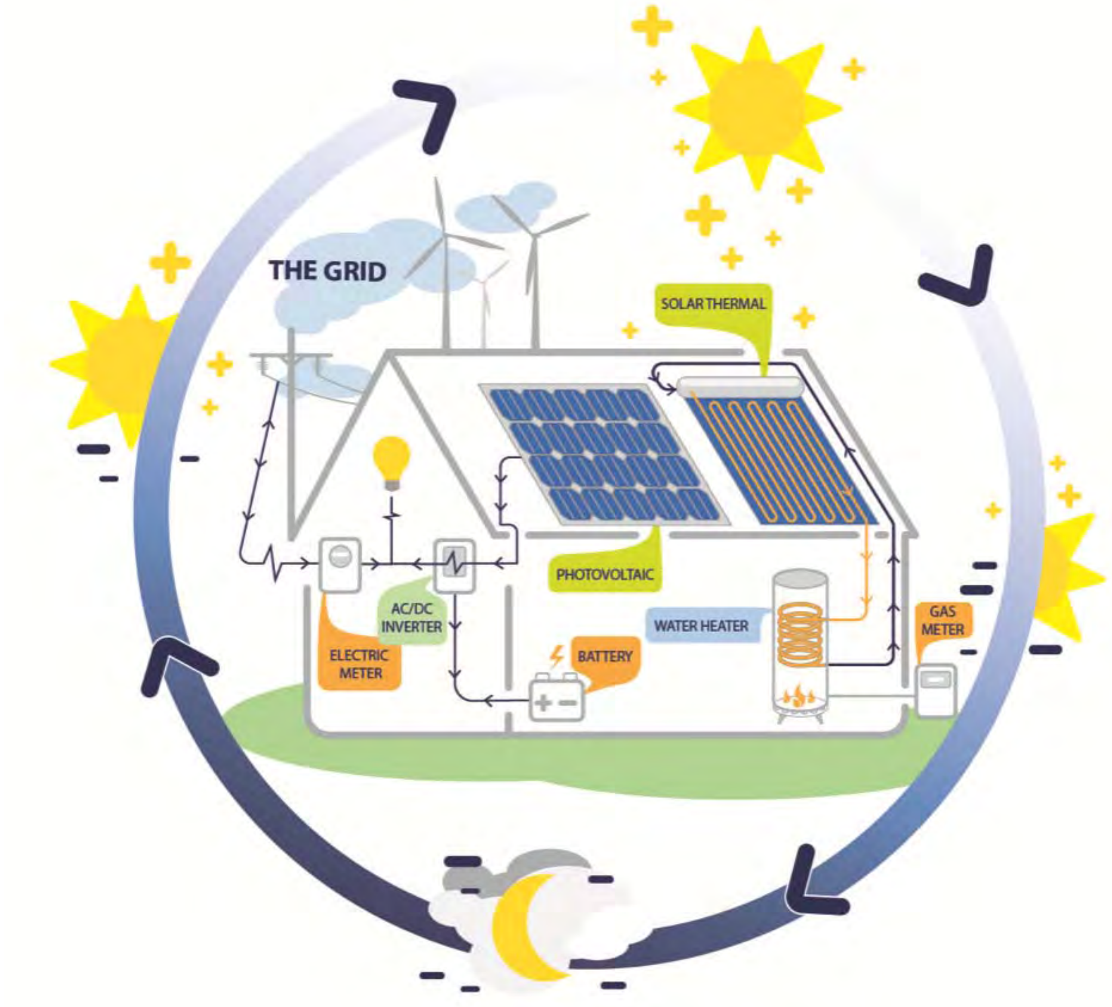
Decoding ✳ Renewables™
Let's Talk PV, Solar & Energy Compliance

Energy Code Ace™ — HELPING YOU PLAY YOUR CARDS RIGHT

Building energy efficiency will always come first when it comes to saving energy and compliance with the energy code, but renewable energy is playing an important role in managing the increasing energy demand in residential buildings.



Building energy efficiency reduces the amount of energy typically used for space heating, cooling and hot water. Building energy efficiency measures include increased insulation, better window performance, and high-efficiency mechanical equipment.

Renewable energy comes from sources that are not depleted when used, such as wind, solar PV and solar hot water.

When building energy efficiency and solar PV are combined with battery storage and controls, it can allow electricity use to be shifted across hours of the day to decrease electric energy use on-peak or increase use off-peak. This strategy is called demand flexibility or grid harmonization. It maximizes on-site use of electricity from home PV systems and minimizes electric energy exports from PV systems to the grid.

SDGE A Sempra Energy utility® | SoCalGas A Sempra Energy utility® | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL® Company | PG&E Pacific Gas and Electric Company®

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	**Single Family** *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency (min. 7.5 kWh for 25% PV reduction, min. 5 kWh for building efficiency reduction)
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units[2]*	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency (min. 7.5 kWh per dwelling unit for 25% PV reduction, min. 5 kWh for building efficiency reduction)
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic l Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	**Nonresidential**	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily *(≥4 habitable story);* **Hotel/Motel**	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

Decoding Renewables™

Exceptions to Single Family Solar Ready §110.10

2016: 250 ft² reserved on roof or overhang

Exception 1
PV system with DC rating ≥1,000 W

Exception 2
Solar Thermal System with 50% SSF

Reduced Solar Area:

Exception 3: Reduced to 150 ft²
≥3 habitable stories and floor area ≤2,000 ft²

Exception 4: Reduced to 150 ft²
CZ 8-14 when in WUI area and installing whole house fan

Exception 5a: Reduced to 50% of potential solar area when Potential Solar Zone of **low sloped roof:**
Roof area within "Annual Solar access" ≥70%

Exception 5b: Reduced to 50% of potential solar area when Potential Solar Zone of **steeped sloped roof:**
Roof area within **110 and 270** degrees of true north (0) with "Annual Solar access" ≥70%

Exception 6: Reduced to 150 ft² when JA5 thermostat installed and receiving signals at final inspection

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)* / Solar Insolation without Shading *(this includes areas shaded by parts of building)*

Exception 7
Approved JA5 Thermostat in **and one of the following:**

- Energy Star dishwasher/refrigerator or A whole house fan
- Home automation system
- Alternative plumbing system
- Rainwater catchment system

JA5 Thermostat

2019: 250 ft² reserved on roof or overhang when PV not installed

Exception 1
Solar Thermal System with 50% SSF

Reduced Solar Area:

Exception 2: Reduced to 150 ft²
≥3 habitable stories and floor area ≤2,000 ft²

Exception 3: Reduced to 150 ft²
In WUI area and installing whole house fan **(CZ removed)**

Exception 4a: Reduced to 50% of potential solar area when Potential Solar Zone of **low sloped roof:**
Roof area within "Annual Solar access" ≥70%

Exception 4b: Reduced to 50% of potential solar area when Potential Solar Zone of **steeped sloped roof:**
Roof area within **90 and 300** ~~**110 and 270**~~ degrees of true north (0) with "Annual Solar access" ≥70%

Exception 5: Reduced to 150 ft² when JA5 thermostat installed and receiving signals at final inspection

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)* / Solar Insolation without Shading *(this includes areas shaded by parts of building)*

Exception 6
Approved JA5 Thermostat in EACH dwelling unit **and one of the following:**

- *Energy Star dishwasher/refrigerator or*
- *A whole house fan* ***or***
- ***SAE J1772 Level 2 EVSE/EV charge with 40 amperes or more***

Decoding Renewables™

2019 Exception to PV: Low-Rise §150.1(c)14

If roof facing between E (90) and WNW (300)* **gets >70% Sun**

Exception 1
If that area(s) is <80 ft² of contiguous area *then:*

No PV Required and use Solar Ready requirements

If the areas(s) are ≥80 ft² *then:*

Exception 3
2 habitable stories:
PV = Min. 1 W/ft² of conditioned floor area

Exception 4
3 habitable stories:
PV = Min. 0.8 W/ft² of conditioned floor area

Exception 2
Building in CZ 15:
PV = Min. 1.5 W/ft² of conditioned floor area

Exception 5
Planning Approval prior to 1/1/2020, when solar ready area between 80-200 ft², *then:*

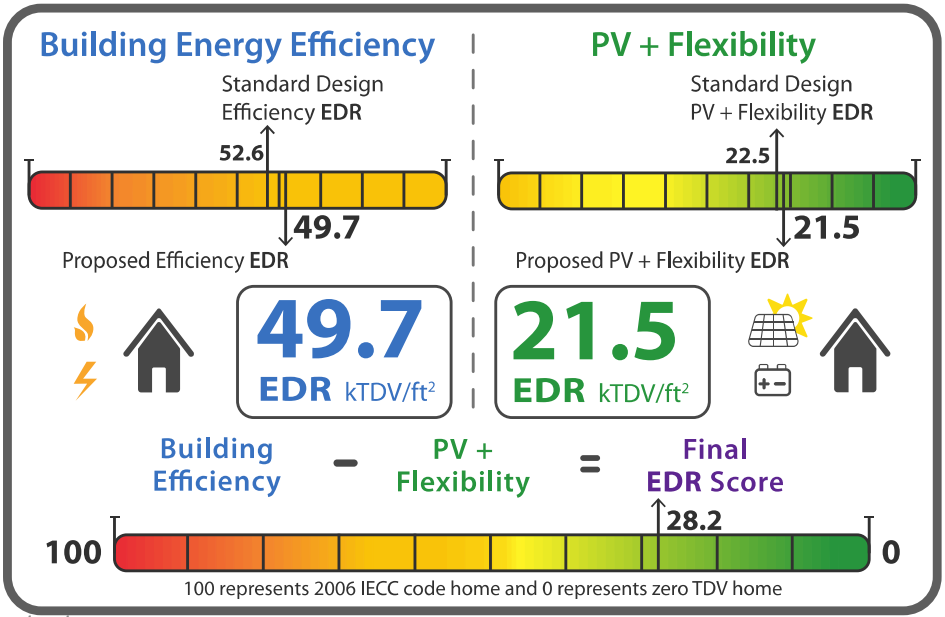
Smaller of either required PV (per Table 150.1-C) or effective annual solar access

Exception 6
If building installing **battery (JA12) min. capacity of 7.5 kWh** *then:*

PV can be reduced by 25%

*If not within this orientation, performance method to be used based on actual orientation. If CA Flexible Installation (CFI) used in performance method, additional requirements apply.

2019 Title 24 Part 6:
Energy Design (EDR) Performance Compliance for New Construction



The building complies when the Proposed Building Energy Efficiency EDR is equal to or less than the Standard Building Energy Efficiency EDR.

- Battery can be used towards building efficiency EDR

In addition, PV + Flexibility EDR which must be equal to or less than the Standard PV + Flexibility EDR.

- Any Building Efficiency savings, beyond standard, can be used towards the PV +Flex EDR

Key
Natural or propane gas energy source.
Electricity energy source.
Photovoltaic energy source.
Battery storage energy source.
EDR Energy Design Rating.

Material Revised

- Often times when we engage in meaningful conversations about the building energy code, we learn of various ways in which the standards language can be interpreted. This Decoding Talk was no exception. Points of clarification include:
  - 2016 Nonresidential Solar Thermal for Service Hot Water: This is no longer an option for the 2016 code to use these systems for performance credit, and the next version of 2016 software will not include this as a modeling feature.
  - 2019 Residential EDR: You can trade building efficiency EDR that exceeds the minimum standard EDR requirements, towards the PV + Flexibility EDR. What is restricted is when the PV system exceeds the minimum standard requirements; trading that additional EDR energy towards Building Efficiency EDR is restricted.
  - 2019 Highrise Residential and Hotel/Motel Solar Ready Exception #4: It has been clarified that the 2019 Title 24 Part 11 has different requirements for EV Charging Spaces than what is required for single family. It was stated during our live sessions that each dwelling unit would be required to meet Title 24 Part 11 Section A4.106.8.2 for EV Charging Station, assuming that this referred to installed chargers, but it is really referring to a certain numbers of parking spaces (15% or more) that need to be EV Charging Stations ready for future EVSE equipment. This option only has to be paired with a JA5 in each dwelling unit, it does not need to paired with any of the other options. The revised flowchart is inserted below.

Decoding Renewables:
Let's Talk PV, Solar & Energy Compliance

HELPING YOU PLAY YOUR CARDS RIGHT

Brought to you by…

California Statewide Codes & Standards

EnergyCode Ace™
Helping you play your cards right

SDGE
A Sempra Energy utility®

SoCalGas
A Sempra Energy utility®

SOUTHERN CALIFORNIA EDISON®
An EDISON INTERNATIONAL® Company

PG&E Pacific Gas and Electric Company®

This program is funded by California utility customers under the auspices of the California Public Utilities Commission and in support of the California Energy Commission.

Who Are We?

Gina Rodda

Principal/Owner

gina@gabelenergy.com

GABEL ENERGY

BUILDING ENERGY ANALYSIS + ENERGY CODE COMPLIANCE

Host: Gina Rodda

Gina Rodda, our host for the Decoding Talk series, is a Certified Energy Analyst (CEA), and LEED Accredited Professional (AP).

She is involved in providing residential and non-residential energy calculations for a variety of building types throughout California; an instructor of full day trainings; and host of various webinars specific to Title 24 (Part 6) Building Energy Efficiency Standards.

Gina has been in the energy modeling field since 1991, starting the ninth California building energy code cycle of her career.

Who Are We?

Brian Selby, Selby Energy, Inc.
brian@selbyenergyinc.com

Co-Host: Brian Selby

Brian is a Principal at Selby Energy, Inc., where his primary role is developing and delivering energy code training for the Energy Codes Ace Title 24 Essentials courses.

He has over 30 years' experience as an energy consultant and residential building designer and has been a HERS rater for over 15 years.

Brian is a Certified Energy Analyst (CEA), HERS Rater and serves on the CABEC board of directors.

Selby Energy Inc.

Decoding Renewables

- Understanding how building types (single family, multifamily and commercial) dictate when renewables are allowed for compliance with the energy code;
- Applying the current renewable requirements and recognizing how they may, or may not, change for future code cycles;
- Strategies for applying renewable energy for energy code compliance.

Why?

Handouts

Decoding Renewables™

Let's Talk PV, Solar & Energy Compliance

Energy Code Ace™
HELPING YOU PLAY YOUR CARDS RIGHT

Building energy efficiency will always come first when it comes to saving energy and compliance with the energy code, but renewable energy is playing an important role in managing the increasing energy demand in residential buildings.

Building energy efficiency reduces the amount of energy typically used for space heating, cooling and hot water. Building energy efficiency measures include increased insulation, better window performance, and high-efficiency mechanical equipment.

Renewable energy comes from sources that are not depleted when used, such as wind, solar PV and solar hot water.

When building energy efficiency and solar PV are combined with battery storage and controls, it can allow electricity use to be shifted across hours of the day to decrease electric energy use on-peak or increase use off-peak. This strategy is called demand flexibility or grid harmonization. It maximizes on-site use of electricity from home PV systems and minimizes electric energy exports from PV systems to the grid.

SDGE A Sempra Energy utility® SoCalGas A Sempra Energy utility® Southern California Edison® An EDISON INTERNATIONAL Company PG&E Pacific Gas and Electric Company®

11/29/2018 Page 1 of 4

2016 ENERGY CODE

Ace Resources Title 24, Part 6 Fact Sheet

Residential and Nonresidential

High-Rise and Low-Rise Multifamily

What is High-Rise and Low-Rise Multifamily?

Multifamily buildings contain multiple dwelling units that share common walls and may also share common floors or ceilings. Hotel and motel buildings are not considered multifamily.

Building type, and the number of habitable stories in a multifamily building dictates whether it is considered "high-rise" or "low-rise"- and which of the Title 24, Part 6 Building Energy Efficiency Standards (Energy Standards) requirements apply to it. Multifamily buildings with four or more habitable stories are considered high-rise, while buildings with three or fewer habitable stories, and duplexes and townhomes are considered low-rise.

Why? When applying the Energy Standards, it is important to properly identify the project as low-rise or high-rise multifamily. Multifamily projects are complicated because a mixture of nonresidential and residential requirements apply based on the space types within the building. In addition, there are specific high-rise residential requirements for some Prescriptive requirements. See Table 1 for a summary of which sections in the Energy Standards apply to multifamily building types.

2016 California Building Energy Efficiency Standards

Project Type	Requirement Type	Relevant Sections
All Occupancies		
Scope, Definitions and Rules of Construction	All occupancies	100.0-100.2
Mandatory Requirements	All occupancies	110.0-110.11
Low-Rise Residential		
Common Area Indoor Lighting	Nonresidential*	130.0, 130.1, 130.4, 140.3, 140.6
Dwelling Unit Indoor Lighting and Outdoor Lighting	Residential	130.0, 150.0, 150.1
HVAC, Envelope and DHW	Residential	150.0, 150.1
Pool/Spa Systems	Residential	150.0
Additions, Alterations, Repairs	Residential	150.2
High-Rise Residential		
Dwelling Unit Indoor Lighting and Outdoor Lighting (Controls Within Unit)	Residential	130.0, 150.0, 150.1
Common Area Indoor Lighting and Outdoor Lighting (Controls Outside Unit)	Nonresidential	120.8, 130.0, 130.1, 130.2, 130.4, 140.3, 140.6, 140.7
Electrical Power Distribution	Nonresidential	130.5
HVAC	Nonresidential	120.0-120.5, 120.8, 140.4
Envelope	High-rise Residential	120.7, 120.8, 140.3
DHW	Residential	120.3, 120.8, 120.9, 140.5
Pool/Spa Systems	Residential	150.0
Additions, Alterations, Repairs	Nonresidential	141.0

* May be able to use residential requirements based on common area as percentage of conditioned floor area (see Section 150.0(k)6)

Table 1: Multifamily Projects: Applicable Energy Standards Sections

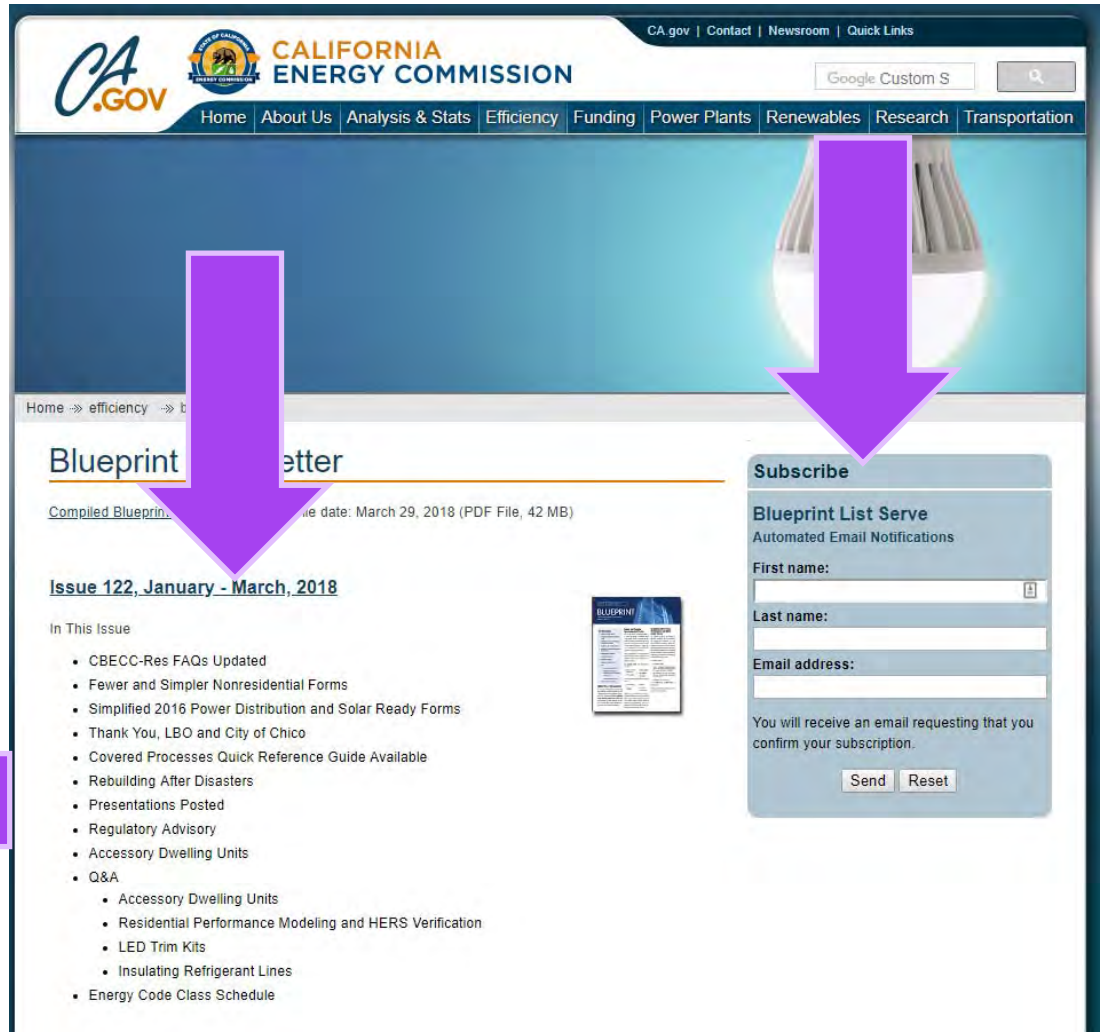
EnergyCodeAce™ Helping you play your cards right

2016 Title 24, Part 6 - Residential and Nonresidential High-Rise and Low-Rise Multifamily

Page 1 of 6
2018-10-17

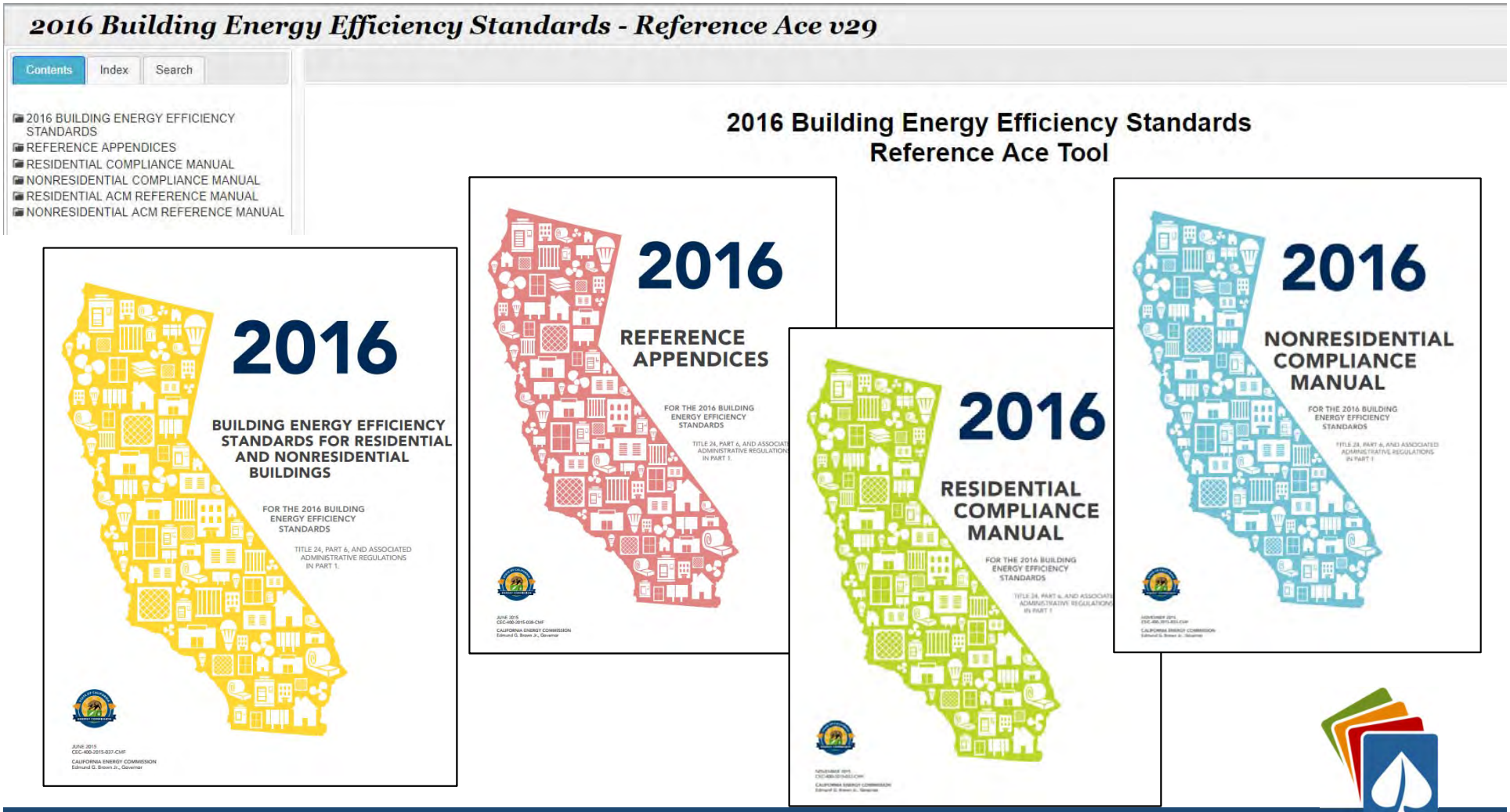
Where to get the Blueprints(s)

Online Resource Center
http://www.energy.ca.gov/title24/orc/



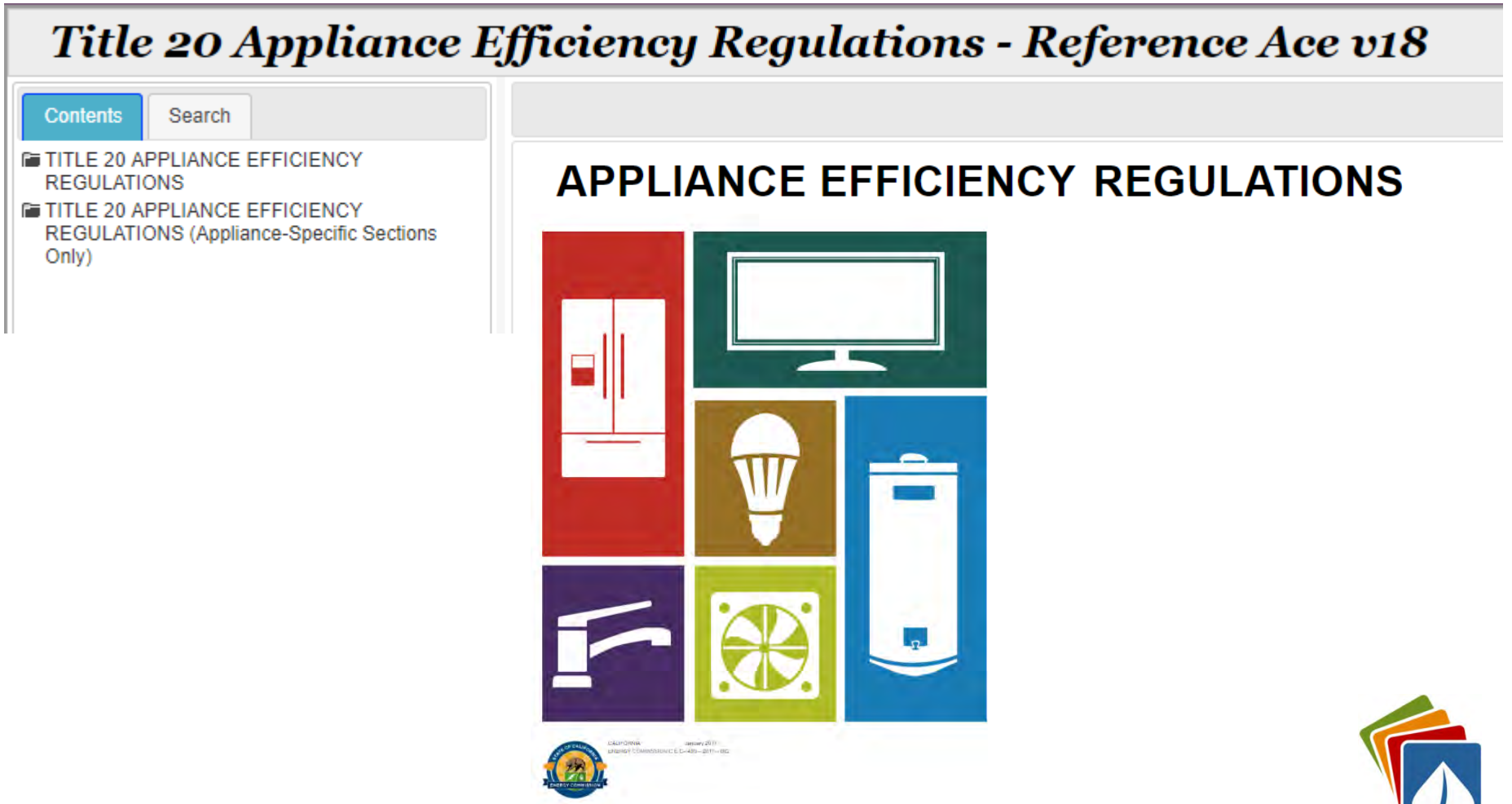
Ace Tools™

Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections



EnergyCodeAce.com/tools

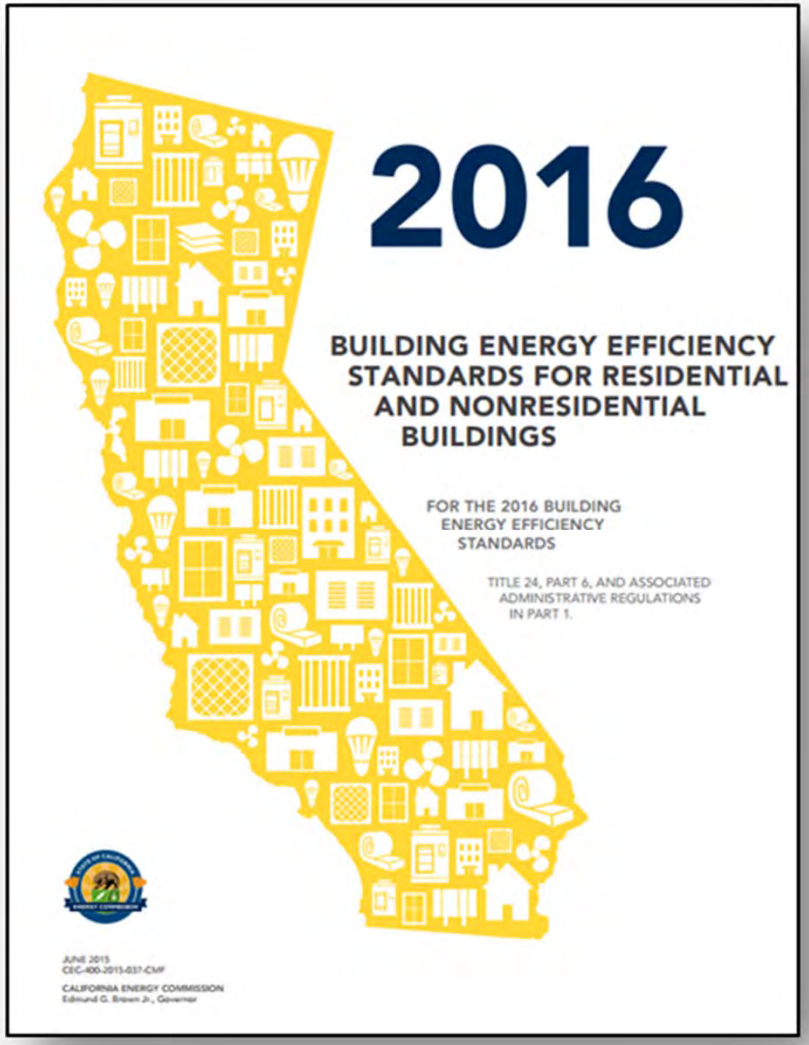
Helps you navigate the Standards using key word search capabilities, hyperlinked tables and related sections



https://energycodeace.com/content/reference-ace-t20-tool

Which Code Year Applies? Permit pulled….

Jan. 2017- Dec. 2019



Jan. 2020- Dec. 2023

SUBCHAPTER 1
ALL OCCUPANCIES—GENERAL PROVISIONS

SECTION 100.0 – SCOPE

(a) **Buildings Covered.** The provisions of Part 6 apply to all buildings:

1. That are of Occupancy Group A, B, E, F, H, I, M, R, S, or U; and
2. For which an application for a building permit or renewal of an existing permit is filed (or is required by law to be filed) on or after the effective date of the provisions, or which are constructed by a governmental agency; and
3. That are:
   A. Unconditioned; or
   B. Indirectly or directly conditioned ~~by mechanical heating or mechanical cooling~~, or process spaces; ~~or~~
   ~~C. Low-rise residential buildings that are heated with a non-mechanical heating system.~~

EXCEPTION 1 to Section 100.0(a): Qualified historic buildings, as regulated by the California Historic Building Code (Title 24, Part 8). Lighting in qualified historic buildings shall comply with the applicable requirements in Section 140.6(a)3Q.

EXCEPTION 2 to Section 100.0(a): Building departments, at their discretion, may exempt temporary buildings, temporary outdoor lighting or temporary lighting in an unconditioned building, or structures erected in response to a natural disaster. Temporary buildings or structures shall be completely removed upon the expiration of the time limit stated in the permit.

EXCEPTION 3 to Section 100.0(a): Buildings in Occupancy Group I-3 and I-4.

(b) **Parts of Buildings Regulated.** The provisions of Part 6 apply to the building envelope, space-conditioning systems, water-heating systems, pool and spas, solar ready buildings, indoor lighting systems of buildings, outdoor lighting systems, electrical power distribution systems, and signs located either indoors or outdoors, in buildings that are:

1. Covered by Section 100.0(a); and
2. Set forth in TABLE 100.0-A.

(c) **Habitable Stories.**

1. All conditioned space in a story shall comply with Part 6 whether or not the story is a habitable space.
2. All unconditioned space in a story shall comply with the lighting requirements of Part 6 whether or not the story is a habitable space.

(d) **Outdoor Lighting and Indoor and Outdoor Signs.** The provisions of Part 6 apply to outdoor lighting systems and to signs located either indoors or outdoors as set forth in TABLE 100.0-A.

(e) **Sections Applicable to Particular Buildings.** TABLE 100.0-A and this subsection list the provisions of Part 6 that are applicable to different types of buildings covered by Section 100.0(a).

1. **All buildings.** Sections 100.0 through 110.12~~110.10~~ apply to all buildings.

   EXCEPTION to Section 100.0(e)1: Spaces or requirements not listed in TABLE 100.0-A.

2. **Newly constructed buildings.**
   A. **All newly constructed buildings.** Sections 110.0 through 110.12~~110.10~~ apply to all newly constructed buildings within the scope of Section 100.0(a). In addition, newly constructed buildings shall meet the requirements of Subsections B, C, D or E, as applicable.

What? Title 24 Part 6: Energy Code

http://www.energy.ca.gov/title24/2016standards/index.html

Mandatory, Prescriptive, Performance

1. Mandatory Measures

2. Prescriptive Approach

or

3. Performance Approach

- Requires the use of Energy Commission approved software
- Most flexible approach, allows for trade-offs
- Proposed energy budget ≤ Standard energy budget

Moving Towards 2019 Code Cycle

As presented by Mazi Shirakh, PE during PreRulemaking on August 22, 2017

Building Energy Efficiency Standards

1. Increase building energy efficiency cost effectively
2. For Part 6, make **progress toward the ZNE** goal as possible within the **confines of NEM and life cycle costing rules**, while recognizing that Part 6 is an important but not the only tool for achieving ZNE
3. Contribute to the State's GHG reduction goals
4. **Promote self-utilization of the PV generation** by encouraging or requiring **demand flexibility and grid harmonization strategies**
5. Provide **independent compliance path** for both mixed-fuel and all electric homes
6. Achieve the above goals while ensuring real benefits for the building occupants with **positive benefit to cost ratios** for all efficiency and generation measures
7. Provide the tools for local governments to adopt **ordinances to achieve ZNE through** Part 11 Reach Codes, and other beyond code practices

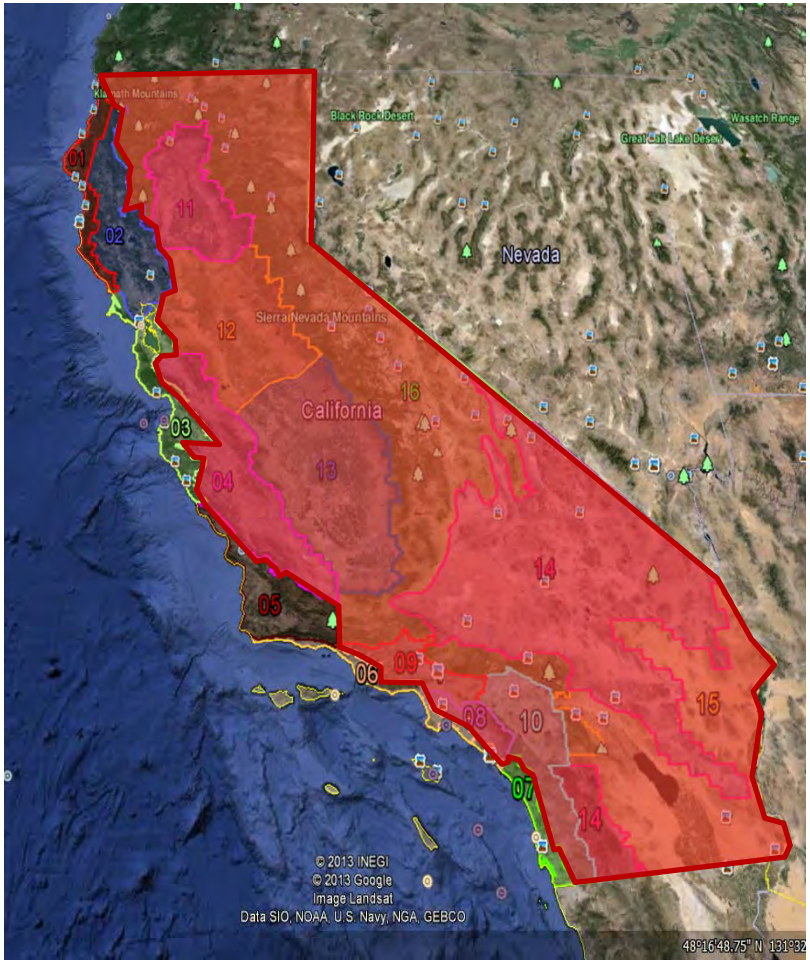
The proposed 2019 Standards strategy will accomplish all seven goals listed above

10

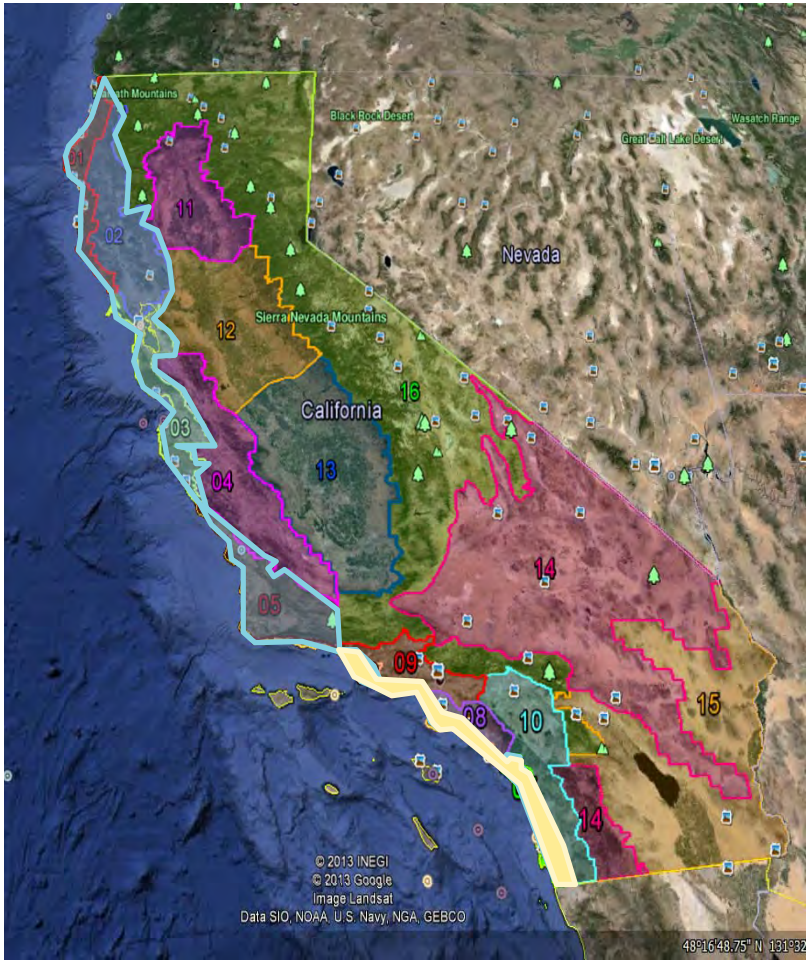
https://efiling.energy.ca.gov/GetDocument.aspx?tn=220876

Prescriptive Package A: §150.1

Hot/Cold Climate Zones



Mild Climate Zones



Our Question To You

What is your biggest challenge in understanding how renewables (Photo voltaic (PV) / Solar thermal Water Heating / Battery Storage) factor into a building's "compliance" margin?
What part should renewables play (energy generation) in building energy efficiency (Title 24)?
What are your top 3 concerns regarding renewables?
If you could wave your magic wand, the energy code would allow renewables to _____ .

A credit in compliance

To educate homeowners about cost related to renewable; Space constraints; Too vague and overhyped renewable myths

Be paid for by the carbon tax and be free to the builders/owners.

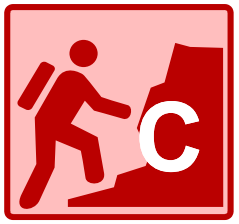
affordability, accessibility, location

Let's Talk

Challenges

- **Challenge A: 2016 Low-Rise Residential**
  - ***Not Including Multifamily***

- **Challenge B: 2016 Multifamily & Hotel/Motel**
  - ***Low-Rise and High-Rise***



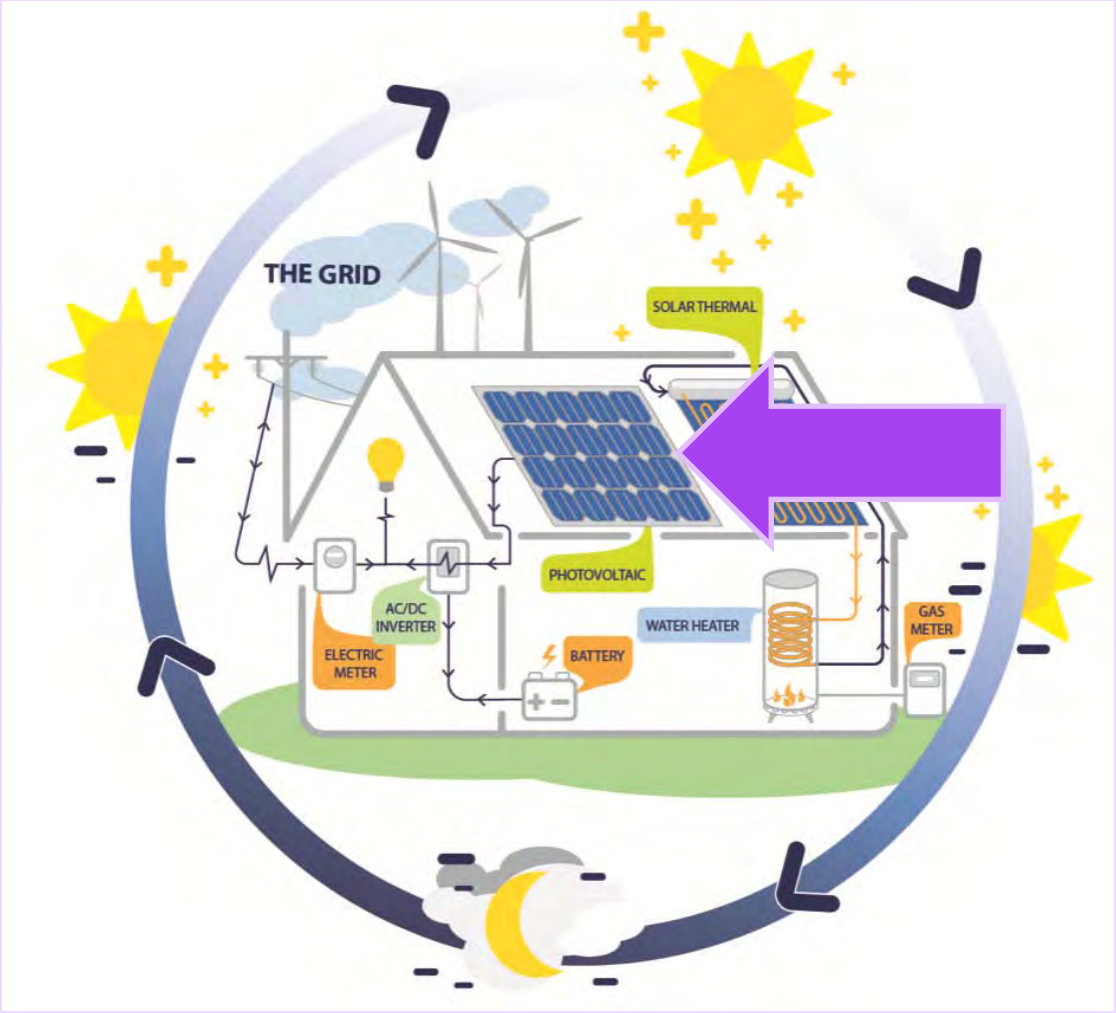
- **Challenge C: 2016 Nonresidential**
  - ***Not Including Multifamily***

- **Challenge D: 2019 Strategies for Compliance**
  - ***Nonresidential, High-Rise Multifamily, Hotel/Motel***
  - ***Residential: EDR; Solar Access; Sizing of PV; Flexibility***

Challenge A


Challenge A
2016 Low-Rise Residential
Not Including Multifamily

Photovoltaics (PV): Res ACM



PV Performance Option: 2016

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (≥4 habitable story); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

PV Performance Option: New Homes Only: 2016

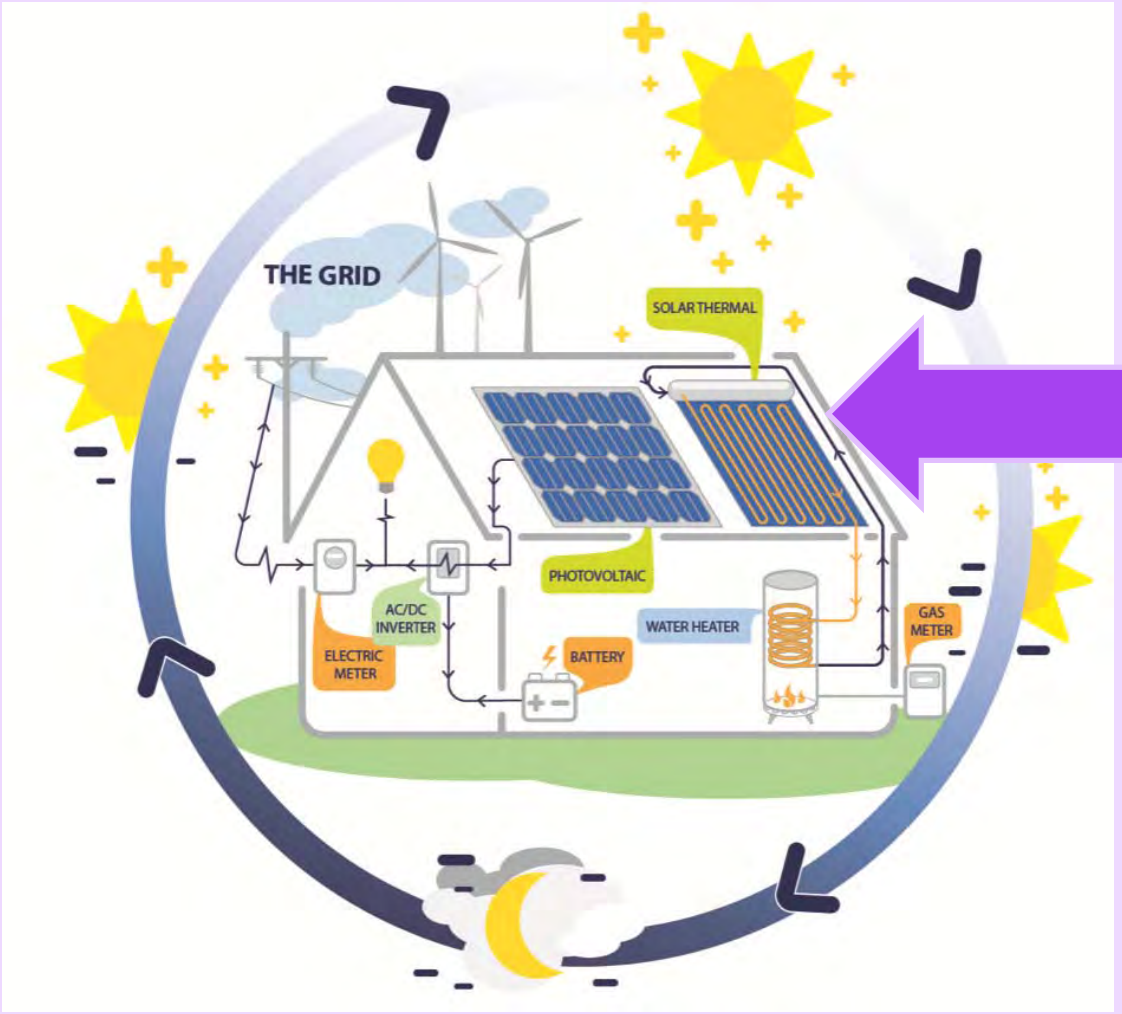
Table 1: PV Credit Calculation Factors

Climate Zone	PV Generation Rate(kTDV/kWdc)	Maximum PV Credit for Single Family	Maximum PV Credit for Multi Family
01	26762	8.0%	4.4%
02	30021	8.6%	5.0%
03	31137	6.9%	3.1%
04	30935	17.7%	11.4%
05	33490	7.6%	2.3%
06	30081	0.0%	0.0%
07	30701	0.0%	0.0%
08	29254	28.1%	9.1%
09	29889	25.9%	11.0%
10	30200	23.1%	10.0%
11	29693	17.7%	8.7%
12	29328	22.0%	9.5%
13	29553	19.8%	9.2%
14	31651	16.0%	8.2%
15	29177	16.3%	7.3%
16	30930	15.1%	8.6%

Residential ACM 2.2.3

- The maximum PV credits calculated by using a prototype analysis with the proposed features set equal to the 2016 prescriptive requirements **except:**
  - ***Replacing the 2016 high performance attics (HPA) and high performance walls (HPW) with the 2013 prescriptive requirements***.
    - Climate zones 6 and 7 have no 2016 requirement for either HPA or HPW, so there is no PV credit in those climate zones.

Solar Thermal: Res ACM



PV Performance Option: 2016

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (≥4 habitable story); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

Solar Performance Option: 2016

Residential ACM 2.9.3

- When a water heating system has a solar thermal system to provide part of the water heating, provide one of the following:
  - **Solar Fraction (SF) using the CEC Solar Water Heating Calculator,**
  - **OG-100 calculation method, or**
  - **The certified OG-300 rating**.
- The calculation method requires that the user specify the:
  - climate zone,
  - conditioned floor area,
  - Solar Savings Fraction (SSF).

Single Family: 2016

Solar Ready: §110.10

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units[2]*	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (≥4 habitable story); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

- Subdivisions with ten or more single family residences and;
- Application for a *tentative subdivision map dated July 1, 2014 or later*, for the residences has been deemed complete, by the enforcement agency.

NEW Tool at Energy Code Ace: 2016

Q&Ace

Check out the Top Topics below or use the filters on the right to find more.

Search

subdivisions

Explore th

Solar: Requirements for Single-Family Homes in Subdivisions

Occupancy: Residential
Project Scope: New Construction
Standards Version: Title 24, Part 6: 2016 Standard, 2013 Standard

Do the solar ready requirements apply to all single family homes?

Solar: Changes to Requirements from 2013 to 2016 Energy Standard

Occupancy: Residential
Project Scope: New Construction
Standards Version: Title 24, Part 6: 2016 Standard

Are there changes to the ady requirements in the 2016 Energy Standards?

The solar ready requi ngle family homes in subdivisions of 10 homes or more stil
map application date. Th ete map application date of July 1, 2014, still applies. In addit

Reference: CEC Blueprint July-Aug2016

mplete

Issue 115 | July – August 2016

BLUEPRINT

California Energy Commission
Efficiency Division

In This Issue

New 2013 Home Energy Rating System Provider

The California Energy Commission (Energy Commission) has approved ConSol Home Energy Efficiency Rating Services (CHEERS) as a Home Energy Rating System (HERS) Provider under the *2013 Building Energy Efficiency Standards* (Energy Standards).

CHEERS is authorized to train and certify HERS raters for field verification and diagnostic testing for newly constructed, additions, and alterations to residential buildings.

CHEERS may be reached at:
Phone: (800) 424-3377
Email: **info@CHEERS.org**
Website: **www.CHEERS.org**

For a complete list of approved HERS Providers, please visit: **http://www.energy.ca.gov/HERS/providers.html**.

Easy Navigation of the 2016 Energy Standards and Compliance Manuals

Navigating the electronic versions of the 2016 Energy Standards and compliance manuals just got easier.

2016 Energy Standards

Section references throughout the **2016 Energy Standards** are now linked to quickly take you to that section. These links work on both the downloaded and web based versions.

TABLE 100.0-A, which directs you to the appropriate section based on building and project type, is now available for download **separately** from the Energy Standards. To use the links in the downloaded version you must be connected to the internet.

2016 Compliance Manuals

The 2016 **Residential** and **Nonresidential** Compliance Manuals have also been updated to include links to the chapters. These links work on both the downloaded and web based versions.

Air-to-Water Heat Pump Systems Efficiency Data

Starting July 1, 2016, air-to-water heat pump systems must be listed in the **Appliance Efficiency Database**. An independent list of manufacturer certified air-to-water heat pump systems will no longer be maintained. This reduces the number of sources needed to locate efficiency data.

These systems can be used to provide space conditioning, water heating, or both. Modeling of these systems for compliance credit remains the same.

Air-to-water heat pump systems are not regulated for efficiency. Manufacturers must test and list these products in the **Appliance Efficiency Database**. To locate these systems in the database select *Appliance Search*, followed by *Appliance Type*. For *Category* select Central Heat Pumps and for *Appliance Type* select Heat Pump Water Heating Packages.

Low-Rise Residential: Single Family 2016

Minimum Area: Designed

- The solar zone shall be *designed to be* located on the roof or overhang of the building and have a total area no less than 250 square feet OR
  - Use an exception.

EXCEPTION 1 to Section 110.10(b)1A: Single family residences with a permanently installed solar electric system having a nameplate DC power rating, measured under Standard Test Conditions, of no less than 1000 watts.

EXCEPTION 2 to Section 110.10(b)1A: Single family residences with a permanently installed domestic solar water-heating system meeting the installation criteria specified in the Reference Residential Appendix RA4 and with a minimum solar savings fraction of 0.50.

EXCEPTION 3 to Section 110.10(b)1A: Single family residences with three habitable stories or more and with a total floor area less than or equal to 2000 square feet and having a solar zone total area no less than 150 square feet.

EXCEPTION 4 to Section 110.10(b)1A: Single family residences located in Climate zones 8-14 and the Wildland-Urban Interface Fire Area as defined in Title 24, Part 2 and having a whole house fan and having a solar zone total area no less than 150 square feet.

EXCEPTION 5 to Section 110.10(b)1A: Buildings with a designated solar zone area that is no less than 50 percent of the potential solar zone area. The potential solar zone area is the total area of any low-sloped roofs where the annual solar access is 70 percent or greater and any steep-sloped roofs oriented between 110 degrees and 270 degrees of true north where the annual solar access is 70 percent or greater. Solar access is the ratio of solar insolation including shade to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

EXCEPTION 6 to Section 110.10(b)1A: Single family residences having a solar zone total area no less than 150 square feet and where all thermostats comply with Reference Joint Appendix JA5 and are capable of receiving and responding to Demand Response Signals prior to granting of an occupancy permit by the enforcing agency.

EXCEPTION 7 to Section 110.10(b)1A: Single family residences meeting the following conditions:

A. All thermostats comply with Reference Joint Appendix JA5 and are capable of receiving and responding to Demand Response Signals prior to granting of an occupancy permit by the enforcing agency.

B. Comply with one of the following measures:

   i. Install a dishwasher that meets or exceeds the ENERGY STAR Program requirements with either a refrigerator that meets or exceeds the ENERGY STAR Program requirements or a whole house fan driven by an electronically commutated motor; or

   ii. Install a home automation system capable of, at a minimum, controlling the appliances and lighting of the dwelling and responding to demand response signals; or

   iii. Install alternative plumbing piping to permit the discharge from the clothes washer and all showers and bathtubs to be used for an irrigation system in compliance with the *California Plumbing Code* and any applicable local ordinances; or

   iv. Install a rainwater catchment system designed to comply with the *California Plumbing Code* and any applicable local ordinances, and that uses rainwater flowing from at least 65 percent of the available roof area

Solar Ready Exceptions: 2016

A typical 1kWdc system often has approximately four PV panels, depending on the PV efficiency.

Exception 1: No Solar Ready Area Required

- Single family residences with a **permanently installed** solar electric system having a nameplate DC power rating, measured under Standard Test Conditions, of **no less than 1,000 watts**.

Solar Ready Exceptions: 2016

RA4.4.20 Solar Water Heating Systems: *Solar water-heating systems and/or collectors shall be certified and rated by the Solar Rating and Certification Corporation (SRCC) or by a listing agency that is approved by the Executive Director.*

Exception 2: No Solar Ready Area Required

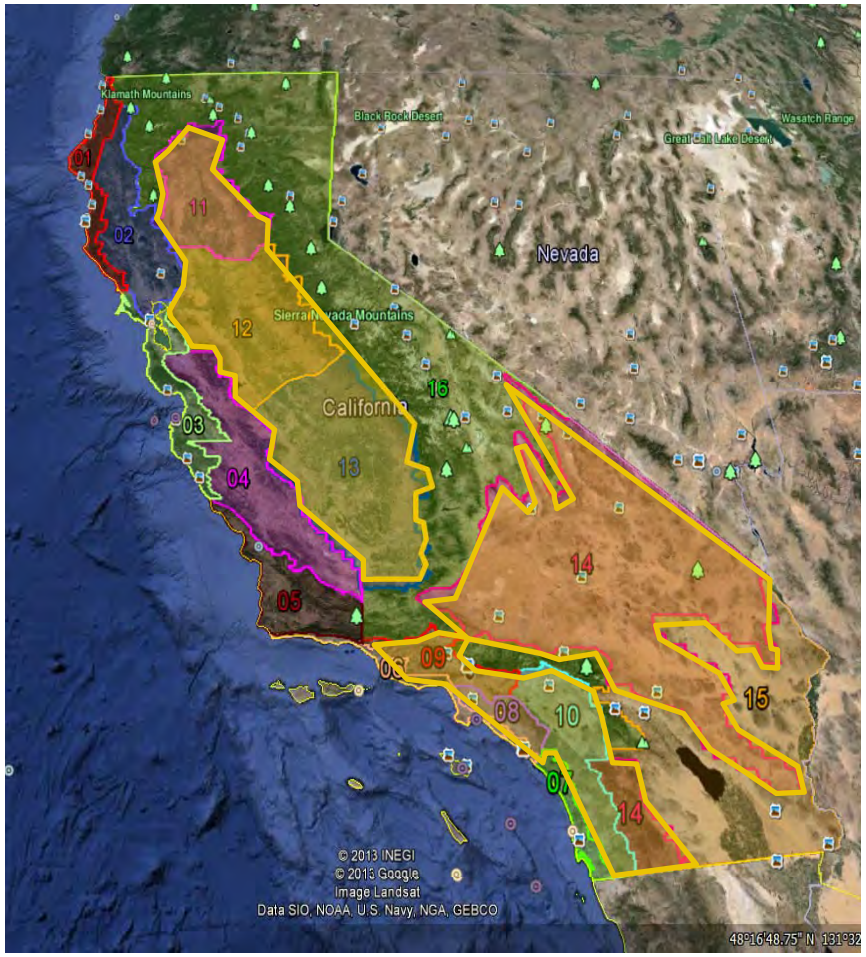
- Single family residences with a permanently installed domestic solar water-heating system
  - Meeting the installation criteria specified in the Reference Residential Appendix RA4.4.20 and
  - Min. solar savings fraction of 0.50 (50% of hot water needs meet throughout the year by solar thermal system)

Solar Ready Exceptions: 2016

Exception 3: Reduced Solar Ready Area

- Single family residences with:
  - Three habitable stories or more and
  - With a total floor area less than or equal to 2000 square feet *allowing for*
  - Solar zone total area no less than 150 square feet.

Solar Ready Exceptions: 2016



Exception 4: Reduced Solar Ready Area

- Single family residences located in Climate zones 8-14 and
  - In Wildland-Urban Interface Fire Area as defined in Title 24, Part 2 and
  - Having a whole house fan *allowing for*
  - Solar zone total area no less than 150 square feet.

Solar Ready Exceptions: 2016

Exception 5: Reduced Solar Ready Area

- Buildings with a designated solar zone area that is no less than 50% of the potential solar zone area.
  - The potential solar zone area is the total area of:
    - Low-sloped roofs where the annual solar access is ≥70%
    - Steep-sloped roofs oriented between 110 degrees and 270 degrees of true north where the annual solar access is ≥70%.
    - Solar access is the ratio of solar insolation including shade to the solar insolation without shade.
    - Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

Solar Ready Exceptions: 2016

- **JA5 Required Functional Resources**
- JA5.2.1 Setback Capabilities
  - All OCSTs shall meet the requirements of Section 110.2(c). Thermostats for heat pumps shall also meet the requirements of Section 110.2(b).
- JA5.2.2 Communication Capabilities
- JA5.2.3 OCST Messages and Attributes
- JA5.2.3.1 Demand Responsive Control
- JA5.2.3.2 Demand Response Periods
- JA5.2.4 Event Response
- JA5.2.5 Other Required Capabilities
  a) Default Restart Settings
  b) Automatic Rejoin

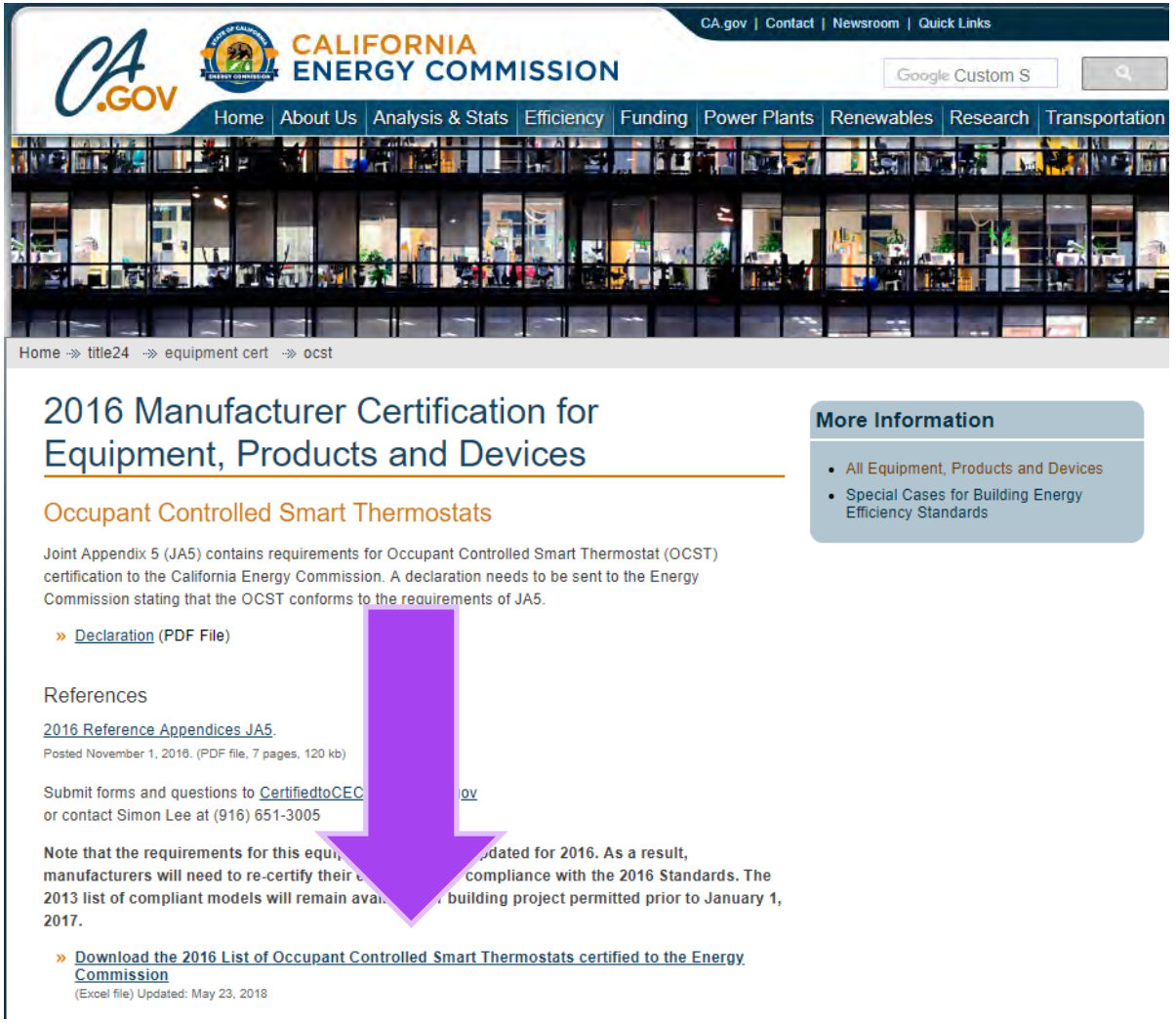
Exception 6: Reduced Solar Ready Area

- Single family residences having a solar zone total area no less than 150 square feet and where
  - All thermostats comply with Reference Joint Appendix JA5 and
  - Capable of receiving and responding to Demand Response Signals prior to granting of an occupancy permit by the enforcing agency (time of use meter that speaks to thermostat/utilities)
  - **Certified through Energy Commission**

Finding Certified JA5 Thermostats

Online Resource Center

http://www.energy.ca.gov/title24/orc/



Solar Ready Exceptions: 2016

Exception 7: No Solar Ready Area

- Single family residences meeting the following conditions:

A. All **thermostats comply with Reference Joint Appendix JA5** and are capable of receiving and responding to Demand Response Signals prior to granting of an occupancy permit by the enforcing agency **and**

B. Comply with **one of the following** measures:

i. Install a dishwasher that meets or exceeds the ENERGY STAR Program requirements with either a refrigerator that meets or exceeds the ENERGY STAR Program requirements or a whole house fan driven by an electronically commutated motor; **or**

ii. Install a home automation system capable of, at a minimum, controlling the appliances and lighting of the dwelling and responding to demand response signals; **or**

iii. Install alternative plumbing piping to permit the discharge from the clothes washer and all showers and bathtubs to be used for an irrigation system in compliance with the California Plumbing Code and any applicable local ordinances; **or**

iv. Install a rainwater catchment system designed to comply with the California Plumbing Code and any applicable local ordinances, and that uses rainwater flowing from at least 65% of the available roof area.

Exception to Single Family Solar Ready 2016

250 ft² reserved on roof or overhang

Exception 1

PV system with DC rating ≥1,000 W

Exception 2

Solar Thermal System with 50% SSF

Reduced Solar Area:

Exception 3: Reduced to 150 ft²

≥3 habitable stories and floor area ≤2,000 ft²

Exception 4: Reduced to 150 ft²

CZ 8-14 when in WUI area and installing whole house fan

Exception 5: Reduced to 50% of potential solar area when

Potential Solar Zone of **low sloped roof:**
Roof area within "Annual Solar access" ≥70%

Exception 5: Reduced to 50% of potential solar area when
Potential Solar Zone of **steeped sloped roof:**
Roof area within **110 and 270** degrees of true north (0) with "Annual Solar access" ≥70%

Exception 6: Reduced to 150 ft² when JA5 thermostat installed and receiving signals at final inspection

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)*
Solar Insolation without Shading *(this includes areas shaded by parts of building)*

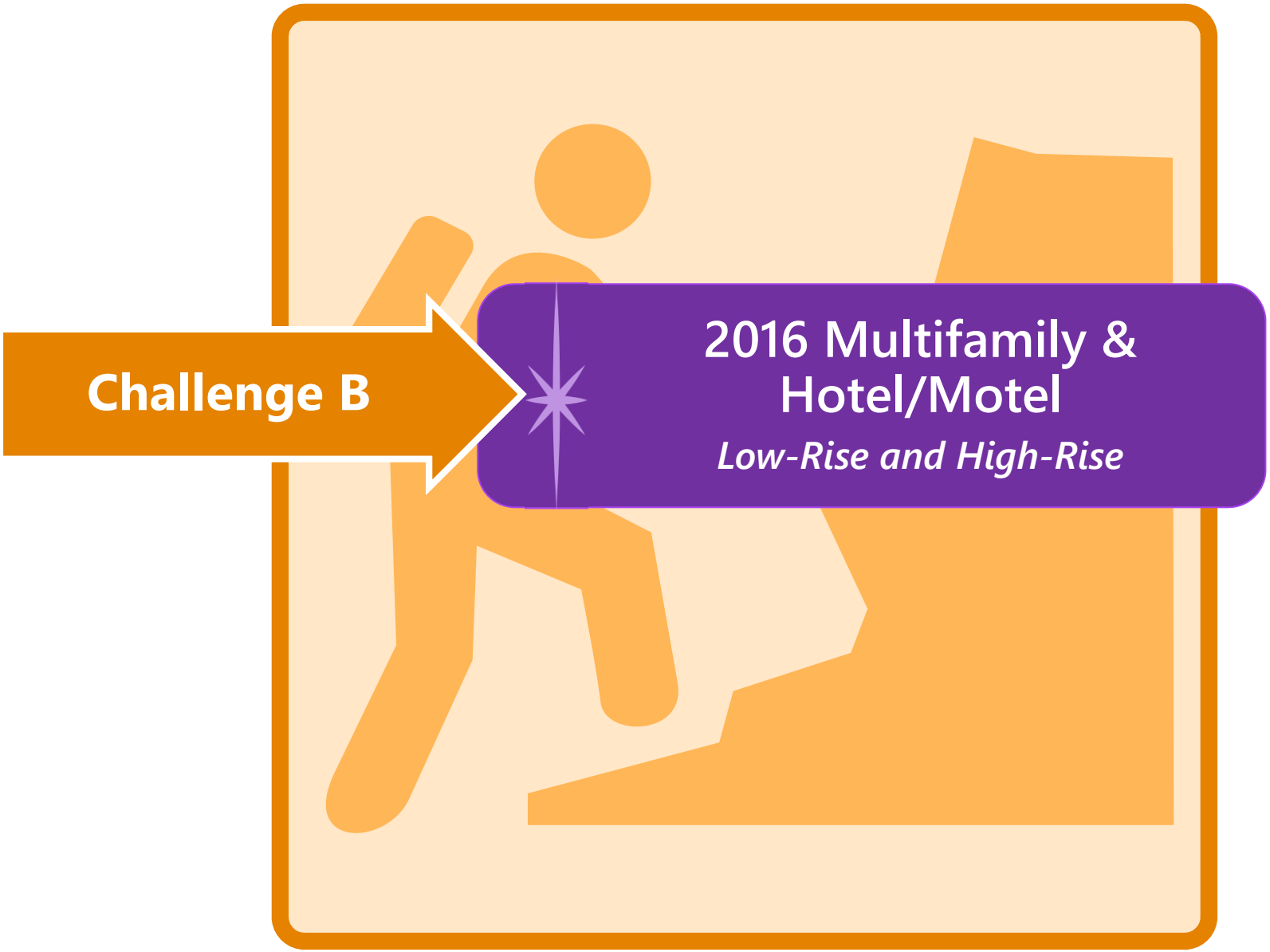
Exception 7

Approved JA5 Thermostat in **and one of the following:**

- Energy Star dishwasher/refrigerator or A whole house fan
- Home automation system
- Alternative plumbing system
- Rainwater catchment system

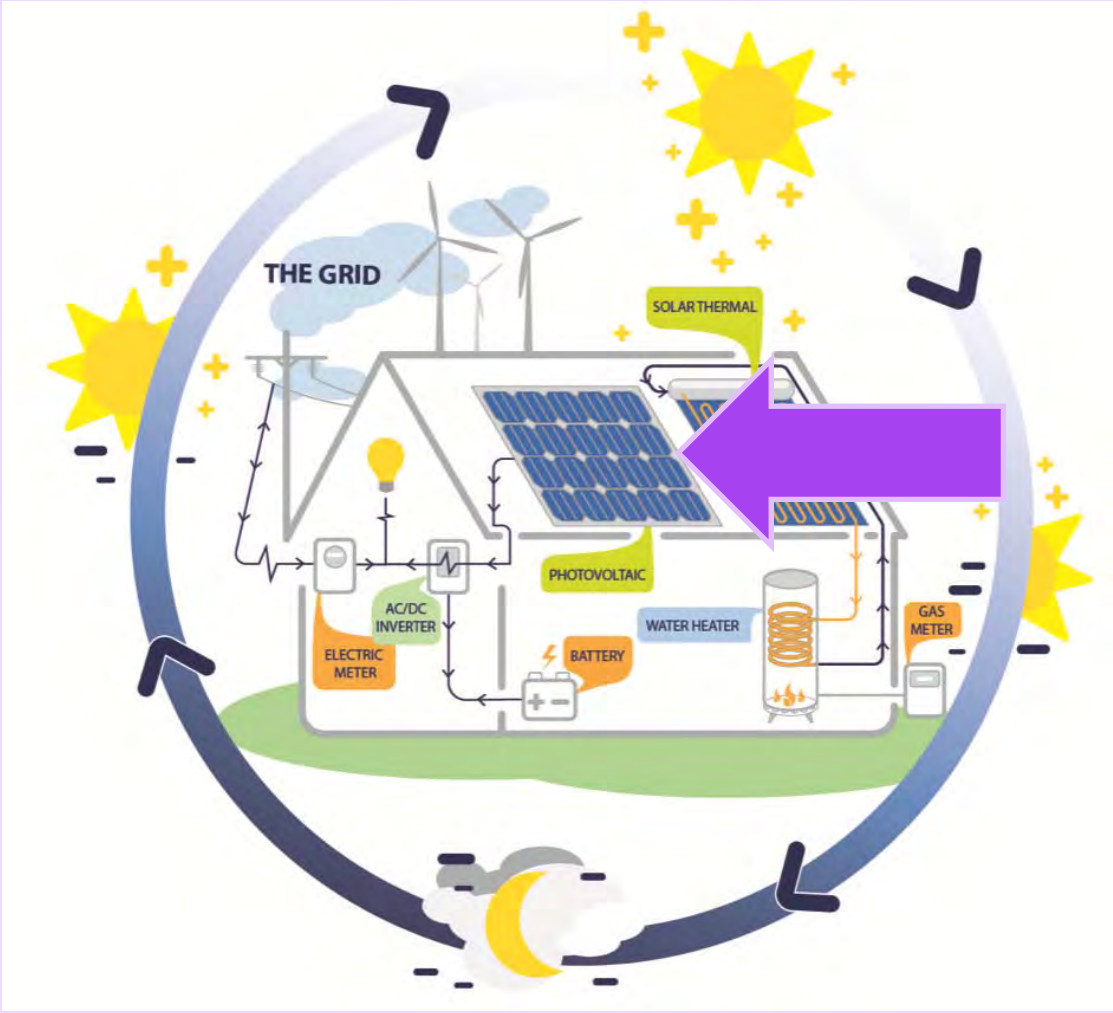
JA5 Thermostat

Challenge B


Challenge B
2016 Multifamily & Hotel/Motel
Low-Rise and High-Rise

Low-Rise Multifamily: 2016

Photovoltaics (PV): Res ACM



PV Performance Option: 2016

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (≥4 habitable story); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

PV Performance Option: New Low-Rise Buildings Only 2016

Table 1: PV Credit Calculation Factors

Climate Zone	PV Generation Rate(kTDV/kWdc)	Maximum PV Credit for Single Family	Maximum PV Credit for Multi Family
01	26762	8.0%	4.4%
02	30021	8.6%	5.0%
03	31137	6.9%	3.1%
04	30935	17.7%	11.4%
05	33490	7.6%	2.3%
06	30081	0.0%	0.0%
07	30701	0.0%	0.0%
08	29254	28.1%	9.1%
09	29889	25.9%	11.0%
10	30200	23.1%	10.0%
11	29693	17.7%	8.7%
12	29328	22.0%	9.5%
13	29553	19.8%	9.2%
14	31651	16.0%	8.2%
15	29177	16.3%	7.3%
16	30930	15.1%	8.6%

Residential ACM 2.2.3

- The maximum PV credits calculated by using a prototype analysis with the proposed features set equal to the 2016 prescriptive requirements **except:**
  - ***Replacing the 2016 high performance attics (HPA) and high performance walls (HPW) with the <u>2013 prescriptive</u> requirements***.
    - Climate zones 6 and 7 have no 2016 requirement for either HPA or HPW, so there is no PV credit in those climate zones.

PV Options: 2016

10-115(a)

Where's the PV?

- Can be located on:
  - Roof
  - Overhang of the building
  - Roof or overhang of another structure located within 250 feet of the building
  - Covered parking installed with the building project

High-Rise Multifamily and Hotel/Motel 2016

Photovoltaics (PV): N/A

Decoding Renewables™

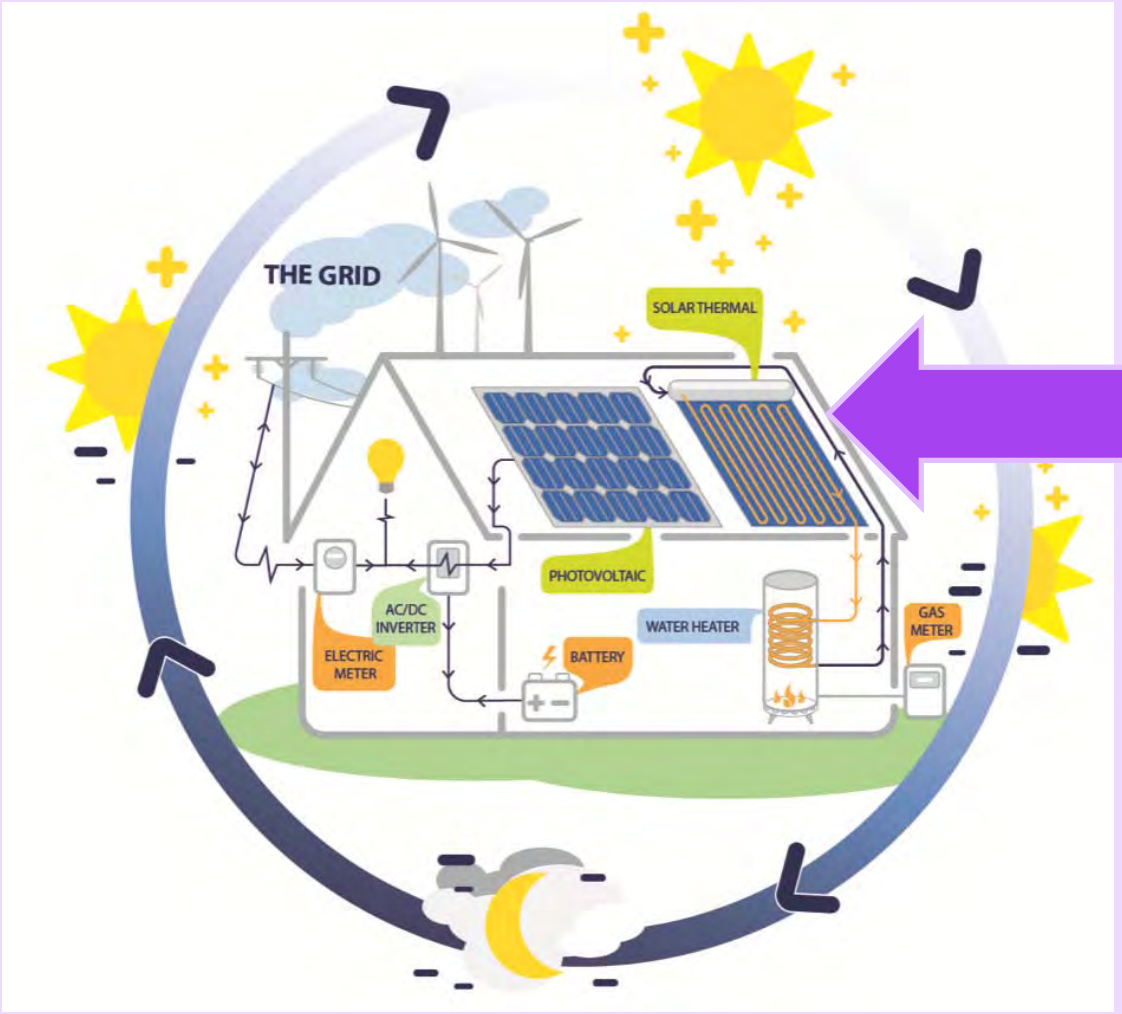
What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

No PV Requirements Nor Performance Options

Low-Rise & High-Rise Multifamily, Hotel/Motel 2016

Solar Thermal: §150.1(c)8Biii



Central DHW Systems 2016

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units[2]*	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (≥4 habitable story); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

Multifamily & Hotel/Motel: §150.1(c)8Biii

- Minimum solar savings fraction of:
  - Climate Zones 1 through 9
    - 20% or higher
  - Climate Zones 10 through 16.
    - 35% or higher
  - The solar savings fraction shall be determined using a calculation method approved by the Commission (T24 Solar Calculator)

Finding SSF Calculator

Online Resource Center

http://www.energy.ca.gov/title24/orc/

Low-Rise & High-Rise Multifamily, Hotel/Motel 2016

Solar Ready: §110.10

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

- Low-rise multi-family buildings
- Hotel/motel occupancies and high-rise multi-family buildings with ten habitable stories or fewer

Multifamily/Hotel/Motel: 2016

Minimum Area: Designed

- The solar zone shall be *designed to be* located on the roof or overhang of 15% of the total roof area excluding skylights, **or**
  - Use an exception…

EXCEPTION 1 to Section 110.10(b)1B: Buildings with a permanently installed solar electric system having a nameplate DC power rating, measured under Standard Test Conditions, of no less than one watt per square foot of roof area.
EXCEPTION 2 to Section 110.10(b)1B: Buildings with a permanently installed domestic solar water-heating system complying with Section 150.1(c)8Ciii.
EXCEPTION 3 to Section 110.10(b)1B: Buildings with a designated solar zone area that is no less than 50 percent of the potential solar zone area. The potential solar zone area is the total area of any low-sloped roofs where the annual solar access is 70 percent or greater and any steep-sloped roofs oriented between 110 degrees and 270 degrees of true north where the annual solar access is 70 percent or greater. Solar access is the ratio of solar insolation including shade to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.
EXCEPTION 4 to Section 110.10(b)1B: Low-rise and high-rise multifamily buildings meeting the following conditions:

A. All thermostats in each dwelling unit comply with Reference Joint Appendix JA5 and are capable of receiving and responding to Demand Response Signals prior to granting of an occupancy permit by the enforcing agency.
B. In each dwelling unit, comply with one of the following measures:
   i. Install a dishwasher that meets or exceeds the ENERGY STAR Program requirements with either a refrigerator that meets or exceeds the ENERGY STAR Program requirements or a whole house fan driven by an electronically commutated motor; or
   ii. Install a home automation system capable of, at a minimum, controlling the appliances and lighting of the dwelling and responding to demand response signals; or
   iii. Install alternative plumbing piping to permit the discharge from the clothes washer and all showers and bathtubs to be used for an irrigation system in compliance with the *California Plumbing Code* and any applicable local ordinances; or
   iv. Install a rainwater catchment system designed to comply with the *California Plumbing Code* and any applicable local ordinances, and that uses rainwater flowing from at least 65 percent of the available roof area.

EXCEPTION 5 to Section 110.10(b)1B: Buildings where the roof is designed and approved to be used for vehicular traffic or parking or for a heliport

Exception to Multifamily and Hotel/Motel Solar Ready 2016

15% of the ROOF excluding skylights, *or*

Exception 1

PV with DC rating = 1 watt per roof ft²

Exception 2

Solar Thermal System meeting §150.1(c)8Ciii

Exception 3

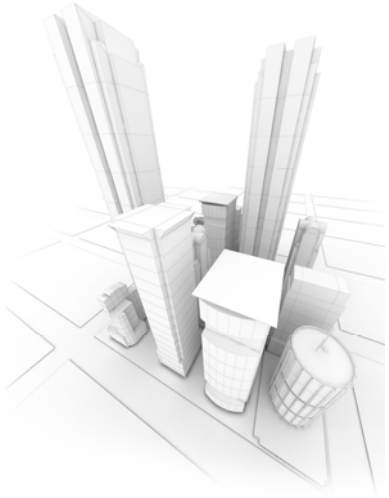
If potential solar zone ≤50% **Potential Solar Zone**

Potential Solar Zone of **low sloped roof:**

Roof area within "Annual Solar access" = ≥70%

Potential Solar Zone of **steeped sloped roof:**

Roof area within 110 and 270 degrees of true north (0) with "Annual Solar access" = ≥70%



Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)* / Solar Insolation without Shading *(this includes areas shaded by parts of building)*

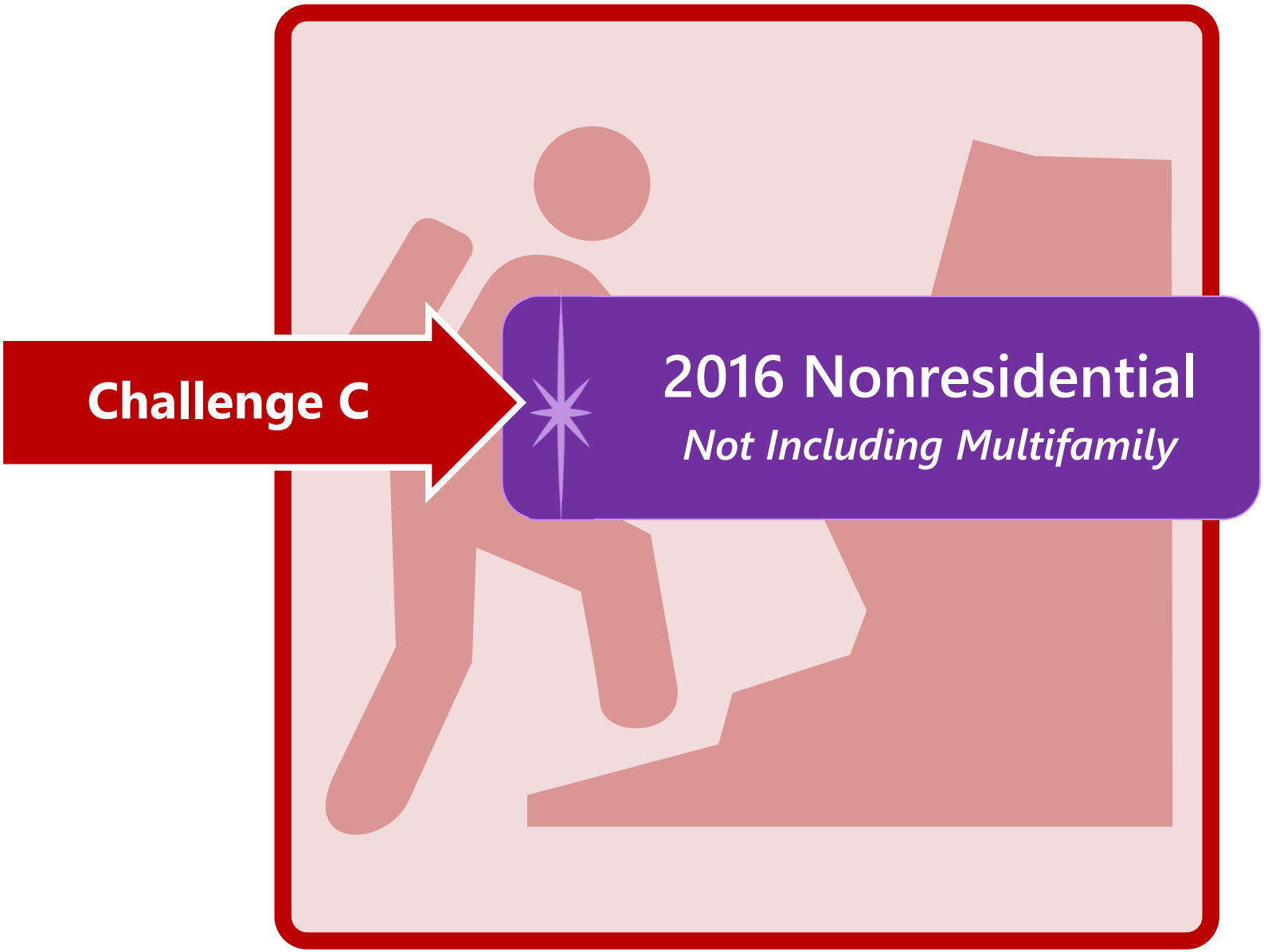
Exception 4

JA5 Thermostat in EACH dwelling unit **and one of the following:**

- *Energy Star dishwasher/refrigerator OR a whole house fan*
- *Home automation system*
- *Alternative plumbing piping*
- *Rainwater catchment system*

Exception 5: Roof used for parking, auto hardscape or heliport

Challenge C


Challenge C
2016 Nonresidential
Not Including Multifamily

Nonresidential: 2016

Photovoltaics (PV)

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (≥4 habitable story); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

No PV Requirements Nor Performance Options

Nonresidential: 2016

Solar Thermal

Decoding Renewables™

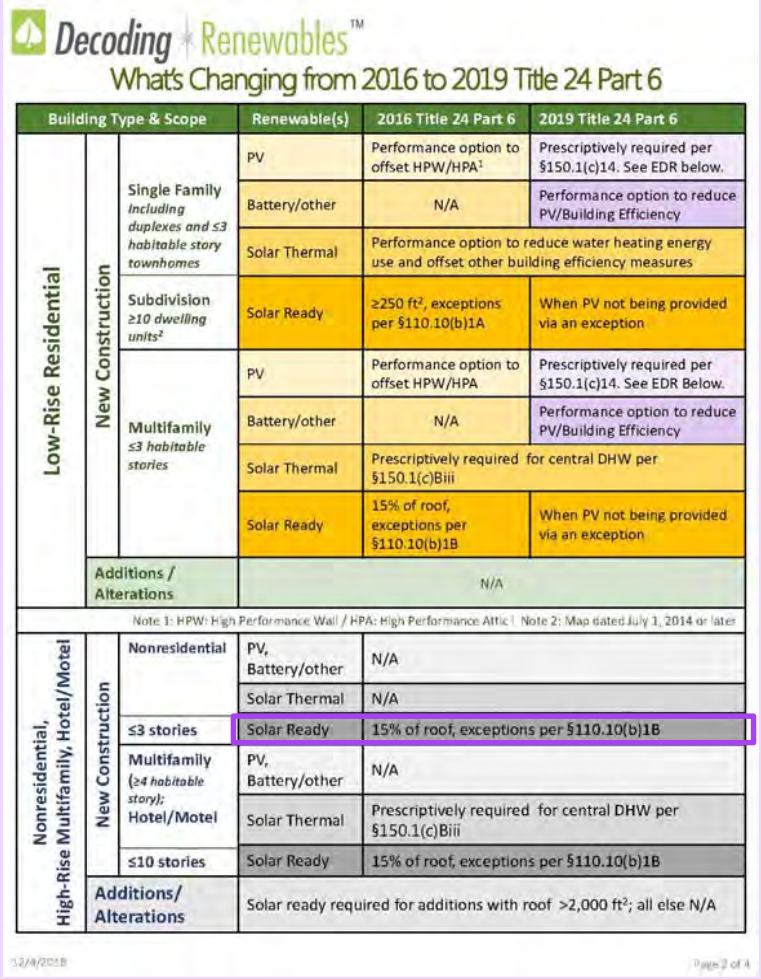
What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

No Solar Thermal Requirements Nor Performance Options

Nonresidential: 2016

Solar Ready §110.10



Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

- Nonresidential buildings with three habitable stories or fewer

Exceptions Specific to Nonresidential: 2016

15% of the ROOF excluding skylights, *or*

Exception 1

PV with DC rating = 1 watt per roof ft^2

Exception 3

If potential solar zone ≤50%
Potential Solar Zone

Potential Solar Zone of **low sloped roof:**

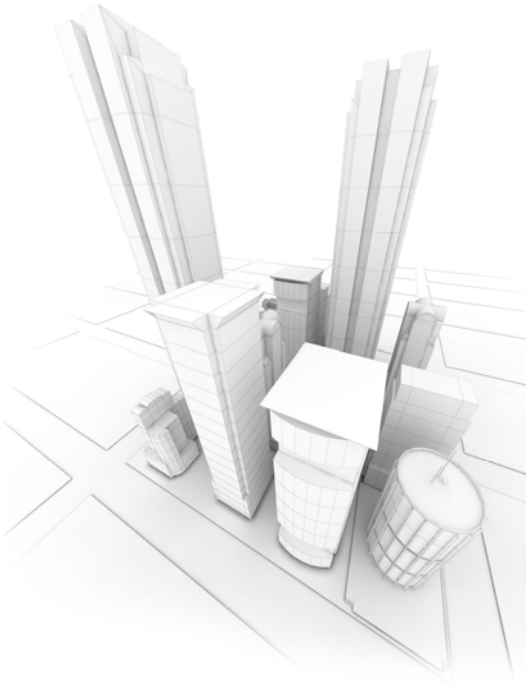
Roof area within "Annual Solar access" = ≥70%

Potential Solar Zone of **steeped sloped roof:**

Roof area within 110 and 270 degrees of true north (0) with "Annual Solar access" = ≥70%

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)* / Solar Insolation without Shading (*this includes areas shaded by parts of building)*

Exception 5: Roof used for parking, auto hardscape or heliport



PV Options

10-115(a)

Where's the PV?

- Can be located on:
  - Roof
  - Overhang of the building
  - Roof or overhang of another structure located within 250 feet of the building
  - Covered parking installed with the building project

Challenge D

Challenge D

2019 Strategies for Compliance

Nonresidential Changes

Residential Changes: EDR; Solar Access; Sizing of PV; Flexibility

What's Changed for 2019

Nonresidential

Nonresidential for 2019

Photovoltaics (PV): N/A

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units[2]*	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

No changes

Nonresidential for 2019

Solar Thermal: NR ACM

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units[2]*	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

No changes

Nonresidential for 2019

Solar Ready: §110.10

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

Minor changes

Exception to Nonresidential: 2019

15% of the ROOF excluding skylights, *or*

Exception 1

PV with DC rating = 1 watt per roof ft^2

Exception 3

Designated solar zone ≤50% of **Potential** Solar Zone

Potential Solar Zone of **low sloped roof:**

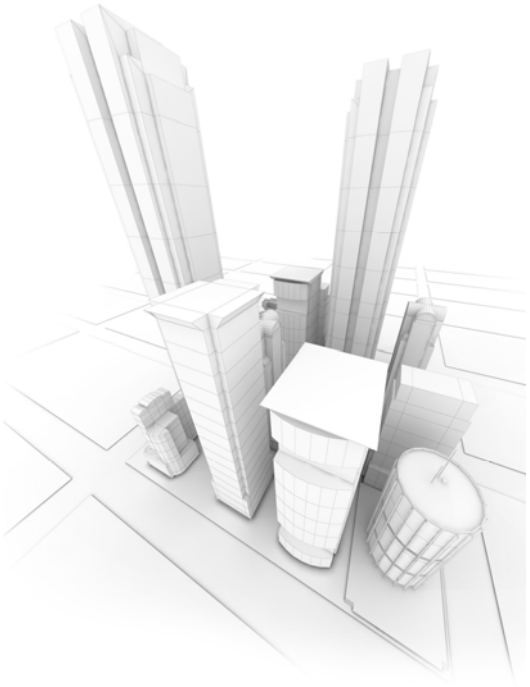
Roof area within "Annual Solar access" = ≥70%

Potential Solar Zone of **steeped sloped roof:**

Roof area within **90 and 300 ~~110 and 270~~** degrees of true north (0) with "Annual Solar access" = ≥70%

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)* / Solar Insolation without Shading (*this includes areas shaded by parts of building)*

Exception 5: Roof used for parking, auto hardscape or heliport



What's Changing for 2019

Multifamily

Multifamily for 2019

Photovoltaics (PV): §150.1

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

High-Rise: No changes

Low-Rise: See Single Family

Solar Thermal: §150.1

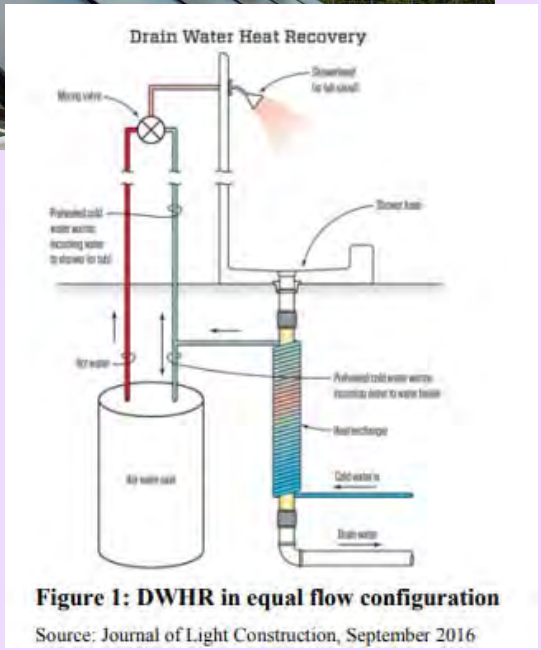


Figure 1: DWHR in equal flow configuration

Source: Journal of Light Construction, September 2016

- Solar savings fraction (SSF) can be reduced by 5% if HERS verified drain water heat recovery system used:
  - CZ 1-9: 20% SSF
    - Reduced to 15% SSF
  - CZ 10-16: 35% SSF
    - Reduced to 30% SSF
- Min. rated effectiveness = ≥42%
- Recover heat from 50% of the showers located above the first floor and:
  - Must at least transfer that heat either back to all the respective showers, or the water heater.

High-Rise & Low-Rise Multifamily / Hotel / Motel: 2019

Solar Ready: §110.10

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

Minor changes

Exception to Multifamily and Hotel/Motel Solar Ready 2019

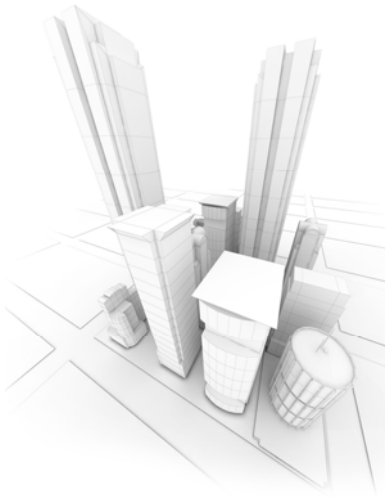
15% of the ROOF excluding skylights, *or*

Exception 1

PV with DC rating = 1 watt per roof ft^2

Exception 2

Solar Thermal System meeting §150.1(c)8Ciii



Exception 3

Designated solar zone ≤50% of **Potential** Solar Zone

Potential Solar Zone of **low sloped roof:**

Roof area within "Annual Solar access" = ≥70%

Potential Solar Zone of **steeped sloped roof:**

Roof area within **90 and 300 ~~110 and 270~~** degrees of true north (0) with "Annual Solar access" = ≥70%

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)* / Solar Insolation without Shading *(this includes areas shaded by parts of building)*

Exception 4

JA5 Thermostat in EACH dwelling unit **and one of the following:**

- *Energy Star dishwasher/refrigerator or a whole house fan*
- *Home automation system*
- *Alternative plumbing piping*
- *Rainwater catchment system*
- ***15% total # of parking stations to be EV charging spaces capable of supporting future EVSE (T24 P11 A4.106.8.2)***

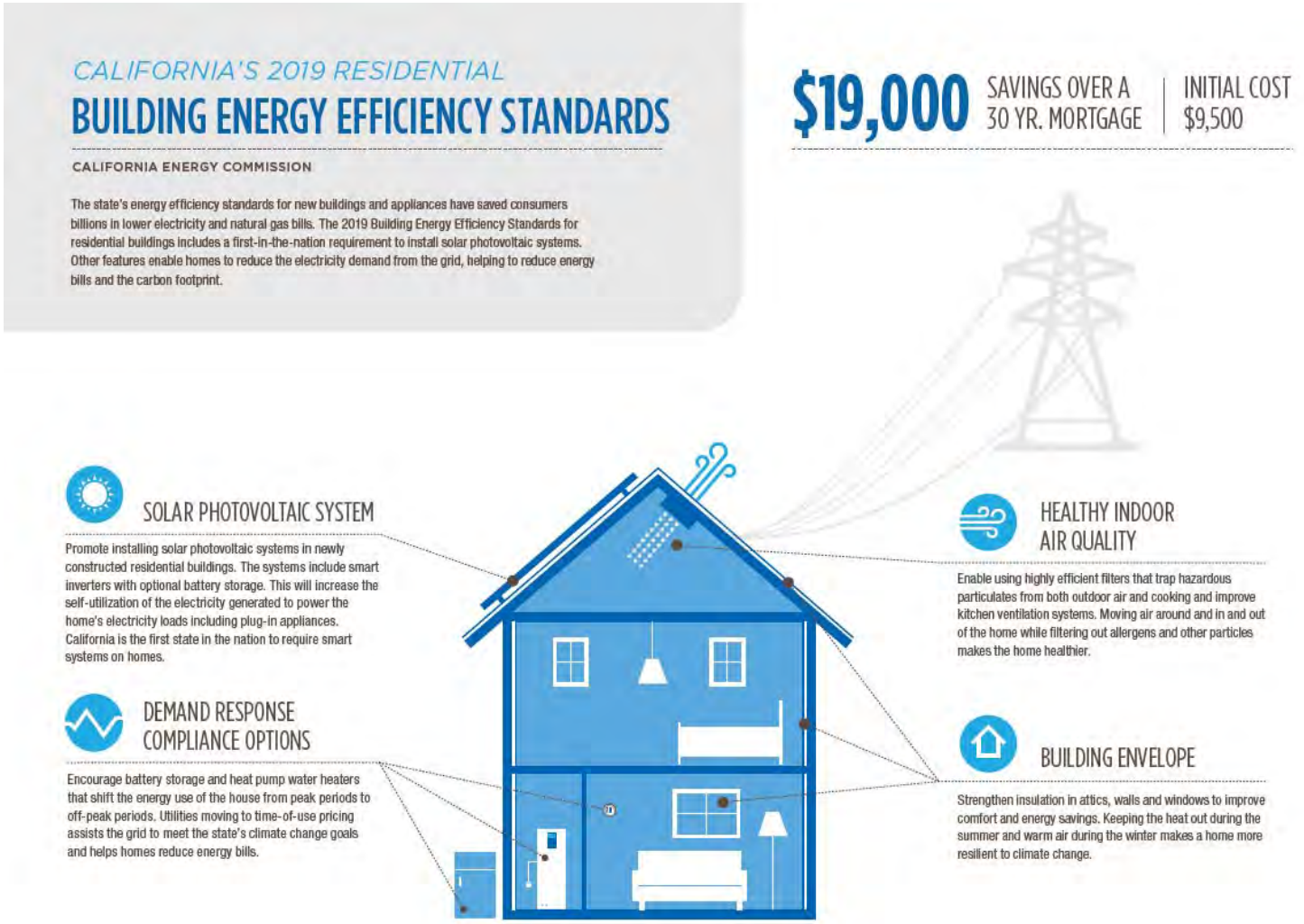
Exception 5:

Roof used for parking, auto hardscape or heliport

What's Changing for 2019

Single Family Residential

2019 Energy Commission Infographic



Energy Design Rating (EDR) *(New)*

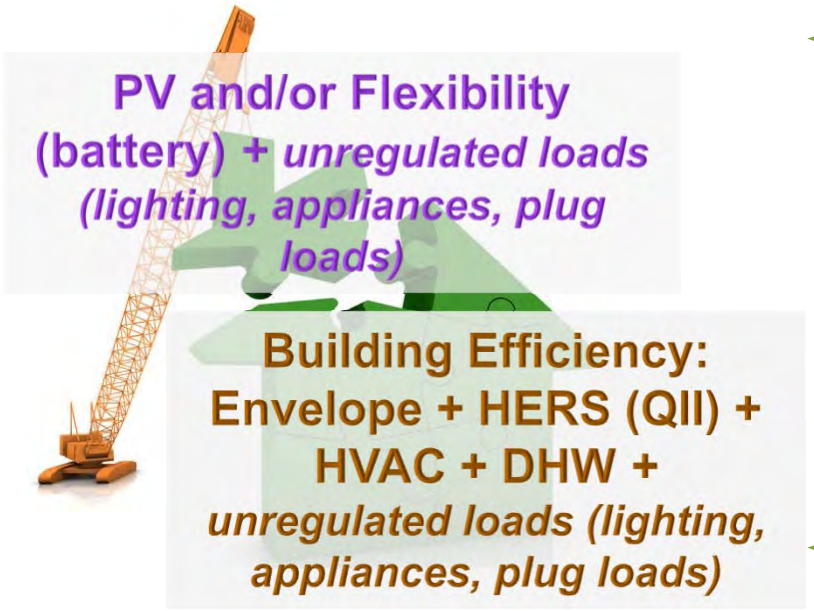
- ENERGY DESIGN RATING (EDR) for New Construction projects using performance method (TDV):
  - 100 represents the energy consumption of the building built to the specifications of the 2006 International Energy Conservation Code (IECC) home
  - 0 (zero) represents a building that has zero energy consumption
  - Final EDR represents the overall TDV energy usage as a score

Building Efficiency - **PV + Flexibility** = **Final EDR Score**

Your score

100 **0**

Compliance Metric (EDR) *(New)*



- Building *complies* when:
  - Building efficiency: Proposed ≤ Standard (baseline)
    - EDR exceeding baseline can be used towards PV+Flex
  - PV + flexibility: Proposed ≤ Standard (baseline)
    - Battery (min. requirements apply)
      - 7.5 kWh battery may be used to reduce the PV size
      - 5 kWh battery can reduce the building efficiency requirements
  - And when combined, the final square shows overall compliance
- EDR does not apply to additions and alterations (TDV budget applies)

Building Efficiency

Standard EDR ≥ Proposed EDR

−

PV + Flexibility

Standard EDR ≥ Proposed EDR

=

Final Score

- *Additional Building Efficiency EDR savings can be "traded" towards PV+Flex EDR.*
- *Battery can be traded towards Building Efficiency EDR.*

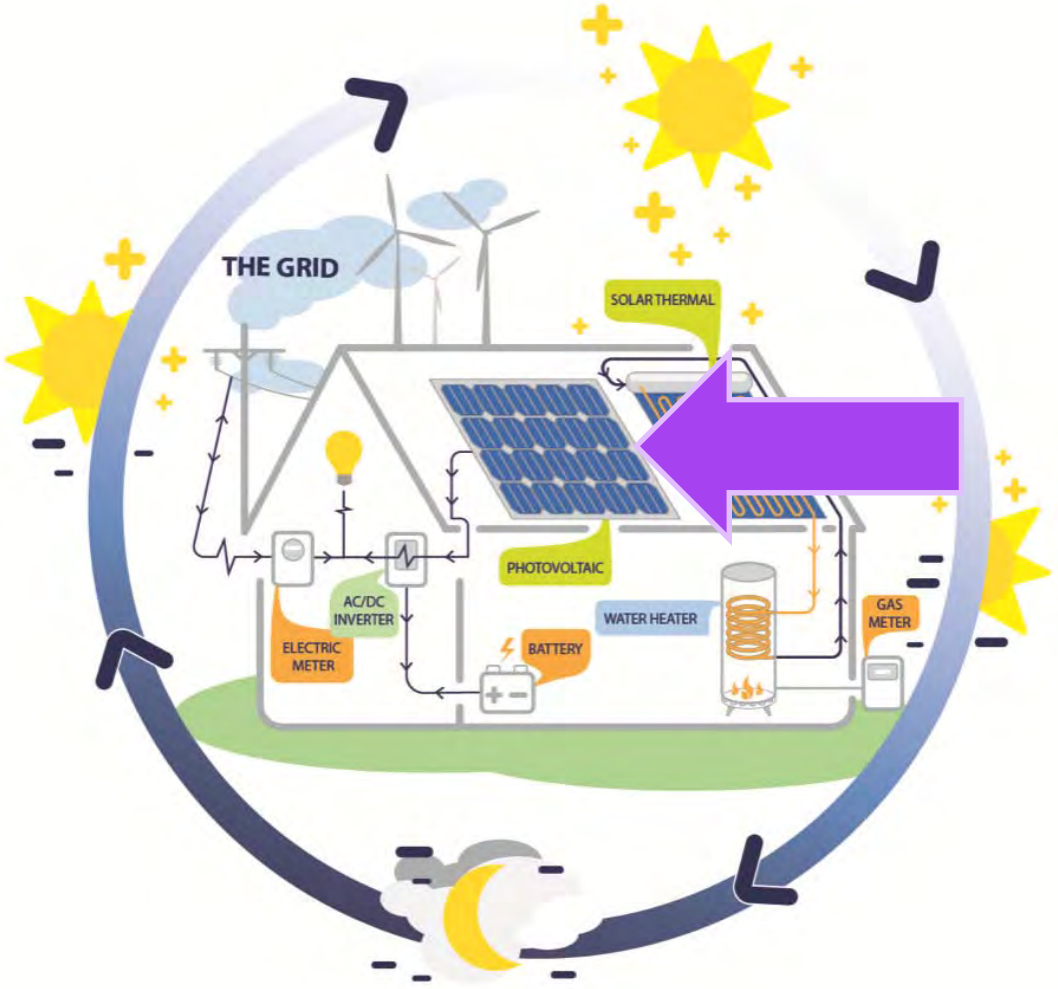
Single Family for 2019

Photovoltaics (PV): §150.1

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		



2019 Prescriptive PV Requirement

Table 150.1-C

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21
5	0.585	1.06
6	0.594	1.23
7	0.572	1.15
8	0.586	1.37
9	0.631	1.36
10	0.627	1.41
11	0.836	1.44
12	0.613	1.40
13	0.894	1.51
14	0.741	1.26
15	1.56	1.47
16	0.59	1.22

§150.1(c)14

- Photovoltaic Requirements. All low-rise residential buildings shall have a photovoltaic (PV) system meeting:
  - Minimum qualification requirements as specified in Joint Appendix JA11 AND
  - Annual electrical output equal to or greater than the dwelling's annual electrical usage as determined by Equation 150.1-C

kWPV = (CFA x A)/1000 +(NDwell x B)

Where: kWPV = *kWdc size of the PV system*
CFA = *Conditioned floor area*
NDwell = *Number of dwelling units*
A = *Adjustment factor from Table 150.1-C*
B = *Dwelling adjustment factor from Table 150.1-C*

2019 Prescriptive PV Example

Table 150.1-C

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21
5	0.585	1.06
6	0.594	1.23
7	0.572	1.15
8	0.586	1.37
9	0.631	1.36
10	0.627	1.41
11	0.836	1.44
12	0.613	1.40
13	0.894	1.51
14	0.741	1.26
15	1.56	1.47
16	0.59	1.22

§150.1(c)14

- Single Family Example:

What is the minimum size (kW) PV system for a 2100 ft^2 single-family in climate zone 4?

kWPV = (CFA x A)/1000 + (NDwell x B)

Where:
kWPV = *kWdc size of the PV system*
CFA = *Conditioned floor area*
NDwell = *Number of dwelling units*
A = *Adjustment factor from Table 150.1-C*
B = *Dwelling adjustment factor from Table 150.1-C*

Solution:
(2100 x 0.586)/1000 + (1 x 1.21) = **2.44 kW**

Exceeding prescriptive sizing must be confirmed as meeting NEM rules (with your local utility) and only a small amount is allowed as "tradeoff" towards Building Efficiency EDR.

2019 PV Multifamily: Low-Rise

Table 150.1-C

Climate Zone	A - CFA	B - Dwelling Units
1	0.793	1.27
2	0.621	1.22
3	0.628	1.12
4	0.586	1.21
5	0.585	1.06
6	0.594	1.23
7	0.572	1.15
8	0.586	1.37
9	0.631	1.36
10	0.627	1.41
11	0.836	1.44
12	0.613	1.40
13	0.894	1.51
14	0.741	1.26
15	1.56	1.47
16	0.59	1.22

Low-Rise: 150.1(c)14

- A PV system is now required for low-rise multifamily buildings per:
  - Equation 150.1-C, using
  - Table 150.1-C.
- Multifamily Example:

  Low-rise Multifamily: 21,000 ft^2 30-unit 2 story apartment building in Oakland (CZ3)

  Solution:

  (21000 x 0.628)/1000 + (30x1.12) = **46.788 kW**

Exceeding prescriptive sizing must be confirmed as meeting NEM rules (with your local utility) and only a small amount is allowed as "tradeoff" towards Building Efficiency EDR

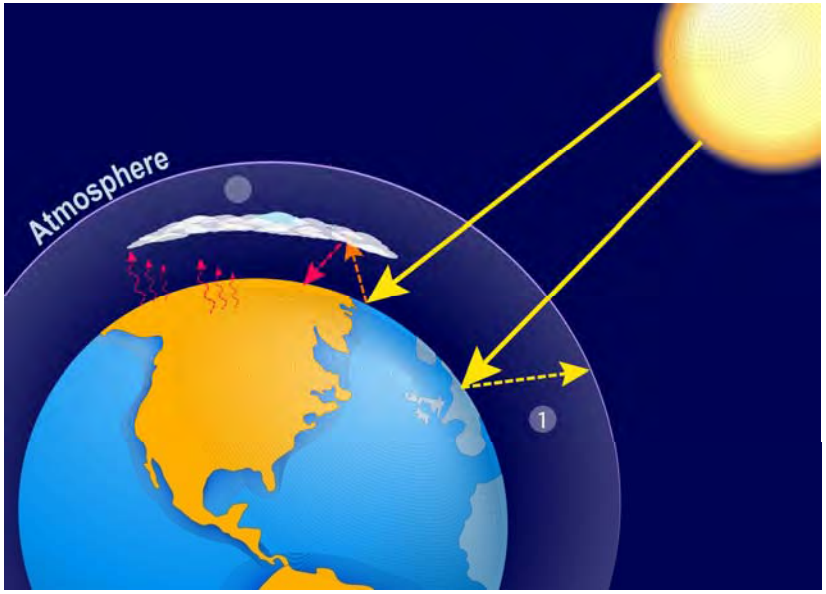
Community Solar System §10-115(a)

- In addition, there are requirements for:
  - Energy Performance: Meet the promised made in the Certificate of Compliance
  - Durability: 20 years
  - Additionality: Can't double dip on promised energy savings.
  - Accountability and Recordkeeping: 20 years

- Community Shared Solar Electric Generation System or Battery Storage System Offset.
  - If the system has been approved by the Energy Commission.
  - Community system to be installed and available for inspection at the time the building permit is being finalized Energy Performance.

Annual Solar Access

150.1(c)14

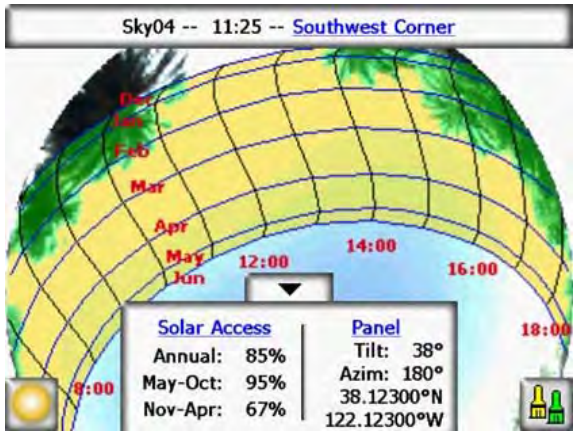


The annual **Solar Insolation** for a house in Sacramento with a 6:12 roof pitch facing 180° South is approx. 2045 kWh/m^2

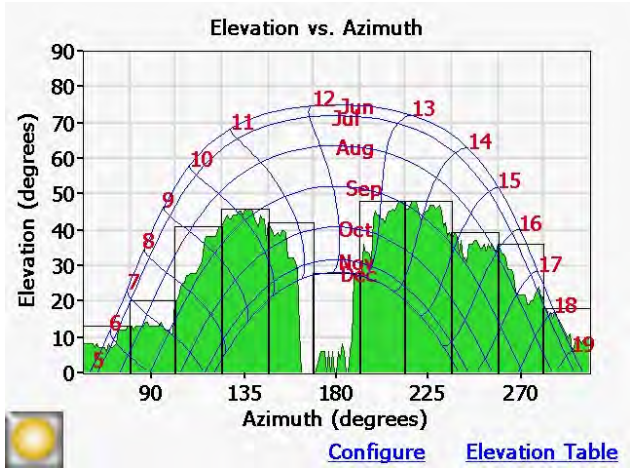
- **Annual Solar Access** is the ratio of *solar insolation* including shade to the solar insolation without shade.
  - Commonly expressed as percent (%) of annual solar access.
- **Solar Insolation** represents the quantity of solar energy that is incident on a surface of a given size during an amount of time.
  - This is commonly expressed as kWh/m^2 (kilowatt-hours per square meter).

Annual Solar Access

150.1(c)14



Annual sunpath view shows shade timing and solar access. Photo Courtesy of Solmetric, Inc.



Obstruction elevation view shows elevation angle vs azimuth of horizon. Photo Courtesy of Solmetric, Inc.

- Annual solar access requires an analysis of the proposed surface (rooftop), given its:
  - Location (Latitude and Longitude)
  - Orientation (90° and 300°)
  - Tilt
  - Shading from obstructions.

  Note: Only external obstructions (i.e. trees, other buildings, etc.) are considered in determining annual solar access.

$$\textit{Solar Access} = \frac{\textit{Solar Insolation Including Shading}}{\textit{Solar Insolation without Shading}}$$

Example:

$$\frac{1636\ \text{kWh/m}^2\ \text{with shading}}{2045\ \text{kWh/m}^2\ \text{without shading}} = \textbf{80\% Solar Access}$$

Annual Solar Access

150.1(c)14

Photo Courtesy of Solmetric, Inc.

- **Solar Access Verification (JA11)**.
  - Installer to demonstrate shading condition compliance of installed PV via CF2R using either:
    - Solar Assessment Tool approved by the Energy Commission and used per the manufacturer's instructions OR
    - An Aerial satellite, drone or digital image.

2019 Exception to PV: Low-Rise §150.1(c)14

If roof facing between E (90) and WNW (300)* gets >70% Sun

Exception 1

If that area(s) is <80 ft² of contiguous area *then:*

No PV Required and use Solar Ready requirements

If the areas(s) are ≥80 ft² *then:*

Exception 3

2 habitable stories:

PV = Min. 1 W/ft² of conditioned floor area

Exception 4

3 habitable stories:

PV = Min. 0.8 W/ft² of conditioned floor area

Exception 2

Building in CZ 15:

PV = Min. 1.5 W/ft² of conditioned floor area

Exception 5

Planning Approval prior to 1/1/2020, when solar ready area between 80-200 ft², *then:*

Smaller of either required PV (per Table 150.1-C) or effective annual solar access

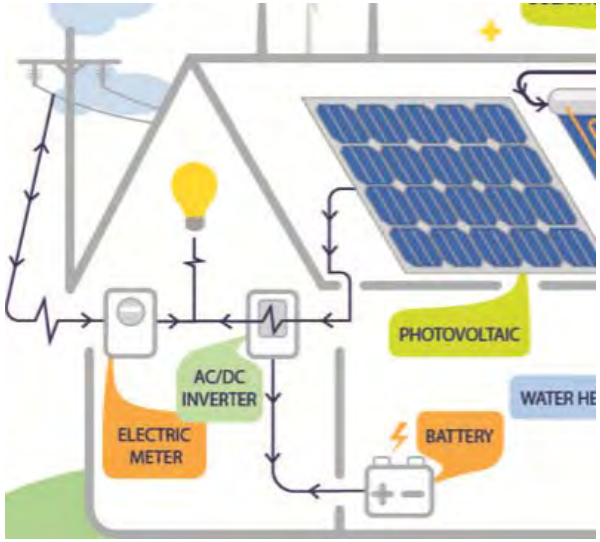
Exception 6

If building installing **battery (JA12) min. capacity of 7.5 kWh** *then:*

PV can be reduced by 25%

*If not within this orientation, performance method to be used based on actual orientation. If CA Flexible Installation (CFI) used in performance method, additional requirements apply.

Check Your Understanding



2. Design in building efficiency measures that allow additional TDV energy (beyond standard requirements) by enough to allow 2 KW PV to show compliance in Final Score

Example

Can I use 2 kW PV system for a 2100 ft^2 single-family in climate zone 12, even though its less than the prescriptive sizing calculation (Equation 150.1-C) value of 2.66 kW?

Answer: **YES.** There are 2 ways

1. Exception 6 to Section 150.1(c)14 allows you to reduce the PV system size (kW) if it's installed in conjunction with a battery storage system.
   - The minimum size battery storage system size is 7.5 kWh and must meet the qualification requirements specified in Joint Appendices JA12.

Single Family for 2019

Solar Thermal: Res ACM

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units*[2]	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

No Changes

Single Family for 2019

Solar Ready: §110.10

Decoding Renewables™

What's Changing from 2016 to 2019 Title 24 Part 6

Building Type & Scope			Renewable(s)	2016 Title 24 Part 6	2019 Title 24 Part 6
Low-Rise Residential	New Construction	Single Family *Including duplexes and ≤3 habitable story townhomes*	PV	Performance option to offset HPW/HPA[1]	Prescriptively required per §150.1(c)14. See EDR below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Performance option to reduce water heating energy use and offset other building efficiency measures	
		Subdivision *≥10 dwelling units[2]*	Solar Ready	≥250 ft², exceptions per §110.10(b)1A	When PV not being provided via an exception
		Multifamily *≤3 habitable stories*	PV	Performance option to offset HPW/HPA	Prescriptively required per §150.1(c)14. See EDR Below.
			Battery/other	N/A	Performance option to reduce PV/Building Efficiency
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
			Solar Ready	15% of roof, exceptions per §110.10(b)1B	When PV not being provided via an exception
	Additions / Alterations		N/A		
Note 1: HPW: High Performance Wall / HPA: High Performance Attic | Note 2: Map dated July 1, 2014 or later					
Nonresidential, High-Rise Multifamily, Hotel/Motel	New Construction	Nonresidential	PV, Battery/other	N/A	
			Solar Thermal	N/A	
		≤3 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
		Multifamily (*≥4 habitable story*); Hotel/Motel	PV, Battery/other	N/A	
			Solar Thermal	Prescriptively required for central DHW per §150.1(c)Biii	
		≤10 stories	Solar Ready	15% of roof, exceptions per §110.10(b)1B	
	Additions/ Alterations		Solar ready required for additions with roof >2,000 ft²; all else N/A		

12/4/2018 Page 2 of 4

Minor changes

Exception to Single Family Solar Ready 2019

250 ft² reserved on roof or overhang when PV not installed

Exception 1

Solar Thermal System with 50% SSF

Reduced Solar Area:

Exception 2: Reduced to 150 ft²

≥3 habitable stories and floor area ≤2,000 ft²

Exception 3: Reduced to 150 ft²

In WUI area and installing whole house fan **(CZ removed)**

Exception 4: Reduced to 50% of potential solar area when

Potential Solar Zone of **low sloped roof:**

Roof area within "Annual Solar access" ≥70%

Exception 4: Reduced to 50% of potential solar area when Potential Solar Zone of **steeped sloped roof:**
Roof area within **90 and 300 ~~110 and 270~~** degrees of true north (0) with "Annual Solar access" ≥70%

Exception 5: Reduced to 150 ft² when JA5 thermostat installed and receiving signals at final inspection

Annual Solar Access = Solar Insolation Including Shading *(if not part of building, i.e. trees)*
Solar Insolation without Shading *(this includes areas shaded by parts of building)*

Exception 6

Approved JA5 Thermostat in EACH dwelling unit **and one of the following:**

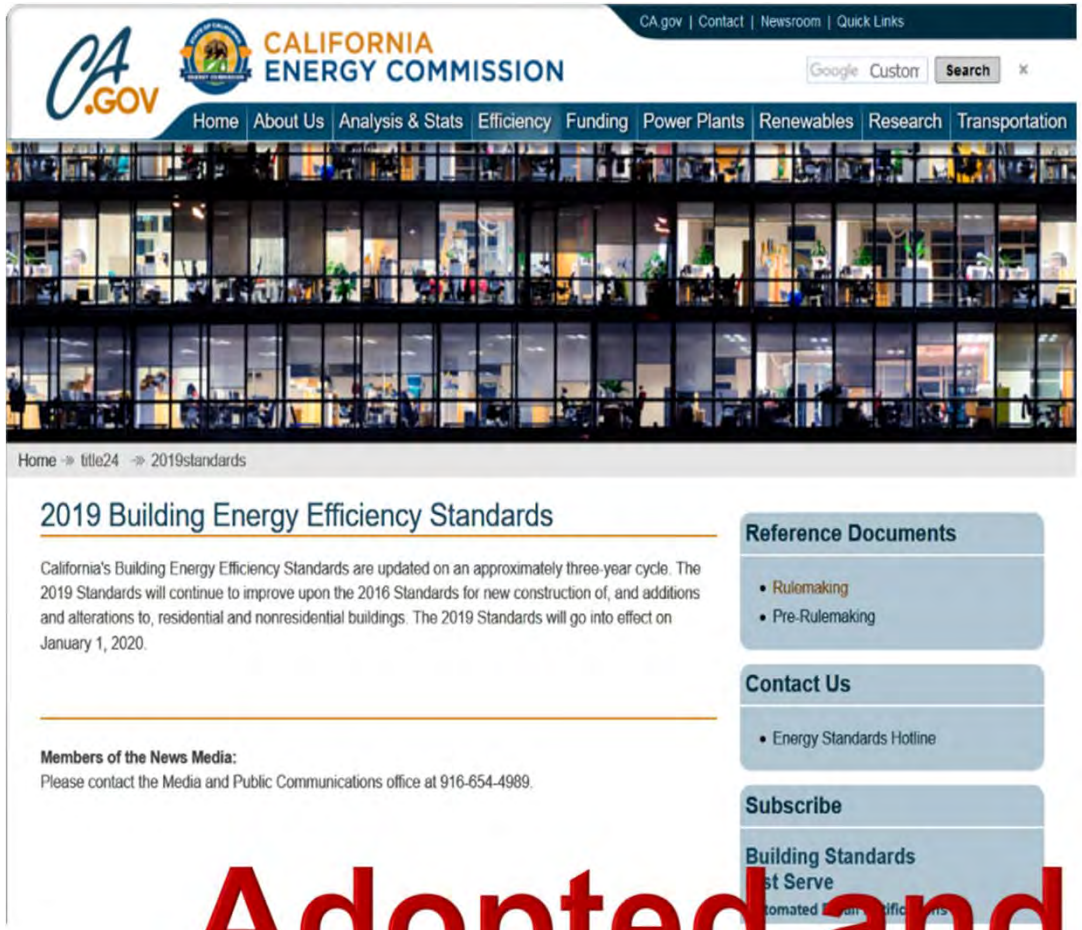
Energy Star dishwasher/refrigerator or

A whole house fan ***or***

SAE J1772 Level 2 EVSE/EV charge with 40 amperes or more

Next Steps

Standards Update Schedule



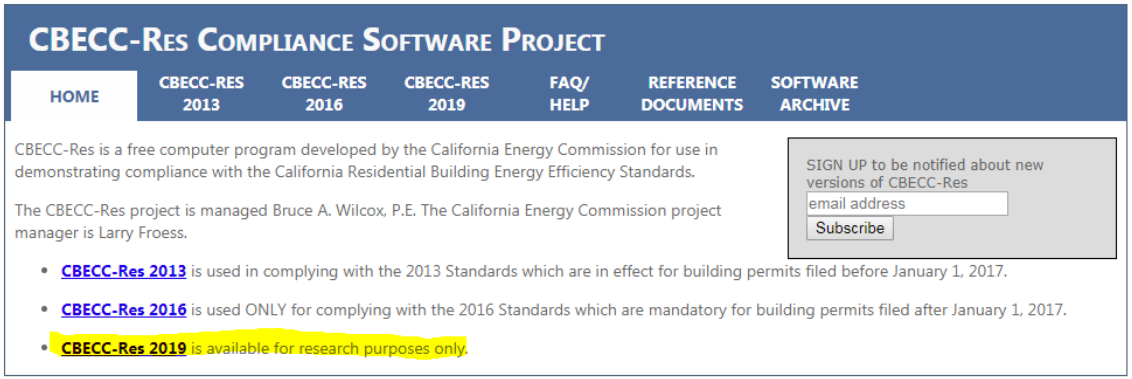
- May 9, 2018 Business Meeting – Language Adoption
- Jan 1, 2020 Implementation Date
  - Any projects that apply for permit on or after Jan 1, 2020 will be subject to the 2019 Standards
- "Revised Express Terms" documents available at:
  - http://www.energy.ca.gov/title24/2019standards/
- ~~Final 2019 Title 24 Part 6 Standards expected to be approved and available January 2019~~

Adopted and available as of 12/14/2018

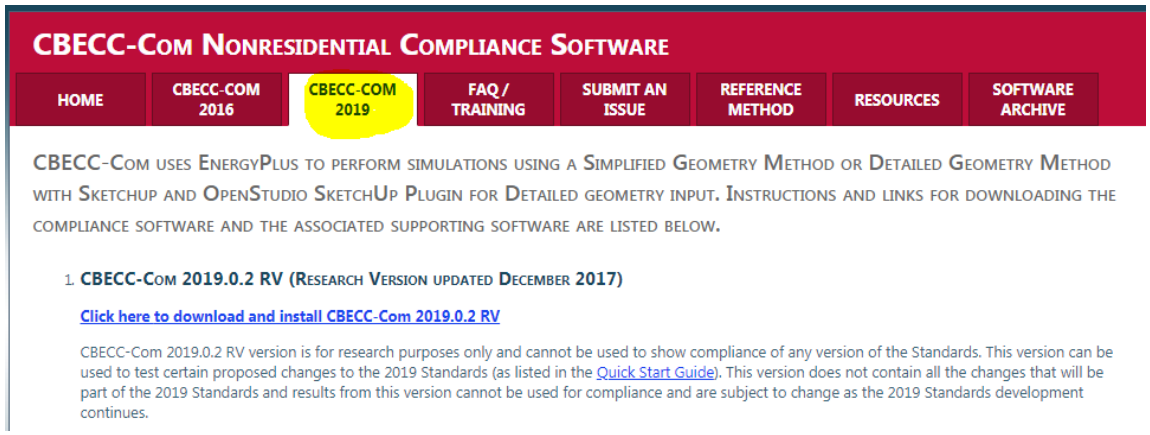
Want to Start Playing Early?

2019 Performance Software

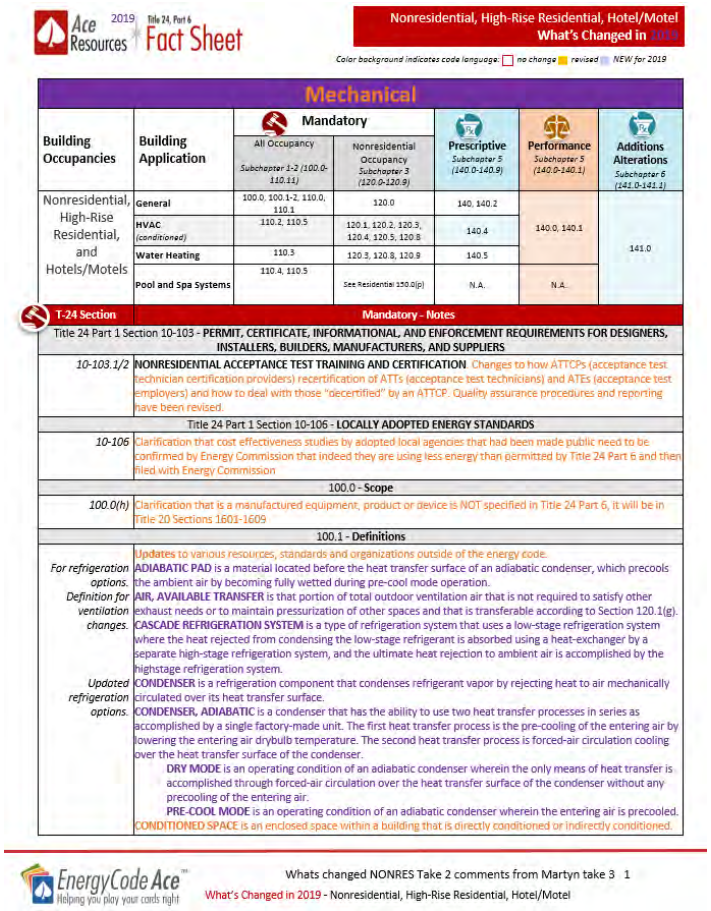
- Residential: http://www.bwilcox.com/BEES/cbecc2019.html



- Nonresidential: http://bees.archenergy.com/software2019.html



Coming Soon!



Ace Resources 2019 Title 24, Part 6 Fact Sheet

Nonresidential, High-Rise Residential, Hotel/Motel
What's Changed in 2019

Color background indicates code language: no change revised NEW for 2019

Mechanical

Building Occupancies	Building Application	Mandatory: All Occupancy (Subchapter 1-2 (100.0-110.11))	Mandatory: Nonresidential Occupancy (Subchapter 3 (120.0-120.9))	Prescriptive (Subchapter 5 (140.0-140.9))	Performance (Subchapter 5 (140.0-140.1))	Additions Alterations (Subchapter 6 (141.0-141.1))
Nonresidential, High-Rise Residential, and Hotels/Motels	General	100.0, 100.1-2, 110.0, 110.1	120.0	140, 140.2	140.0, 140.1	141.0
	HVAC (conditioned)	110.2, 110.5	120.1, 120.2, 120.3, 120.4, 120.5, 120.8	140.4		
	Water Heating	110.3	120.3, 120.8, 120.9	140.5		
	Pool and Spa Systems	110.4, 110.5	See Residential 150.0(p)	N.A.	N.A.	

T-24 Section	Mandatory - Notes
Title 24 Part 1 Section 10-103 - **PERMIT, CERTIFICATE, INFORMATIONAL, AND ENFORCEMENT REQUIREMENTS FOR DESIGNERS, INSTALLERS, BUILDERS, MANUFACTURERS, AND SUPPLIERS**	
10-103.1/2	**NONRESIDENTIAL ACCEPTANCE TEST TRAINING AND CERTIFICATION** Changes to how ATTCPs (acceptance test technician certification providers) recertification of ATTs (acceptance test technicians) and ATEs (acceptance test employers) and how to deal with those "decertified" by an ATTCP. Quality assurance procedures and reporting have been revised.
Title 24 Part 1 Section 10-106 - **LOCALLY ADOPTED ENERGY STANDARDS**	
10-106	Clarification that cost effectiveness studies by adopted local agencies that had been made public need to be confirmed by Energy Commission that indeed they are using less energy than permitted by Title 24 Part 6 and then filed with Energy Commission
100.0 - **Scope**	
100.0(h)	Clarification that is a manufactured equipment, product or device is NOT specified in Title 24 Part 6, it will be in Title 20 Sections 1601-1609
100.1 - **Definitions**	
For refrigeration options. Definition for ventilation changes. Updated refrigeration options.	Updates to various resources, standards and organizations outside of the energy code. **ADIABATIC PAD** is a material located before the heat transfer surface of an adiabatic condenser, which precools the ambient air by becoming fully wetted during pre-cool mode operation. **AIR, AVAILABLE TRANSFER** is that portion of total outdoor ventilation air that is not required to satisfy other exhaust needs or to maintain pressurization of other spaces and that is transferable according to Section 120.1(g). **CASCADE REFRIGERATION SYSTEM** is a type of refrigeration system that uses a low-stage refrigeration system where the heat rejected from condensing the low-stage refrigerant is absorbed using a heat-exchanger by a separate high-stage refrigeration system, and the ultimate heat rejection to ambient air is accomplished by the highstage refrigeration system. **CONDENSER** is a refrigeration component that condenses refrigerant vapor by rejecting heat to air mechanically circulated over its heat transfer surface. **CONDENSER, ADIABATIC** is a condenser that has the ability to use two heat transfer processes in series as accomplished by a single factory-made unit. The first heat transfer process is the pre-cooling of the entering air by lowering the entering air drybulb temperature. The second heat transfer process is forced-air circulation cooling over the heat transfer surface of the condenser. **DRY MODE** is an operating condition of an adiabatic condenser wherein the only means of heat transfer is accomplished through forced-air circulation over the heat transfer surface of the condenser without any precooling of the entering air. **PRE-COOL MODE** is an operating condition of an adiabatic condenser wherein the entering air is precooled. **CONDITIONED SPACE** is an enclosed space within a building that is directly conditioned or indirectly conditioned.

EnergyCode Ace Helping you play your cards right

Whats changed NONRES Take 2 comments from Martyn take 3 1

What's Changed in 2019 - Nonresidential, High-Rise Residential, Hotel/Motel

2019 "What's Changing For Title 24 Part 6" Factsheet

- Residential
- Nonresidential
- Multifamily
- Healthcare