sloped roofs

The minimum rated PV system capacity for the building is the smaller value determined by the two equations.

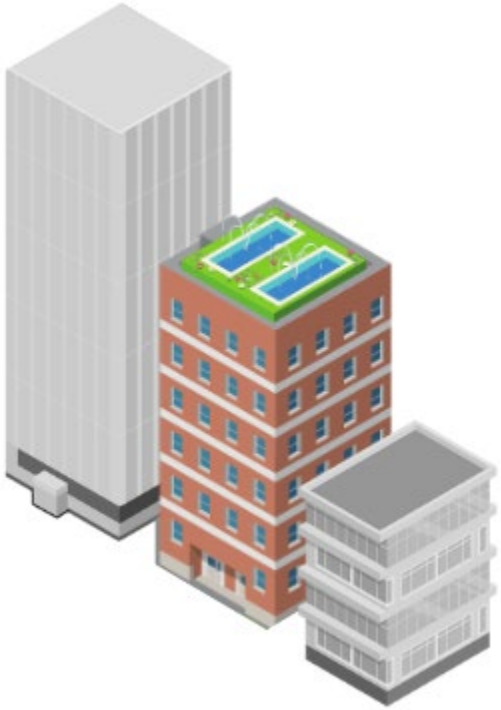
Photovoltaic System Exceptions – Nonresidential, Hotel/Motel

Reference: Section 140.10(a)

There are five allowable exceptions to the prescriptive PV requirements as listed below.

Exception 1 to 140.10(a): No PV system is required where the total of all available SARA is less than three percent of conditioned floor area.

Figure 9-1: Example Building with 5000 square feet CFA



Source: California Statewide CASE Team

The red building is determined to have a SARA of 30 square feet.

Exception 1: 3% × 5000 = 150 ft^2

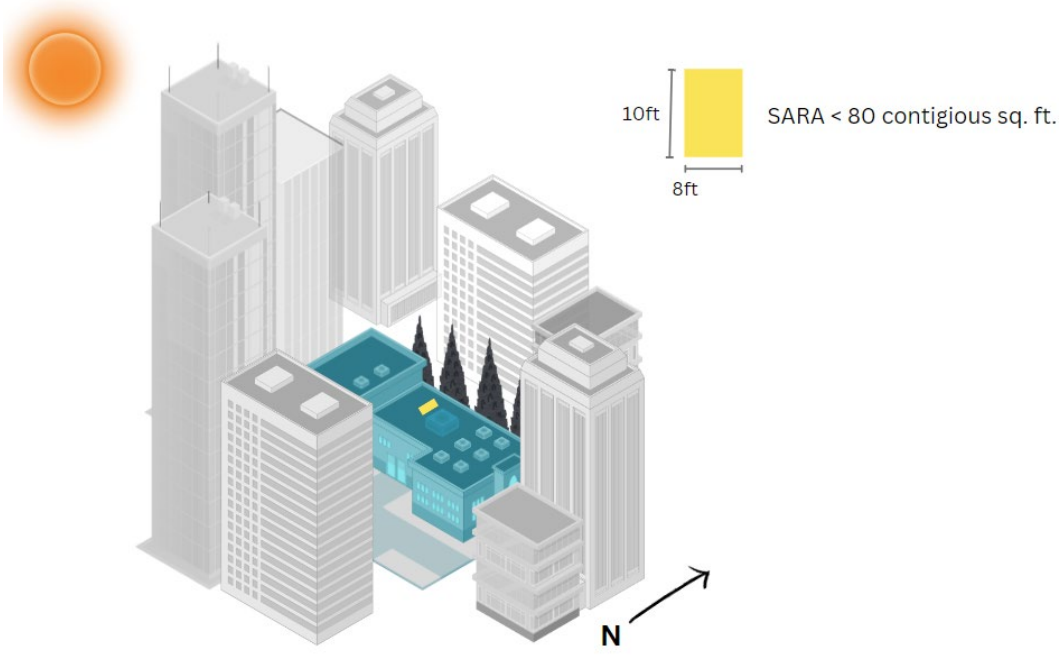
SARA = 30 ft^2 < 150 ft^2 → Exception 1 applies.

Exception 2 to 140.10(a): No PV system is required where the required PV system capacity is less than 4 $kWpv_{dc}$.

Exception 3 to 140.10(a): No PV system is required if the SARA contains less than 80 contiguous square feet.

The blue building is determined to have a SARA (indicated in yellow) that is less than 80 contiguous square feet. Exception 3 applies so that PV in this case is not required for the whole building. When the SARA for any individual roof area is less than 80 contiguous ft^2, that area is not included in determining PV kW sizing. When the SARA for any individual roof area is ≥ 80 contiguous ft^2, that roof area is included in determining PV kW sizing. If there is no SARA with ≥ 80 contiguous ft^2 on any portion of the roof, PV is not required for the building, and solar readiness will apply.

Figure 9-2: Example Building with SARA that is less than 80 contiguous square feet



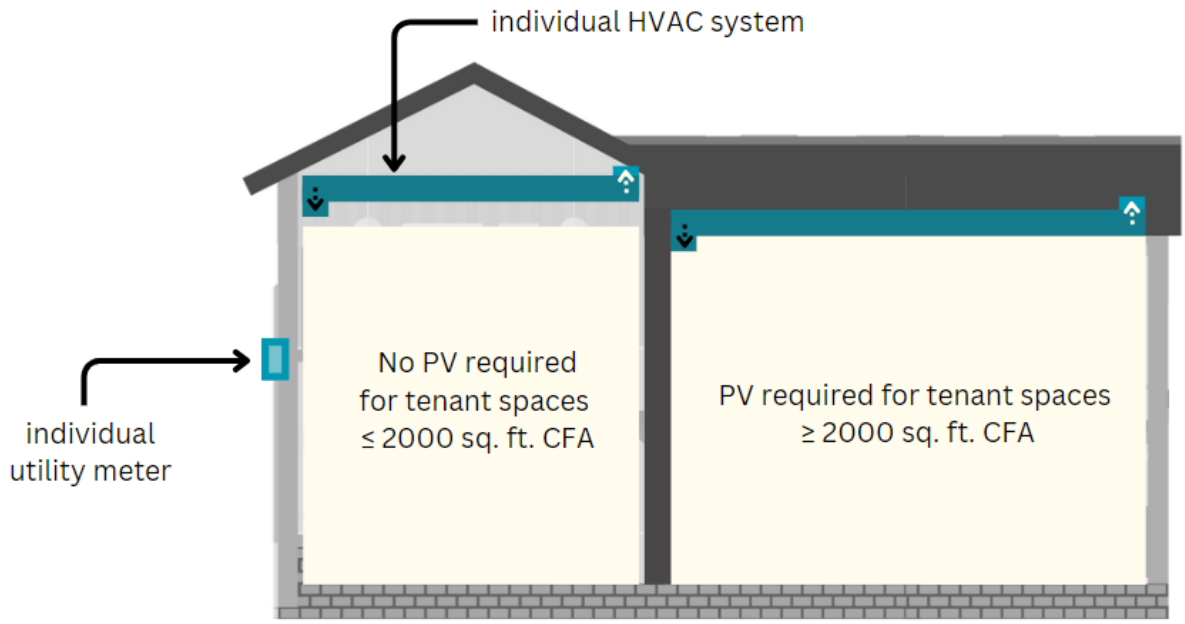
Source: California Statewide CASE Team

Exception 4 to 140.10(a): Buildings with enforcement-authority-approved roof designs, where the enforcement authority determines it isn't possible for the PV system, including panels, modules, components, supports, and attachments to the roof structure, to meet the snow load requirements of Ch. 7 in the American Society of Civil Engineers (ASCE) Standard 7-16.

Exception 5 to 140.10(a): For nonresidential and hotel/motel multitenant buildings, the PV capacity determined by the photovoltaic direct current capacity equation (Equation 140.10(a) shall be calculated without including tenant spaces meeting all of the following:

- The tenant space is less than or equal to 2,000 square feet of conditioned space;
- The tenant space is served by an HVAC system that does not serve other spaces in the building; and
- The tenant space has an individual utility meter to track electricity consumption that does not include the electricity consumption of other tenant spaces in the building.

Figure 9-3: Multitenant Space Qualifying for Exception 5 to Section 140.10(a)



Source: California Statewide CASE Team

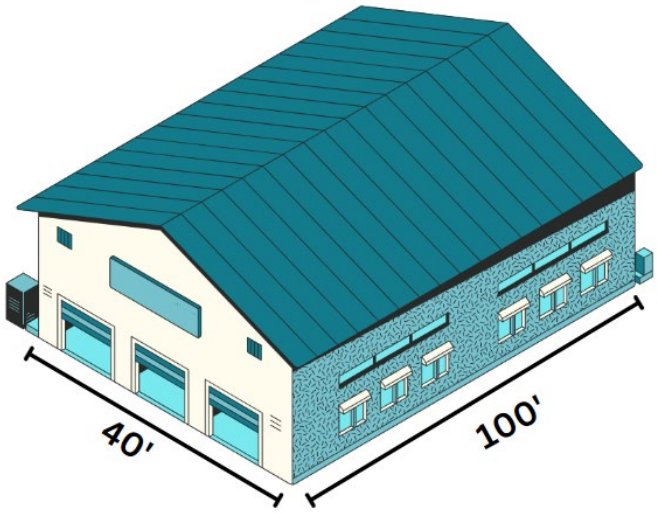
Multitenant buildings present a complication for PV systems to allocate the value provided by PV and BESS systems to each unit without wiring them separately and incurring added cost. Exception 5 allows for tenant spaces of 2,000 square feet or less of conditioned space to be excluded from the PV calculation if each of these units is served by its own HVAC system and its own electric meter. However, tenant spaces over 2,000 square feet (or otherwise not meeting the requirements for the exception) are required to comply with the solar and BESS requirements. Note that this exception does not apply in areas with approved community solar programs, because these programs allow for practical application of PV production to each tenant. Similarly, this exception also does not apply in areas where the electrical utility company or other load-serving entity provides a virtual net energy metering program that allows the owner of a multi-meter property to allocate portions of the energy credits calculated by the netting of the PV generation and onsite consumption from the property's PV generation meter to the property's tenants. Note that if the virtual net energy metering program provided by the load-serving entity does not allow energy bill credits from netting of energy generation and consumption, then compliance is required using Exception 5 provisions explained above for tenant spaces of greater than 2,000 square feet (or otherwise not meeting the requirements of the exception).

Example 9-1: PV Exception 2

Question:

I am designing a warehouse with 4,000 square feet of conditioned floor area in climate zone 12. Is PV required for my building?

Figure 9-4: Example Warehouse



Source: California Statewide CASE Team

Answer:

First determine the kWdc required by using the above equations Equation 140.10-A. From Table 140.10-A a warehouse in Climate Zone 12 has a PV capacity factor of 0.44.

kW_{PVdc} required = (CFA x A)/1000 = (4,000 x 0.44) / 1000 = 1.76 kWdc

Since the required PV is less than 4 kWdc, this warehouse qualifies for Exception 2, and a PV system is not required.

Example 9-2: PV Exception 5

Question:

I am designing a strip mall in Climate Zone 5 with a low-sloped roof and 30,000 square feet of conditioned floor area and SARA of 18,000 square feet. Each tenant space will be served by an individual HVAC system and utility meter. All tenant spaces, except one with 26,000 square feet CFA, will have less than 2,000 square feet of conditioned space each. What is the minimum rated PV system capacity required for my building?

Answer:

Under Exception 5, only the tenant space with the 26,000 square foot of conditioned space needs to be included when calculating PV capacity.

To determine the minimum required kW_{PVdc}, use the two equations shown in the Photovoltaic System Size – Nonresidential and Hotel/Motel section above, and select the smaller value. For a retail space in Climate Zone 5, the PV capacity factor is 3.05, and low-sloped roofs have a SARA multiplier of 14 W/ft².

Photovoltaic Direct Current Capacity:

- kW_{PVdc} required = (CFA x A)/1000 = (26,000 ft^2 x 3.05 W/ft^2)/1000 = 79.3 kW

If SARA is limited, PV System Capacity:

- $kW_{PVdc,SARA}$ required = (SARA x B)/1000 = (18,000 ft^2 x 14 W/ft^2)/1000 =252 kW

The minimum rated PV system capacity for the building is 79.3 kW.

Note: If the CEC has approved a community solar program , or if the load serving entity provides virtual energy bill credits calculated by the netting of PV generation and onsite consumption, the building does not qualify under Exception 5, and compliance will need to be determined for the PV capacity of all tenant spaces.

Example 9-3: PV Exception 5 - VNEM program applicable for Exception 5

Question:

I am designing a strip mall in climate zone 13 and there are 10 tenants in the building with 4 tenants that have their own HVAC system, electric meter, and conditioned floor areas less than 2,000 square feet. The load-serving entity provides a virtual net energy metering program. However, the program does not allow netting of energy generation and consumption. Can I apply Exception 5 and not include the 4 tenants for calculating kWpvdc that have conditioned floor areas of less than 2,000 square feet?

Answer:

Yes. Since the virtual net energy metering program does not allow the netting of building PV generation with onsite consumption of the tenants, Exception 5 will still apply and the PV will be calculated by adding the conditioned floor areas of the 6 tenants that have conditioned floor areas of more than 2,000 square feet.

Example 9-4: PV Exception 5 - VNEM program not applicable for Exception 5

Question:

I am designing a strip mall in climate zone 11 and there are 10 tenants in the building with 4 tenants that have their own HVAC system, electric meter, and conditioned floor areas less than 2,000 square feet. The load serving entity provides a virtual net energy metering program. The program applies bill credits from netting of the generation of the PV system with the consumption of the tenant spaces. Can I apply Exception 5 and not include the 4 tenants for calculating kWpvdc that have conditioned floor areas of less than 2,000 square feet?

Answer:

No. Since the virtual net energy metering program allows the netting of building PV generation with onsite consumption of the tenants, Exception 5 will not apply and the PV will be calculated by adding the conditioned floor areas of all tenants.

Joint Appendix 11 (JA11) Requirements

In addition to the discussion below, please refer to Chapter 9.2.3 of the *2022 Nonresidential and Multifamily Compliance Manual*.

System Orientation

For prescriptive path compliance, a PV system or strings with module pitches greater than 2:12, or 10 degrees, shall be oriented with an azimuth between 90 to 300 degrees measured clockwise from true north. Module pitches smaller than 2:12 or less than 10 degrees (low-slope) can be installed in any orientation since the azimuth of low-slope modules has an insignificant impact on array performance.

When using the performance approach, the array may be oriented in any direction, including due north; however, the more the orientation deviates from the optimum orientation of southwest, the worse the system performs, resulting in a larger PV system size to be needed to achieve compliance. It is best to orient the panels as close to southwest as possible to maximize the system performance with the smallest array size.

There are two options for using a California Flexible Installation approach to simplify performance approach compliance software modeling and installation in the field. To use the California Flexible Installation 1 (CFI1), the PV array shall be installed between 150 to 270 degrees from true north, with all modules at the same tilt as the roof for pitches up to 7:12. When the CFI2 option is selected in the performance calculation, the PV array can be installed in a larger azimuth range; the PV array shall be installed between 105 and 300 degrees from true north, with all modules at the same tilt as the roof for pitches up to 7:12. When selecting CFI2, the performance of the proposed system is derated by approximately 10 percent, which results in a larger PV size being necessary to comply.

If the PV array does not meet either CFI1 or CFI2, then the actual orientation and tilt of the PV array shall be described.

Shading

Shading from obstructions must be limited to meet the performance or prescriptive requirements. Any obstruction located north of the array does not need to be considered. Obstructions include the following:

- Any vent, chimney, architectural feature, mechanical equipment, or other obstruction that is on the roof or any other part of the building.
- Any part of the neighboring terrain.
- Any tree that is mature at the time of installation of the PV system.
- Any tree that is planted on the building lot or neighboring lots or planned to be planted as part of landscaping for the building. (The expected shading shall be based on the mature height of the tree.)
- Any existing neighboring building or structure.
- Any planned neighboring building or structure that is known to the applicant or building owner.
- Any telephone or other utility pole that is closer than 30 feet from the nearest point of the array.

Example 9-5: Shading

Question:

What would be the impact of shading on the PV sizing requirement?

Answer:

Prescriptively, the PV array must have at least 98% annual solar access. Under the performance path, there is no minimum requirement for annual solar access; however, the increase in shading (lower annual solar access) will necessitate a larger PV size to meet the same LSC budget as a smaller unshaded PV system. In addition, shading may reduce annual solar access below 70% for some parts of the roof. Any roof sections with under 70% annual solar access may be excluded from SARA. If the SARA is low enough due to shading, a reduced PV size may be allowed. In extreme cases, the SARA will be so small that the building would require no solar system and thus no battery storage system, either.

Solar Access Verification

A certified solar assessment tool that is approved by the Executive Director, listed here https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/solar-assessment-tools, must be used to demonstrate the shading conditions modeled in the performance method as indicated on the CF1R-PRF-01 of the PV system or to claim an exception based on limited amount of solar access.

The installer must provide documentation that demonstrates the actual shading condition of the installed PV system using an approved solar assessment tool. To be certified by the executive director, the solar assessment tool:

- Must calculate the annual solar access percentage of each solar array and a weighted average of the PV system. The calculation must include all known obstructions, including any tree that is planted on the building lot or neighboring lots or planned to be planted as part of landscaping for the building.
- Must not include horizon shading in the calculation.
- Must produce a shade report with a summary of the PV system, including the address of the project, individual array panel count, orientation, annual solar access percentage, and a weighted average of the PV system as a whole.
- Must ensure that annual solar access percentage values are comparable to on-site measurements if the model shading condition of the tool is based on satellite or aerial images. Documentation must be provided to the CEC as proof.

Remote Monitoring Capability

Please refer to Chapter 9.2.3.4 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Additional Requirements

Please refer to Chapter 9.2.3.5 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Performance Approach Compliance for Photovoltaic Systems

Energy Budget Calculations

The performance approach allows for modeling of the PV system performance by taking into account the PV system size, climate, panel orientation, panel and inverter efficiency, and shading characteristics. As discussed earlier in the Photovoltaic System Size – Nonresidential and Hotel/Motel section, the minimum rated PV system capacity is normally determined using Equation 140.10-A as shown in Photovoltaic System Size – Nonresidential and Hotel/Motel. When there is limited total Solar Access Roof Area (SARA), the minimum rated PV system capacity may be reduced using the equation based on SARA. The standard design PV system size is the smaller of the two above calculations. The performance method allows for modeling different PV capacities, more energy efficiency measures, additional battery storage, and other demand-response measures. For showing compliance with the long-term system cost (LSC) energy budgets, the performance method allows for efficiency measures to substitute for PV and BESS but does not allow PV or BESS to substitute for efficiency measures. For showing compliance with the source energy budget, efficiency measures, PV, and BESS all can be considered, interchangeably.

Exceptions to PV Requirements

Please refer to the earlier Photovoltaic System Exceptions – Nonresidential, Hotel/Motel section. The same exceptions apply to the performance approach.

Additional Requirements

The installed PV system must meet the applicable requirements specified in JA11. See the earlier discussion of these requirements.

Example 9-6: Efficiency Tradeoff

Question:

Does the performance path allow tradeoffs between PV systems and energy efficiency measures? How about tradeoffs between a PV system that is coupled with a battery storage system and energy efficiency measures?

Answer:

The performance path does not allow installing a larger PV system in exchange for less energy efficiency measures for showing compliance with the LSC energy budget. However, compliance software does allow installing more energy efficiency, demand-responsive measures; and battery storage in exchange for a smaller PV system. Larger PV systems can gain compliance credit for meeting the hourly source energy .

Example 9-7 Solar Thermal System

Question:

Does a solar thermal water heating system still qualify for compliance credit in the performance path?

Answer:

Yes, although a solar water heating system cannot serve as a substitution for the prescriptively required PV system, it can still be installed along with a water heating system for optional compliance credit in the performance path. Solar water heating systems are modeled along with all of the other water heating and distribution systems and can be used for trading off efficiency measures or installing a smaller PV system. The requirements for solar thermal water heating systems are described in Chapter 4, Water Heating Requirements.

Community Shared Solar Electric Generation and Storage Systems

Photovoltaic and/or BESS System Size

Reference: Section 140.1(a)

The Energy Code allows for photovoltaics, which would otherwise be installed on the building site, to be offset by community-shared solar electric generation. "Community-shared solar electric generation" means solar electric generation or other renewable technology electric generation that is provided as part of a community or neighborhood program that is approved to share the generation resources it develops with individual homes to demonstrate compliance with the Energy Code.

Also, the BESS that otherwise would be installed in combination with photovoltaics on the building site to comply with battery storage requirements could be offset by a community-shared BESS. Community-shared solar electric generation systems and community-shared BESS possibly can be combined or separate. All of these possibilities are hereinafter referred to as just "community-shared solar electric generation systems."

For these offsets to become available, entities who wish to serve as administrators of a proposed community-shared solar electric generation system or BESS must apply to the CEC for approval, demonstrating that all of the criteria specified in Section 10-115 of the regulations are met. The CEC will review these applications to determine if they meet these criteria. If approved, CEC-approved compliance software will be modified to enable users to take compliance credit for buildings participating in that CEC-approved community-shared solar electric generation system.

Any entity may apply to serve as administrator of a proposed community-shared solar electric generation system, including, but not limited to, utilities, builders, solar companies, or local governments. The entity will be responsible for ensuring that the criteria for approval are met throughout (at least) a 20-year period for each building that uses shares of the community-shared solar electric generation system to offset the onsite solar electric generation and batteries, which would otherwise be required for the building to comply with the Energy Code. Throughout that period the administrator will be accountable to builders, building owners, enforcement agencies, the CEC, and other parties who relied on these systems to offset compliance with the standards. Records demonstrating compliance with the criteria must be maintained over that period, with access to those records provided to any entity approved by the Energy Commission.

Entities interested in applying to serve as an administrator of a proposed community-shared solar electric generation system should become thoroughly familiar with the criteria for

approval specified in Section 10-115 and contact the CEC Building Standards Office for further discussion and explanation of the criteria as necessary.

Enforcement Agency

The community-shared solar electric generation system must exist and be available for enforcement agency review early in the permitting process and shall not cause delay in the enforcement agency review and approval of the building that will be served by the community-shared solar generation system. All documentation required to demonstrate compliance for the building and the compliance offset from the community-shared solar electric generation system must be completed and submitted to the enforcement agency with the permit application. The enforcement agency must be provided facilitated access to the community-shared solar generation system to verify the validity and accuracy of compliance documentation.

Energy Performance and Minimum Community-Shared PV Size

CEC-approved compliance software must be used to show that the energy performance of the shares of the community-shared solar electric generation system that is dedicated to the participating building results in an LSC that is equal to or greater than the LSC, which would be determined for the onsite solar electric generation system that otherwise would have been required for the building to comply with the standards.

The compliance software will determine a minimum kW size that will be the share of the community solar resource that is required to be dedicated to the building, based on the resource's PV system component performance characteristics, orientation (azimuth and tilt), inverter type, tracking versus fixed systems, climate zone and CEC weather files containing solar insolation data.

Participating Building Energy Savings and Bill Reduction Benefits

A specific share of the community-shared solar generation system, determined to comply with the energy performance requirement above, must be dedicated on an ongoing basis to the participating building. The energy savings benefits dedicated to the building shall be provided in one of the following ways:

A. Actual reductions in the energy consumption of the building;

B. Energy reduction credits that will result in virtual reductions in the building's energy consumption that is subject to energy bill payments; or

C. Payments to the building that will have an equivalent effect as energy bill reductions that would result from one of the other two options above.

For all three options mentioned above, the reduction in energy bills resulting from the share of the community-shared solar generation system or community-shared battery storage system or both that is dedicated to the building must be greater than the cost that is charged to the building to obtain that share of the community-shared solar generation system or community-shared battery storage system or both.

Durability, Participation, and Building Opt-Out

Durability: The benefits from the specific share of the Community Shared Solar Generation System and/or community shared battery storage system must be provided to each participating building for a period of not less than 20 years.

Participation: Buildings using community shared solar and/or BESS to comply with the Energy Code requirements, must participate for at least 20 years, regardless of who owns or occupies the building, unless the building owner fulfills the opt-out requirements. The CEC-approved administrator(s) must require the builder to provide equitable servitude by recording a covenant, deed restriction or other legally binding method that runs with the land and obligates all owners/tenants to maintain the participation of the building in the community-shared solar and/or community shared battery storage system for at least 20 years or satisfy the opt-out requirements.

Compliance Documentation: The administrator must maintain record(s) of the compliance documentation that determined the requirements for the on-site solar electric generation system or battery storage system or both to comply with the standards in effect at the time the builder applied for the original building permit, and that establishes participants' obligations to meet the opt-out requirements. The administrator shall provide a copy of this compliance documentation upon a participating building owner's request, to every new owner of a participating building when the administrator is notified that the title has transferred and to any participating building owner who requests to opt-out.

Building Opt-Out: During the 20-year participation period, a participating building owner has the option to opt out of participation in the community-shared solar electric generation system if the opt-out requirements are met.

- Before opting out, the building owner must demonstrate that they have installed an on-site solar electric generation system that meets or exceeds the annual LSC generation resulting from the on-site PV and battery storage system that would have been required by the Energy Code in effect at the time of the original building permit application for the building. The building owner must also provide documentation from the installer of the on-site solar system or an attestation of the building owner with supporting documentation confirming the installation of the required onsite systems. The building owner is responsible for all costs associated with documentation of the opt-out requirements.
- The administrator must review opt-out documentation and determine if the installed solar system meets the opt-out requirements. Within 30 days the administrator must provide written confirmation if the building meets the opt-out requirements.
- At the point in time that a building owner has completed all opt-out requirements, all costs and benefits associated with participation in the community-shared solar electric generation system shall cease. If any balance of costs or benefits is owed to either party at the time of opt-out, that balance shall be paid to that party.
- The administrator (or other approved entity) must not impose any penalty related to a participating building opting out or charge participants for recuperation of unrealized revenue that would have been expected to accrue beyond the end of participation. If the administrator plans to charge any other fees at the time of building opting out, the

application for commission approval of the community-shared solar electric generation system shall explain the purpose of those fees.

Additionality

The specific shares of the community-shared solar electric generation system must provide the benefits exclusively to the participating building. The benefits must in no way be attributed to any other building or transferred to other buildings or property. Renewable Energy Credits (RECs) that are unbundled from the community-shared solar electric generation system do not meet this additionality requirement.

The participating building(s) must be served primarily by renewable resources developed specifically for the community-solar electric generation system.

Other renewable resources meeting the requirements may be used for each participating building if the building(s) is permitted before the renewable resources developed for the program start operating or after they cease operating. For each renewable resource developed to serve participating buildings, bundled RECs, which satisfy the criteria of Portfolio Content Category 1 of the California Renewable Portfolio Standard regulations, shall be retired and tracked in the Western Renewable Energy Generation Information System (WREGIS) on behalf of program participants to ensure they will not be allocated to or used for any other mandatory or voluntary renewable electricity program requirement or claim.

Renewable resources that are developed to serve participating buildings may also be used to serve other loads when there is excess generation beyond what is needed to serve participating buildings. Any excess generation used for such other loads must be isolated from the generation serving participating buildings. This is not considered a violation of the additionality requirements.

Location

The community shared solar electric generation system must be located on a distribution system of the load serving entity providing service to the participating buildings. The distribution system shall have an electrical voltage less than 100kV.

Size

The community shared solar electric generation system must not be served by any individual source larger than 20 MW.

Battery Energy Storage System (BESS)

The primary function of the BESS is daily cycling for the purpose of load shifting to harmonize the onsite PV system with the grid and to deliver benefits to the grid, environment, and the building occupants.

For the purpose of the Energy Code, "grid harmonization" is defined as strategies and measures that harmonize customer-owned distributed energy resources assets with the grid to maximize self-utilization of solar PV array output, and limit grid exports to periods beneficial to the grid and the ratepayer. This is done by charging the battery from the solar PV system when there is limited electrical load at the building and excess solar PV generation that would

otherwise be exported directly to the grid in midday when the grid already has plenty of utility-owned solar PV, and the value of customer-owned generation has low value to the grid. By charging the battery with that excess solar PV generation, the battery can load shift by discharging to the building load in the late afternoon and early evening hours, when there is much less utility-owned solar PV generation available and loads at the house and on the grid are peaking for the day and when the customer-owned generation has much higher value to the grid.

BESS is a prescriptive requirement for specific nonresidential and hotel/motel buildings, as specified in Section 140.10(b). In the performance method, trade-offs are possible using different BESS sizes, but BESS only impacts the Total LSC and Source metrics, not the Efficiency LSC metric. In all cases, BESS must meet all applicable requirements in Joint Appendix JA12 and be self-certified to the CEC by the manufacturer as a qualified product.

Coupling a PV system with a BESS and appropriate control strategy, described in Prescriptive Requirements for BESS below, allow reaching specific Total LSC targets and source energy with a smaller PV system than otherwise would have been possible. This strategy is useful and cost-effective for meeting target LSCs that may be required by reach codes, with a smaller and grid-harmonized PV system.

The list of qualified JA12 products can be found at https://solarequipment.energy.ca.gov/Home/BatteryList and https://solarequipment.energy.ca.gov/Home/EnergyStorage.

Prescriptive Requirements for BESS

Reference: Section 140.10(b)

To comply with the prescriptive requirements for specific nonresidential and hotel/motel buildings that are required to have a PV system installed, a BESS must also be installed. The minimum qualifying energy capacity of the BESS is determined by the following equations. It is important to note that, if a building is not required to have a PV system, it is also not required to have a BESS.

The BESS Minimum Rated Usable Energy Capacity is calculated using the following equation (Equation 140.10-B).

$$kWh_{batt} = \frac{(CFA \times B)}{(1000 \times C^{0.5})}$$

The BESS Minimum Rated Usable Energy Capacity, SARA-Adjusted is calculated using the following equation (Equation 140.10-C).

$$kWh_{batt} = [\frac{(CFA \times B)}{(1000 \times C^{0.5})}] \times \frac{kW_{PVdc,SARA}}{kW_{PVdc}}$$

Where,

kWh_{batt} = Minimum Rated Usable Energy Capacity of the BESS in kWh

CFA = Conditioned floor area that is subject to the PV system requirements of Section 140.10(a) in square foot.

kW_{PVdc} = Minimum Rated PV system Capacity in kW from Equation 140.10-A.

$kW_{PVdc, SARA}$ = Minimum Rated PV System Capacity in kW from the SARA calculation.

B = BESS Capacity Factor specified in Table 140.10-B for the building type (Wh per square foot).

C = Rated single charge-discharge cycle AC to AC (round-trip) efficiency of the BESS.

The BESS Minimum Rated Power Capacity is calculated using the following equation (Equation 140.10-D).

$$kW_{batt} = kWh_{batt} / 4 kW_{batt} = \frac{kWh_{batt}}{4}$$

Where,

kW_{batt} = Minimum Rated Power Capacity of the BESS in kWdc

kWh_{batt} = Minimum Rated Usable Energy Capacity of the BESS in kWh

Where the building includes more than one of the building types specified in Table 140.10-B, the total BESS capacity for the building shall be determined by applying the above equations to each of the specified building types and summing up the capacities determined for each.

Exceptions to BESS Requirements

There are three allowable exceptions to the prescriptive BESS requirements as specified below for 140.10(b).

- Exception 1: No BESS is required if the installed PV system capacity is less than 15 percent of the capacity determined by Equation 140.10-A.
- Exception 2: No BESS is required if the rated usable energy capacity determined by Equation 140.10-B or Equation 140.10-C is less than 10 kWh.
- Exception 3: For multitenant buildings, the energy capacity of the BESS must be based on the tenant spaces with more than 5,000 square feet of conditioned floor area. For single-tenant buildings with less than 5,000 square feet of conditioned floor area, no BESS is required.

Example 9-11: BESS Exceptions

Question:

I am designing a library with a low-sloped roof, 12,000 square feet of conditioned floor area and SARA of 650 ft^2 in Climate Zone 3. Is PV or BESS required for my building?

Answer:

First determine the PV requirement by using Equation 140.10-A or the SARA multiplied by 18 for steep-sloped roofs or SARA multiplied by 14 for low-sloped roofs. The PV requirement is the smaller of these calculations.

A library in Climate Zone 3 has a PV capacity factor of 2.59.

kW_{PVdc} required = (CFA x A)/1000

= (12,000 ft^2 x 2.59 W/ft^2)/1000

= 31.08 kW

Using the SARA calculation referenced in Photovoltaic System Size – Nonresidential and Hotel/Motel:

$kW_{PVdc,SARA}$ required = (SARA x B)/1000

= (650 x 14)/1000 = 9.1 kW

The PV requirement is the smaller of the two numbers; therefore this building is required to have a minimum 9.1 kW PV system.

Now we can determine the battery requirement based on the equation in Prescriptive Requirements for BESS. A library in Climate Zone 3 has a BESS capacity factor of 5.97. A BESS with 90 percent roundtrip efficiency,

kWh_{batt} = ((CFA x B) / (1000 x $C^{0.5}$)) x ($kW_{PVdc,SARA}$ / kW_{PVdc})

= ((12,000 ft^2 x 5.97 Wh/ft^2) / (1000 x $0.9^{0.5}$)) x (9.1 kW / 31.08 kW)

= 22.11 kWh

Since the rated usable energy capacity is more than 10 kWh, this building does not qualify for Exception 2 and needs a battery energy storage system.

Now, to determine the BESS minimum rated power capacity, use Equation 140.10-D:

kW_{batt} = kWh_{batt} / 4

= 22.11 kWh / 4

= 5.53 kWh

Joint Appendix (JA12) Requirements

Minimum System Performance Requirements

JA12 specifies that the BESS must meet or exceed the following performance specifications:

- For performance compliance, Usable capacity of at least 5 kWh per building.
- For prescriptive compliance, single charge-discharge cycle AC to AC (round-trip) efficiency of at least 80 percent.
- For both performance and prescriptive compliance, energy capacity retention of 70 percent of nameplate capacity after 4,000 cycles covered by a warranty, or 70 percent of nameplate capacity under a 10-year warranty.

Controls Requirements

BESS that remain in backup mode indefinitely bring no grid benefits. The JA12 requirements are designed to ensure that the BESS remains in an active control mode and prevent the BESS from remaining in the backup mode indefinitely. These requirements also enable the BESS to receive the latest firmware, software, control strategy, and other important updates.

All control strategies including Basic Control, Time-of-Use (TOU) Control, and Advanced Demand Response Control shall meet the following JA12 General Control Requirements:

- The BESS must have the capability of being remotely programmed to change the charge and discharge periods and to remotely switch between control strategies.
- During charging, for a BESS that is combined with an on-site solar photovoltaic system, the BESS shall first charge from an on-site photovoltaic system when the photovoltaic system production is greater than the on-site electrical load. The BESS also may charge from the grid during off-peak TOU hours of the day if allowed by the load serving entity. However, in anticipation of severe weather, Public Safety Power Shutoff events or a demand response signal, the BESS may charge from the grid at any time if allowed by the load serving entity.
- During discharge, the BESS shall be programmed to first meet the electrical load of the property. If during the discharge period the electrical load of the property is less than the maximum discharge rate, the BESS shall have the capability to discharge electricity into the grid upon receipt of a demand response signal from the load serving entity or a third-party aggregator.

Controls Strategies

JA12 includes four control strategies. BESS shall be commissioned to meet the requirements of one of the following control strategies. The installed BESS can follow any of the following control strategies. However, the compliance software will only simulate the "Time of Use" control strategy.

Basic Control

This control strategy is a simple control that accomplishes only limited load shifting. To qualify for the Basic Control, when combined with an on-site solar PV system, the BESS shall only allow charging when the PV system production is greater than the on-site electrical load. The BESS shall discharge whenever the PV system production is less than the on-site electrical load.

Time-of-Use (TOU) Control

This control strategy is designed to match load shifting with utility TOU rates. To qualify for the TOU Control, when combined with an on-site PV system, BESS shall discharge during the highest priced TOU hours of the day. The operation schedule shall be preprogrammed from the factory, updated remotely, or commissioned during the installation/commissioning of the system. At a minimum, the system shall be capable of programming three separate seasonal TOU schedules, such as spring, summer, and winter.

Advanced Demand Flexibility Control

This control strategy is designed to bring the maximum value to the PV system generations by placing the charge/discharge functions of the BESS under the control of a load serving entity or a third-party aggregator. This control strategy allows discharging to the grid upon receiving a demand response signal from a grid operator. To qualify for the advanced demand flexibility control, when combined with an on-site solar PV system, the battery storage system shall be programmed as either basic control as specified in JA12.3.2.1 or TOU control as specified in

JA12.3.2.1. BESS control shall meet the demand flexibility control requirements specified in Section 110.12(a)1 and Section 110.12(a)2. Furthermore, BESS shall have the capability to change the charging and discharging periods in response to signals from the load serving entity or a third-party aggregator.

Controls for Separate BESS

When BESS is installed separately from (not in combination with) an on-site solar photovoltaic system, including when the building is served by a community solar PV system, to qualify for the compliance credit, BESS shall be programmed to:

- Start charging from the grid during the lowest priced TOU hours of the day and start discharging during the highest priced TOU hours of the day; or
- Meet all the demand response control requirements specified in Section 110.12(a)1 and Section 110.12(a)2, and shall have the capability to change the charging and discharging periods in response to signals from the load serving entity or a third-party aggregator.

Alternative Control Approved by the Executive Director

The Executive Director may approve applications for alternative control strategies that demonstrate equal or greater benefits to those strategies specified in JA12. To qualify for alternative control, BESS shall be operated in a manner that increases self-utilization of the photovoltaic array output, responds to load serving entity rates, responds to demand response signals, minimizes greenhouse gas emissions from buildings, and/or implements other strategies that achieve equal or greater benefits than those specified above. This application to the Executive Director for the alternative control option shall be accompanied with clear and easy to implement algorithms for incorporation into the compliance software for compliance credit calculations.

Safety Requirements

The BESS shall be tested in accordance with the applicable requirements specified in UL1973 and UL9540. Inverters used with BESS shall be tested in accordance with the applicable requirements in UL1741 and UL1741 Supplement SA, or UL1741 Supplement SB.

Enforcement Agency

The local enforcement agency shall verify that all certificates of installation are valid. The BESS shall be verified as a model certified to the CEC as qualified for credit as a BESS. In addition, the enforcement agency shall verify that the BESS is commissioned and operational with one of the controls specified in Controls Strategies above. The control strategy and the compliance cycling capacity at system installation, commissioning and final inspection by enforcement agency shall be the control strategy and the compliance cycling capacity that was used in the certificate of compliance. The enforcement agency cannot enforce a particular control strategy after the BESS is installed and inspected. As a result, BESS can be operated with any JA12 control strategy, but the performance compliance software will only simulate time of use control strategy.

Certification Documentation Requirements

A specification sheet showing usable capacity, compliance cycling capacity, roundtrip efficiency and an identification as a field assembled or integrated BESS shall be submitted to the CEC for JA12 certification. In addition, a document showing the software operation of cycling control

strategy, and a document or training materials describing the programming of the permanent 72 hour reset requirement during the commissioning of the BESS as specified in JA12.3.3.1(e) and JA12.3.3.1(e)(4), respectively shall be submitted to the Energy Commission for JA12 certification.

Example 9-12: Battery Storage Credit

Question:

Can you get compliance credit for battery storage?

Answer:

Battery storage is a prescriptive requirement for certain nonresidential building types. (See Table 140.10-B.) Additional compliance credit is available under the performance path if using a battery storage system larger than the prescriptive requirement. It can be used for compliance tradeoff for a smaller PV system and source energy.

The manufacturers must self-certify to CEC that the battery energy storage systems meet the requirements of JA12. JA12 specifies minimum performance requirements, communication requirements, control requirements, safety requirements, and interconnection requirements, among others, that must be complied with and certified to the CEC. The self-certification form may be downloaded from the Commission's website.

Example 9-13: Battery Storage Credit

Question:

When batteries are used there is a loss of electricity associated with the roundtrip charge and discharge resulting in fewer generated kWh. Why does the CEC require a BESS that is coupled with a PV system if there is a loss of energy?

Answer:

BESS store the PV generated electricity in the middle of the day when the solar resources are generally plentiful, and electricity prices are low. The BESS then discharges the stored electricity later in the day, during the peak hours when solar resources are diminished and electricity prices are high. BESS have a limited roundtrip charge and discharge loss of 5 to 15 percent, depending on the type of battery technology and the inverter efficiencies. The electricity price differential between the middle of the day and the peak hours is far greater than the battery charge and discharge losses.

To calculate the performance of a battery storage system coupled with a PV system, the CEC's compliance software on an hourly basis accounts for the PV generation, losses, storage capacity remaining, charge and discharge rates, cost of electricity, house loads, and hourly exports. Similar calculations are also performed to calculate the benefits of storage for CO2 emissions.

Not any BESS is eligible for compliance credit; it must comply with the requirements of Reference Joint Appendix 12 (JA12). The requirements ensure that the BESS remains in a dynamic mode that allows residents to take advantage of variable electricity costs associated

with charge and discharge periods throughout the day. Static batteries that remain mostly in backup mode have little to no value for load shifting.

Example 9-14: Battery Storage TOU Schedule

Question:

How will the control requirement be enforced for customers that are not on a TOU schedule? How about customers on TOU rate who want to be in basic control?

Answer:

The BESS's cycling capacity must comply with JA12.3.3.1(e) whether the local utility does or does not currently have a TOU schedule. If the local utility currently does not have a TOU schedule, to comply with JA12.2.3, the BESS must perform a system check on 1 May and 1 November by default. A customer can set the control strategy to Basic Control, if a TOU rate is not currently available for the customer. However, this strategy will reduce the benefits of the battery storage for both the customer and the grid and, therefore, is not recommended. Load serving entities are expected to switch to TOU rates over time.

Performance Approach Compliance for Battery Storage System

Energy Budget Calculation

Please refer to Chapter 9.7.1 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Exceptions to Battery Storage Requirements

Please refer to Chapter 9.7.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Additional Requirements

Please refer to Chapter 9.7.3 of the *2022 Nonresidential and Multifamily Compliance Manual.*

Solar-Ready Overview

Reference: Section 110.10

This chapter of the nonresidential compliance manual addresses solar-ready requirements for hotels/motels and nonresidential buildings. These requirements are in Section 110.10 and are only required if PV installation is not required. In these cases, solar-ready is mandatory for newly constructed buildings and additions where the total roof area is increased by at least 2,000 square feet.

The solar-ready requirements must be met when designing the roof and associated equipment of the building. The intent is to reserve a penetration-free and shade-free portion of the roof for the potential future installation of a solar energy system, plan for a pathway for connecting the components of the system, and install a main electrical service panel that will enable the future system. There are no requirements to install panels, conduit, piping, or mounting hardware.

Overview

The solar-ready provisions are mandatory. There are exceptions to the "solar zone" requirements, and these are described in the corresponding sections of this chapter.

Covered Occupancies

The nonresidential solar-ready requirements apply to:

- Hotel/motel occupancies with 10 habitable stories or fewer.
- All other nonresidential buildings with three or fewer habitable stories other than Group I-2 and I-2.1 buildings.

The Energy Code applies to mixed-occupancy buildings. Buildings with nonresidential space on the ground floor and multifamily residential floors above are common examples.

Solar Zone

Reference: Section 110.10(b)

The solar zone is a dedicated place where solar panels can be installed at a future date if the owner chooses to do so. A solar zone area must be designed to have no solar obstructions, such as vents, chimneys, architectural features and roof mounted equipment. The solar zone must comply with the access, pathway, smoke ventilation, and spacing requirements specified in the California Fire Code (Title 24), Part 9. Requirements from the other Parts of Title 24 and those adopted by a local jurisdiction should also be addressed in establishing the solar zone design.

The solar zone can be located at any of the following locations:

- Roof of building
- Overhang of the building
- Covered parking installed with the building project
- Roof of another structure located within 250 feet (75 meters) of the primary building
- Overhang of another structure within 250 feet (75 meters) of the primary building
- Other structures include, but are not limited to, trellises, arbors, patio covers, carports, gazebos, and similar accessory structures.

The solar zone must also adhere to size and azimuth requirements (Section 110.10(b)1A – Section 110.10(b)2). It must be free from solar obstructions, such as vents, chimneys, architectural features and roof mounted equipment. The solar zone must be clearly indicated on construction documents, which must also include the structural design loads of the roof. This documentation is required so that at the time of a future solar PV installation, the structural design loads at the time the building was permitted are known. The Energy Code does not require estimating the structural loads of possible future solar equipment.

Solar Zone Minimum Area

Total Area: The solar zone must have a total area of at least 15 percent of the total roof area, after subtracting any skylights.

Multiple areas: The solar zone may be composed of multiple subareas if they meet the following minimum size specifications:

1. Each subarea dimension must be at least 5 feet.
2. If the total roof area is equal to or less than 10,000 square feet, each subarea must be at least 80 square feet.
3. If the total roof area is greater than 10,000 square feet, each subarea must be at least 160 square feet.

Please refer to Chapter 9.8.4 of the *2022 Nonresidential and Multifamily Compliance Manual* for further information.

Solar Zone Exceptions

There are four exceptions, which are applicable to hotel/motel and nonresidential buildings, to the solar zone area requirement specified in Section 110.10(b)1B. Submit an NRCC-SRA-E, the "Solar Ready Areas" certificate of compliance to the enforcement agency for all building projects subject to solar ready, even if using a solar zone exception.

Exception 3 allows a reduced-size solar zone when the solar zone minimum area requirements cannot be achieved because solar access is limited due to shading obstructions exterior to the building.

Exceptions 1, 2, and 4 allow alternate efficiency measures instead of a solar zone. When these efficiency measures are installed, the solar zone requirements for zone shading, orientation, and design load; interconnection pathway; and owner documentation also do not apply. Any installations must be inspected and verified prior to final approval by the enforcement agency.

Exception 1: A compliant solar electric system is permanently installed on hotel/motel, and nonresidential buildings. The system must have a nameplate direct current (DC) power rating of no less than 1 watt per sq. ft of roof area. The nameplate rating must be measured under standard test conditions. To verify compliance with this exception, submit NRCI-SPV-01-E Certificate of Installation: Solar Photovoltaic System.

Exception 2: A solar water heating system (SWH) is permanently installed on hotel/motel, and nonresidential buildings. The SWH system must comply with Section 150.1(c)8C. To verify compliance with this exception, submit NRCI-STH-01-E Certificate of Installation: Solar Water Heating System.

Exception 3: Obstructions that are not part of the building shade part of the roof where the potential solar zone would be, reducing the potential solar zone area to no more than 50% of the minimum solar zone area. The up to 50% reduced designated solar zone would become the required solar zone area.

How to Determine Annual Solar Access

Step 1: Determine the annual solar access: For the solar-ready requirements, solar access is the ratio of solar insolation including shading to the solar insolation without shading. Annual solar access is most easily determined using a CEC-certified solar assessment tool.

$$Solar\ Access = \frac{Solar\ Insolation\ Including\ Shading}{Solar\ Insolation\ Without\ Shading}$$

First, evaluate whether there are any obstructions outside the building that will shade the rooftop (or other prospective solar zone areas such as overhangs or parking shade structures). If an existing obstruction outside of the building is located north of all potential solar zones, the obstruction o will not shade the solar zone. Similarly, if the horizontal distance ("D") from the obstruction to the solar zone is at least two times the height difference ("H") between the highest point of the obstruction and the horizontal projection of the nearest point of the solar zone, then the obstruction will not shade the solar zone.

Step 2: Determine the potential solar zone area: On low-sloped roofs, the potential solar zone is the area where annual solar access is ≥ 70 percent.

On steep-sloped roofs the potential solar zone is the area where the annual solar access is

≥ 70 percent on the portion of the roof that is oriented between 90 and 300 degrees of true north.

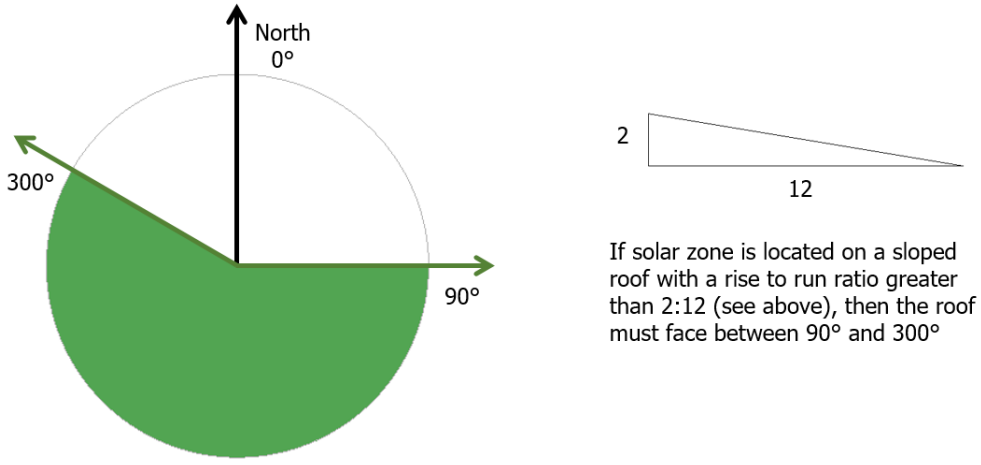
Exception 5: Applies to hotel/motel, and nonresidential buildings. If the roof is designed and approved to be a heliport, or used for vehicular traffic or parking, no solar zone is required. Therefore, interconnection pathway and documentation requirements do not apply.

Solar Zone Azimuth

Reference: Section 110.10(b)2

All sections of the solar zone on steep-sloped roofs (rise-to-run ratio greater than 2:12, or 10 degrees) must face between azimuths of 90 degrees and 300 degrees of true north. This range of azimuths ensures an ample solar exposure if a solar energy system is installed in the future. On a low-sloped roof (rise-to-run ratio equal to or less than 2:12, or 10 degrees), the azimuth requirement does not apply.

Figure 9-5: Azimuth of Roof If Solar Zone Is Located on Steep-Sloped Roof



Source: California Energy Commission

Solar Zone Shading

Please refer to Chapter 9.8.5.2 of the *2022 Nonresidential and Multifamily Compliance Manual*.

Solar Zone Structural Design Loads

The structural design load requirements apply if any portion of the solar zone is located on the roof of the building. For the areas of the roof designated as the solar zone, the structural design loads for roof dead load and roof live load shall be clearly indicated on the construction documents. This is required so that the structural loads are known if a solar energy system is installed in the future.

The Energy Code does not require estimating the loads of possible future solar equipment.

Interconnection Pathways

All buildings that include a solar zone must also include a plan for connecting a PV or SWH system to the electrical or plumbing system of the building. The construction documents must indicate:

1. A location for inverters and metering equipment for future solar electric systems. The allocated space should be appropriately sized for a PV system that could cover the entire solar zone.
2. A pathway for routing conduit from the solar zone to the point of interconnection with the electrical service. The design drawings must show where the conduit would be installed if a system were installed at a future date. There is no requirement to install conduit.
3. A pathway for routing plumbing from the solar zone to the water-heating system connection. The design drawings must show where the plumbing would be installed if a SWH system were installed at a future date. There is no requirement to install piping.

This requirement is not applicable if compliance is achieved by using Exceptions 1, 2, or 4 in lieu of a designated solar zone.

Documentation for the Building Occupant

A copy of the construction documents that show the solar zone, the structural design loads, and the interconnection pathways must be provided to the building occupant. The building occupant must also receive a copy of compliance document NRCC-SRA-E. The document copies are required so that the solar-ready information is available if the occupant decides to install a solar energy system in the future. This requirement is not applicable if compliance is achieved by using Exceptions 1, 2 or 5 in lieu of a designated solar zone.

Main Electrical Service Panel

To anticipate the electrical loads of a future solar PV system, the main electrical service panel must have:

1. A minimum busbar rating of 200 amps; and
2. A reserved space to allow for the installation of a double pole circuit breaker. The reserved space shall be permanently marked as, "For Future Solar Electric."

Additions

The solar-ready requirements for additions are specified in §141.0(a). Additions are not required to comply with the solar-ready requirements unless the addition increases the existing building roof area by more than 2,000 sq. ft.

California Fire Code Solar Access Requirements

The current versions of Title 24, Part 2, California Building Code, Section 3111, and Part 9, California Fire Code, Section 1205 include requirements for installing rooftop solar photovoltaic systems. These regulations cover the marking and location of DC conductors and access and pathways for photovoltaic systems.

Compliance and Enforcement

At the time a building permit application is submitted to the enforcement agency, the applicant also submits plans and energy compliance documentation. This section describes the documents and procedures for documenting compliance with the solar-ready requirements of the Energy Code. The following discussion is addressed to the designer preparing construction and compliance documents and to enforcement agency plan checkers who are examining those documents for compliance with the Energy Code.

There are two documents to demonstrate compliance with the nonresidential solar ready requirements. Each document is briefly described below.

NRCC-SAB-E: Certificate of Compliance: Solar and Battery

This document is required for every project where the solar-ready requirements apply: newly constructed hotel/motel buildings with 10 or fewer stories, high-rise multifamily buildings with 10 or fewer stories, all other newly constructed nonresidential buildings with 3 or fewer stories, and additions to the previously mentioned buildings that increase the roof area by more than 2,000 sq. ft. This form is required for all covered occupancies, including projects that use any of the solar zone exceptions.

NRCI-SAB-01-E: Certificate of Installation — Solar and Battery

This document is required when using solar zone Exception 1 to achieve compliance.