



# 2022 Energy Code

Solar PV, Solar Ready, Battery Storage  
Systems – Nonresidential



# Energy Code History

## The Warren-Alquist Act established the California Energy Commission in 1974

- Authority to develop and maintain Building Energy Efficiency Standards (Energy Code)
- Requires the CEC to update periodically, usually every three years
- Requires the Energy Code to be cost effective over the economic life of the building

### WARREN-ALQUIST ACT

Warren-Alquist  
State Energy Resources  
Conservation and  
Development Act

Public Resources Code  
Section 25000 et seq.



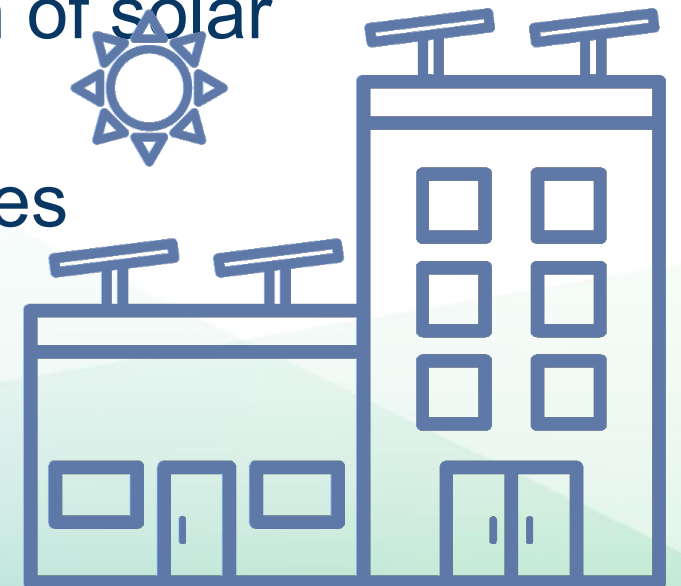
CALIFORNIA  
ENERGY COMMISSION  
Gavin Newsom, Governor

2020 EDITION  
JANUARY 2020  
CEC-140-2020-001



# 2022 Energy Code Goals

- Increase building energy efficiency cost-effectively
- Contribute to California's greenhouse gas (GHG) reduction goals
- Enable pathways for all-electric buildings
- Reduce residential building impacts on the electricity grid
- Promote demand flexibility and self-utilization of solar photovoltaic (solar PV)
- Provide tools for local government reach codes





# Energy Code Environmental Benefit

## Reduced Statewide Emissions



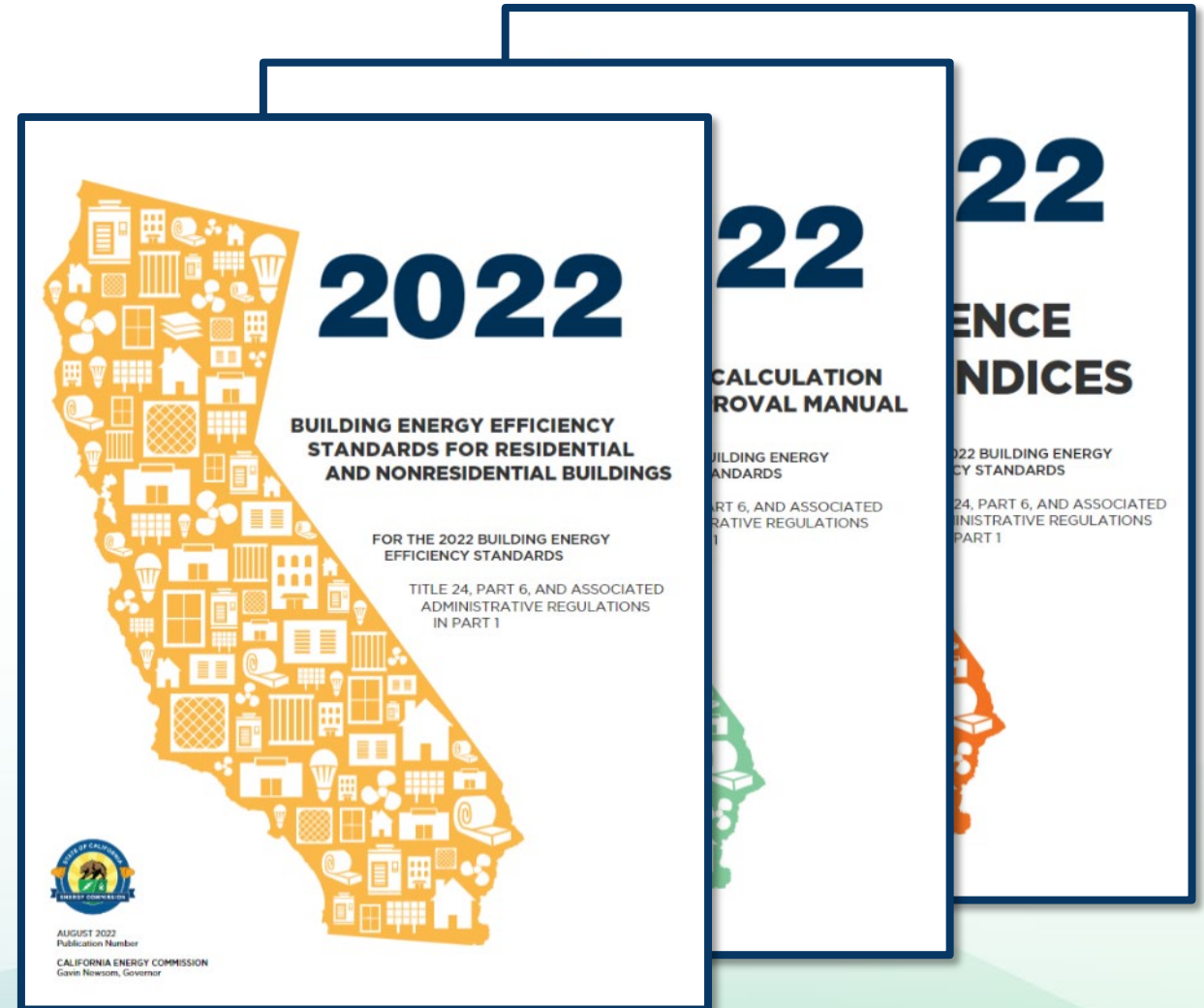
Source: CEC Impact Analysis 2005, 2008, 2013, 2016, 2019, 2022



# 2022 Energy Code

## Effective January 1, 2023

- Building permit applications submitted on or after Jan 1, 2023
- Must use 2022 tools
  - Software
  - Forms





# 2022 Documents Online

## 2022 Building Energy Efficiency Standards

The Building Energy Efficiency Standards (Energy Code) apply to newly constructed buildings, additions, and alterations. They are a vital pillar of California's climate action plan. The 2022 Energy Code will produce benefits to support the state's public health, climate, and clean energy goals.

The California Energy Commission (CEC) updates the Energy Code every three years. On August 11, 2021, the CEC adopted the 2022 Energy Code. In December, it was approved by the California Building Standards Commission for inclusion into the California Building Standards Code. The 2022 Energy Code encourages efficient electric heat pumps, establishes electric-ready requirements for new homes, expands solar photovoltaic and battery storage standards, strengthens ventilation standards, and more. Buildings whose permit applications are applied for on or after January 1, 2023, must comply with the 2022 Energy Code.

2022 Energy Code for Residential and Nonresidential Buildings

2022 ENERGY CODE >



Expand All

Supporting Documents – Appendices, Compliance Manuals, and Forms +

Software – Compliance Software, Manuals, and Tools +

### BUILDING ENERGY EFFICIENCY STANDARDS - TITLE 24

2025 Building Energy Efficiency Standards

2022 Building Energy Efficiency Standards ^

— Workshops, Notices, and Documents

2019 Building Energy Efficiency Standards

2016 Building Energy Efficiency Standards

Past Building Energy Efficiency Standards

Climate Zone tool, maps, and information supporting the California Energy Code

Online Resource Center

Solar Assessment Tools

### RELATED LINKS

Workshops, Notices, and Documents

### CONTACT

[Building Energy Efficiency Standards - Title 24](#)

Toll-free in California: 800-772-3300

Outside California: 916-654-5106

### SUBSCRIBE

Building Energy Efficiency Standards

Email \*

SUBSCRIBE

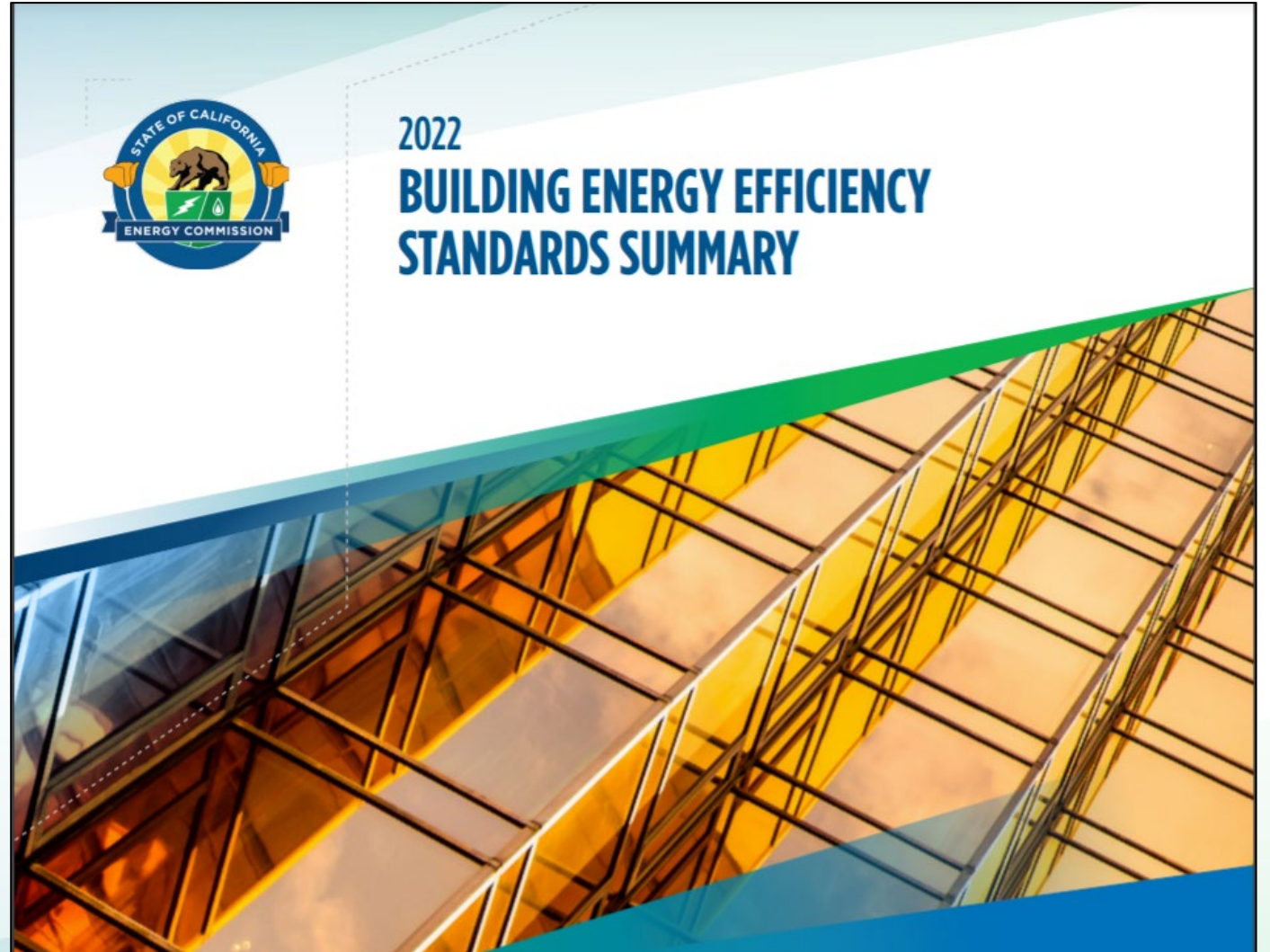
- Energy Code
- Reference Appendices
- Compliance Manuals
- Software
- Forms





# 2022 Energy Code Highlights

- Heat pump baselines
- Solar and battery storage
- Ventilation requirements
- Lighting
- Multifamily restructuring





# Energy Code Requirements

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## Mandatory requirements

- Minimum efficiency requirements must always be met
- Can never trade off

## Prescriptive requirements

- Predefined efficiency requirements
- May supersede mandatory requirements
- Different requirements for newly constructed buildings, additions, and alterations





# Compliance Approaches

## Prescriptive approach

- Simple approach, no trade-offs
- Defines the standard building design
- 2022 heat pump baselines

## Performance approach

- Most flexible approach, allows for trade-offs
- Must meet all mandatory requirements
- Requires the use of CEC-approved software
- Proposed building design meets or exceed standard building design





# 2022 Performance Metrics

- **Energy performance calculations**
- Nonresidential and multifamily
  - Hourly source energy
  - TDV Efficiency
  - TDV Total
    - Efficiency, solar PV + battery

New for 2022

## Heat pump baselines

- Requires heat pump for either space heating or water heating
  - Depends on climate zone and occupancy type
- Ability to go all-electric prescriptively
  - Must use heat pumps for both space heating and water heating



# Demonstrating Compliance

- **Compliance forms confirm Energy Code is met**
- Completed by responsible party
  - Designers, consultants, builders, contractors, technicians, HERS raters, etc.
- Submitted to enforcement agencies for verification

Updated for 2022

Type of form	Single-family	Multifamily 3 or less habitable stories	Nonresidential Multifamily 4 or more habitable stories
Certificate of compliance	CF1R	LMCC	NRCC
Certificate of installation	CF2R	LMCI	NRCI
Certificate of verification	CF3R	LMCV	NRCV
Certificate of acceptance	-	-	NRCA



# 2022 Compliance Software

- Performance approach must use approved compliance software versions
- Single-family
  - CBECC-Res 2022.3.0
  - EnergyPro 9.2
  - Right-Energy 2022.2.0
- Nonresidential and multifamily
  - CBECC 2022.3.0
  - EnergyPro 9.2
  - IES 1.0



# Table 100.0-A, Nonresidential

	Mandatory	Prescriptive	Performance	Additions & Alterations
Solar PV	N/A	140.10(a)	140.0, 140.1	N/A
Battery	N/A	140.10(b)	140.0, 140.1	N/A
Solar Ready	110.10	N/A	N/A	141.0(a)1&2A

- Battery requirements go together with solar PV requirements



# **Solar Photovoltaic (Solar PV) Requirements**



# §140.10(a) – Solar PV System Sizing

- Newly constructed buildings where  $\geq 80\%$  of total floor area made up of any combination of building types listed in Table 140.10-A
- Requires new solar PV meeting JA11
- Minimum annual output = (whichever is smaller):
  - Equation 140.10-A
  - Solar Access Roof Area (SARA)  $\times 14\text{W}/\text{ft}^2$
- For mixed use buildings that contain building types in Table 140.10-A, the total solar PV capacity = sum for each building type, including its support areas, per Equation 140.10-A



# §140.10(a) – Solar PV System Sizing (cont.)

Equation 140.10-A :

$$kW_{PV} = \frac{CFA \times A}{1000}$$

- $kW_{PV}$  = Solar PV size (kW)
- CFA = conditioned floor area (ft<sup>2</sup>)
- A = capacity factor adjustment from Table 140.10-A





# Table 140.10-A

<u>Climate Zone</u>	<u>Factor A – Minimum PV Capacity (W/ft<sup>2</sup> of conditioned floor area)</u>		
	<u>1, 3, 5, 16</u>	<u>2, 4, 6-14</u>	<u>15</u>
<u>Grocery</u>	<u>2.62</u>	<u>2.91</u>	<u>3.53</u>
<u>High-Rise Multifamily</u>	<u>1.82</u>	<u>2.21</u>	<u>2.77</u>
<u>Office, Financial Institutions, Unleased Tenant Space</u>	<u>2.59</u>	<u>3.13</u>	<u>3.80</u>
<u>Retail</u>	<u>2.62</u>	<u>2.91</u>	<u>3.53</u>
<u>School</u>	<u>1.27</u>	<u>1.63</u>	<u>2.46</u>
<u>Warehouse</u>	<u>0.39</u>	<u>0.44</u>	<u>0.58</u>
<u>Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater</u>	<u>0.39</u>	<u>0.44</u>	<u>0.58</u>

- Building types are defined in §100.1
- Capacity factor (A) depends on building type and climate zone



# §140.10(a) – SARA

## SARA includes area of all roof space:

- Able to structurally support solar PV
- All new structures onsite that can support solar PV (Title 24, Pt. 2, §1511.9)
  - e.g. – covered parking areas, carports

## SARA does not include roof area(s):

- < 70% annual solar access
  - *Annual solar access* =  
$$\frac{[\textit{annual solar insolation, minus shading}]}{[\textit{annual solar insolation if unshaded}]}$$
  - Shading from all obstructions counted
- Occupied roof areas (CBC §503.1.4)
- Unavailable due to other building codes, if confirmed by Executive Director



# §140.10(a) Exceptions

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No solar PV system required if/in:

1. SARA < 3% of CFA
2. Minimum solar PV system size < 4 kW<sub>dc</sub>
3. SARA < 80 ft<sup>2</sup>, contiguous
4. AHJ determines solar PV system cannot meet ASCE Std. 7-16, Ch. 7, Snow Loads
5. Multi-tenant buildings in areas where load serving entity provides neither Virtual Net Metering (VNEM) nor community solar program



# Solar PV Sizing Example

Ex: 350k sq ft multitenant building in Climate Zone (CZ) 12; 276k sq ft high-rise multifamily (HRMF), 18.5k sq ft retail, 5.5k sq ft office space, 50k sq ft unconditioned storage; 24k sq ft of SARA

## SARA Method:

Total available Solar Access Roof Areas (SARA) x 14 W/ft<sup>2</sup>

$$24,000 \text{ sqft} \times 14W = 336 \text{ kW}$$



# Solar PV Sizing Example (cont.)

Equation Method:  $kW_{PV} = \frac{CFA \times A}{1000}$

- Retail:  $\left(\frac{18,500}{1000}\right) \times 2.91 = 53.84 \text{ kW}$
- Office:  $\left(\frac{5,500}{1000}\right) \times 3.13 = 17.22 \text{ kW}$
- HRMF:  $\left(\frac{276,000}{1000}\right) \times 2.21 = 609.96 \text{ kW}$
- Total = 681.02 kW

SARA Method = 336 kW, Equation Method = 681.02 kW

**Required solar PV size is 336 kW** (use the lesser kW of the two methods)



# **Reference Joint Appendix JA11 – Solar Photovoltaic System Requirements**

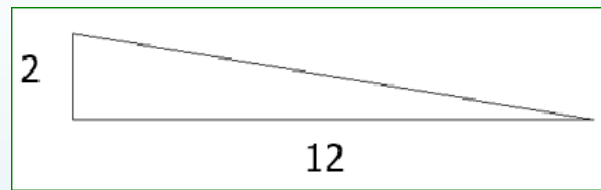
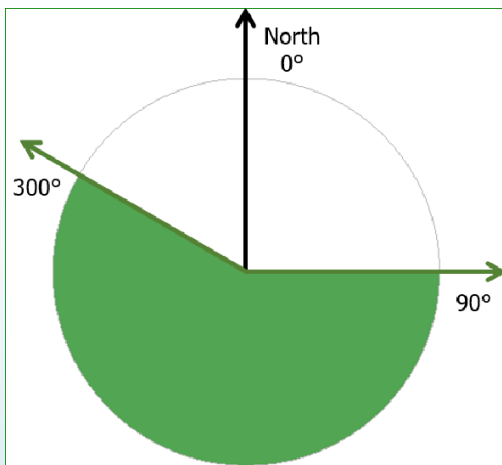


# JA11.2 – Orientation

Required azimuth (angle from true north, clockwise) depends on compliance approach and/or solar PV system tilt:

## Prescriptive Approach

- Determined by solar PV pitch:
  - $> 2:12$  ( $10^\circ$ ) –  $90-300^\circ$ , clockwise
  - $< 2:12$  – any azimuth range



## Performance Approach

- Determined by CA Flexible Installation (CFI) selection in software; solar PV at same tilt as roof, up to 7:12
  - CFI1 selected –  $150-270^\circ$
  - CFI2 selected –  $105-300^\circ$
  - If solar PV array meets neither, then input actual orientation



# JA11.3 – Shading

- Minimize shading from obstructions to meet prescriptive limit
  - Weighted average annual solar access by panel count  $\geq 98\%$
- Obstructions north of array can be ignored
- Verify shading via certified solar access tool (JA11.4)





# JA11.4 – Solar Access Verification

- Use certified solar assessment tool to show that shading:
  - Meets prescriptive limit (JA11.3.1)
  - Matches NRCC
  - Qualifies for exceptions in § 140.10(a)
- Tools must be certified to Executive Director to:
  - Calculate annual solar access %, including all known obstructions
  - Exclude horizon shading
  - Produce shade report (e.g. – address, panel count, orientation, annual solar access %)
  - Satellite/aerial image modeling must be comparable to onsite



# Solar Assessment Tools

The CEC has approved the use of the following solar assessment tools as specified in JA11.4:

- Aurora Solar Inc.
- Helioscope
- Scanifly
- IESVE
- Solar Pathfinder
- Solmetric Suneye
- Sunrun Lightmile



# JA11.5-11.6 – Monitoring and Interconnection

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- Web-based portal and mobile device app that provides:
  - System kW rating
  - Number of modules with nominal W
  - kWh production, including running daily total, daily peak, and current system production
- Installed inverters tested per UL1741 and UL1741 Supplement A
  - System and components, including inverters, must meet Rule 21



# JA11.7-11.8 – Documentation

- Certificate of Installation certifies that JA11 met; must be available onsite
  - Verified by AHJ
- Solar assessment report meeting one of the following:
  - Digital image must be created and dated after solar PV system installed
  - Include additional onsite pictures showing that install matches report



# §140.1 – Performance Standards

- Proposed Design Efficiency and Total TDVs and source energy  $\leq$  Standard Design energy budget
  - New for 2022 – budgets now account for solar PV and battery
  - New for 2022 – CEC-approved community-shared solar/renewable electric gen. system, and/or battery storage system providing dedicated benefits to permitted building may offset required solar electric generation system or battery TDV energy
- Proposed Design TDVs and source energy  $\leq$  Standard Design TDV and source energy; must use CEC-certified compliance software



# **Solar Readiness Requirements**





# §110.10(a)3&4 – Scope

- Mandatory but only triggers if solar PV doesn't apply
- Nonresidential buildings *without solar PV installed* must meet §110.10(b)-(d)
  - Nonresidential buildings, up to 3 habitable stories
  - Hotel/motel buildings, up to 10 habitable stories
  - *Not* I-2 and I-2.1 occupancies



# §110.10(b)1B – Min. Solar Zone Area

- Solar zone must meet access, pathway, smoke ventilation, and spacing requirements in Title 24, Part 9 or any local ordinance
- Solar zone area requirements:
  - No dimensions < 5 ft.
  - $\geq 80 \text{ ft}^2$ , if total roof area  $\leq 10,000 \text{ ft}^2$ 
    - $\geq 160 \text{ ft}^2$ , if total roof area  $> 10,000 \text{ ft}^2$
- Total area  $\geq 15$  percent of total roof area, minus skylights. Applies to entire building, including mixed occupancy
  - Located on roof or overhang, another structure up to 250 ft. away from building, or covered parking installed with building project





# §110.10(b)1B Exceptions

## Eliminate Solar Zone

Exception	Requirements
1	Solar PV, nameplate DC power rating (Standard Test Conditions) $\geq 1$ W/ft <sup>2</sup> of roof area
2	Hotel/Motel with solar water-heating meeting §150.1(c)8Biii
5	Roof is designed and approved for vehicular traffic, parking, or heliport



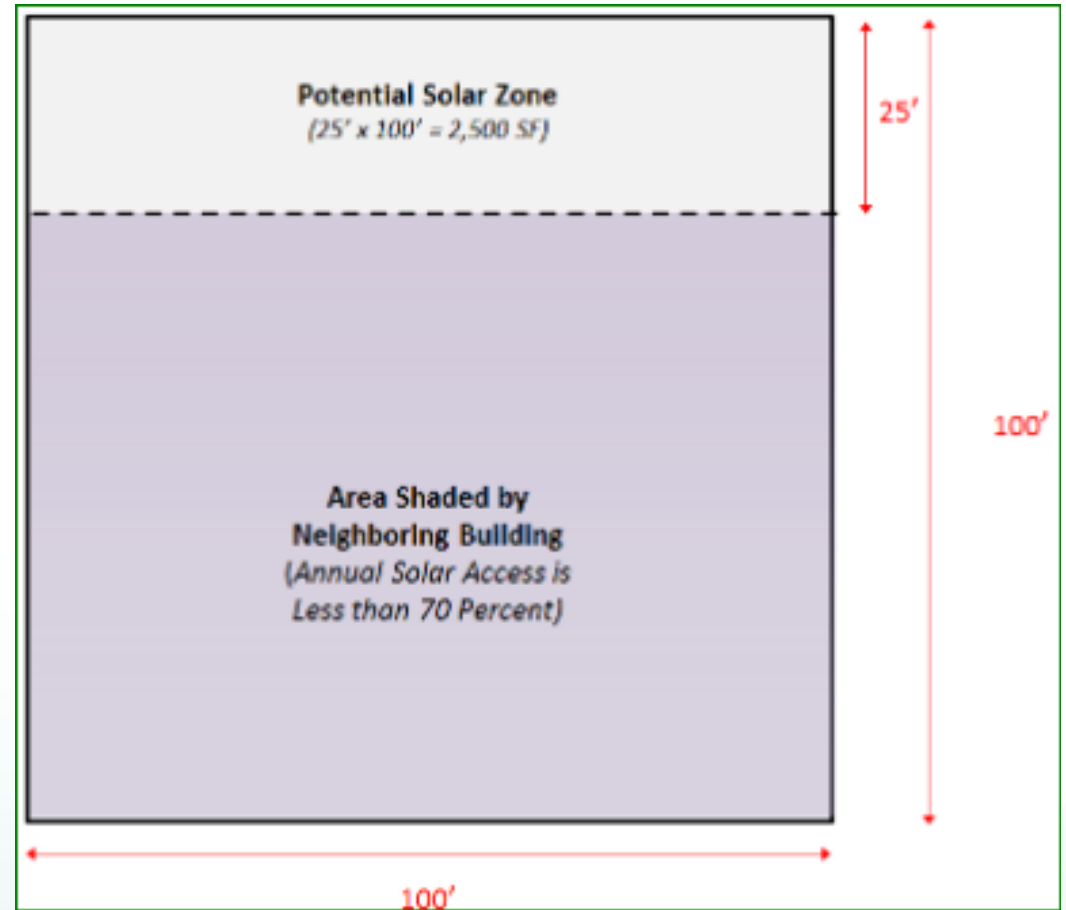
# §110.10(b)1B Exceptions (cont.)

Reduce Solar Zone		
Exception	Requirements	Min. Solar Zone (ft <sup>2</sup> )
3	Designated solar zone (50% of potential solar zone*) < 250 ft <sup>2</sup>	Designated solar zone ( <u>see example</u> )



# §110.10(b)1B Exception 3, Example

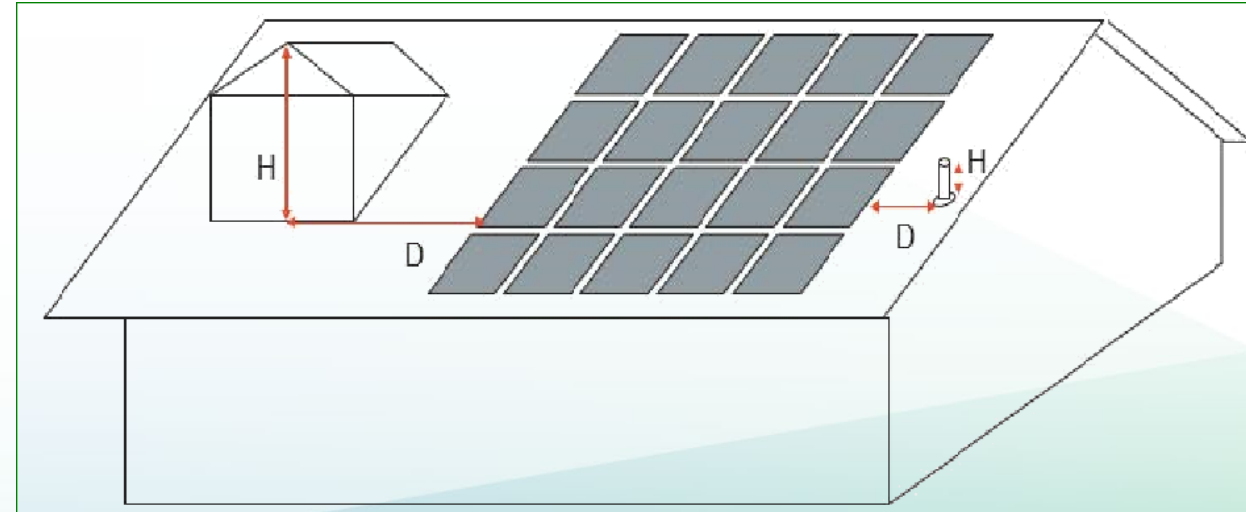
- 10k ft<sup>2</sup> roof; if unshaded, min. solar zone = 1,500 ft<sup>2</sup>
- 7,500 ft<sup>2</sup> shaded by neighboring building; potential solar zone = 2,500 ft<sup>2</sup>
  - Per Exception 3, designated solar zone = 2,500 ft<sup>2</sup> x 50% = 1,250 ft<sup>2</sup>
  - **Thus, min. solar zone = 1,250 ft<sup>2</sup>**





# §110.10(b)2-4

- Steep-sloped roofs – azimuth 90-300°
- Shading
  - No obstructions in solar zone
  - Roof-based obstructions & building portions over solar zone must be at least 2x height away from solar zone
  - EXCEPTION: Any obstructions north of solar zone
- Roof dead loads and live loads must be clearly marked on construction documents





# §110.10(c)-(d) – Documentation

- Construction documents must indicate:
  - Reserved location for inverters and metering equipment
  - Reserved pathway for conduit from solar zone to electrical service connection
  - If central water heating used – pathway for plumbing from solar zone to water-heating system
- Occupant gets construction documents or information from §110.10(b)-(c)



# §141.0(a) – Additions

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- §141.0(a)1&2A – additions must meet §§ 110.0-120.7 [...]
  - Exception 4 to §141.0(a) – additions that increase roof area by 2,000 ft<sup>2</sup> or less exempt from § 110.10



# Battery Storage Systems Requirements



# §140.10(b) – Battery Requirements

- All buildings required to have solar PV must also have battery storage meeting JA12
- Minimum rated energy and power capacities calculated per Equations 140.10-B & -C
  - For mixed use buildings that contain building types in Table 140.10-B, the battery capacity = sum of each value per Equations 140.10-B & -C for each building type, including its support areas





# Equations 140.10-B & -C

## 140.10-B – Rated Energy Capacity

$$kWh_{batt} = \frac{kW_{PVdc} \times B}{D^{0.5}}$$

- $kW_{PVdc}$  = Solar PV required per §140.10(a) ( $kW_{dc}$ )
- B = Battery energy capacity factor per Table 140.10-B
- D = Rated round-trip efficiency

## 140.10-C – Rated Power Capacity

$$kW_{batt} = kW_{PVdc} \times C$$

- $kW_{PVdc}$  = Solar PV required per §140.10(a) ( $kW_{dc}$ )
- C = Battery power capacity factor per Table 140.10-B



# Table 140.10-B

*Table 140.10-B – Battery Storage Capacity Factors*

	<b>Factor B – Energy Capacity</b>	<b>Factor C – Power Capacity</b>
<b>Storage-to-PV Ratio</b>	<b>Wh/W</b>	<b>W/W</b>
Grocery	1.03	0.26
High-Rise Multifamily	1.03	0.26
Office, Financial Institutions, Unleased Tenant Space	1.68	0.42
Retail	1.03	0.26
School	1.87	0.46
Warehouse	0.93	0.23
Auditorium, Convention Center, Hotel/Motel, Library, Medical Office Building/Clinic, Restaurant, Theater	0.93	0.23



# §140.10(b) Exceptions

- No battery required:
  - Installed solar PV < 15% of size per Equation 140.10-A ([see example](#))
  - Battery requirement < 10 kWh rated capacity
  - Offices, schools, and warehouses in climate zone 1
  - Single-tenant buildings with CFA < 5,000 ft<sup>2</sup>
- For multi-tenant buildings, energy and power capacities based on tenant spaces with CFA > 5,000 ft<sup>2</sup>



# §140.10(b) Exception 1 Example

- Retailer in CZ-12; 20k ft<sup>2</sup> CFA; 620 ft<sup>2</sup> SARA. Is battery required?
  - Required minimum solar PV size = Equation 140.10-A or SARA, use whichever is smaller:
    - Eqn. 140.10-A:  $\frac{CFA \times A}{1000} = \frac{20,000 \times 2.91}{1000} = 58.2 \text{ kWdc}$
    - SARA:  $SARA \times \frac{14W}{ft^2} = 620 \times 14 = 8.68 \text{ kWdc}$
  - $58.2 \text{ kWdc} \times 15\% = 8.73 \text{ kWdc}$ ; if 8.73 kWdc or less is installed, **battery storage is not required**



# JA12.2 – Battery Safety and System Performance Requirements

- Battery storage systems must be certified to CEC as meeting:
  - **Safety** – tested per UL1973 and UL9540. Inverters tested per UL1741 and UL1741 Supplement A.
  - **Minimum System Performance** (see table below)

	Prescriptive	Performance
Usable capacity $\geq$ 5 kWh	X	X
Single charge-discharge cycle AC to AC (round-trip) efficiency $\geq$ 80%	X	
<ul style="list-style-type: none"><li>• Energy capacity retention of 70% of nameplate capacity after 4,000 cycles covered by warranty; or</li><li>• 70% of nameplate capacity under 10-year warranty</li></ul>	X	X



# JA12.2 – Control Requirements

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- Battery must:
  - At inspection, be installed for approved control strategy
  - Be able to remotely switch control strategies and change charge/discharge periods
  - Use approved control strategy; backup mode OK if power interrupted
  - Do system check within 10 calendar days before summer and winter TOU schedules



# JA12.2 – Control Strategies

Strategy	Charge	Discharge	Notes
Basic (JA12.2.3.1)	Solar PV production > onsite load	Solar PV production < onsite load	
Time-of-Use (TOU) (JA12.2.3.2)	Solar PV only	Highest-priced TOU hours	<ul style="list-style-type: none"><li>• Schedule factory preprogrammed, updated remotely, or programmed at install</li><li>• At minimum, able to program 3 separate seasonal TOU schedules</li></ul>
Advanced Demand Flex. (JA12.2.3.3)	[Basic or TOU control]	[Basic or TOU control]	<ul style="list-style-type: none"><li>• Control meets §110.12(a)</li><li>• Can change charging/discharging periods per local utility signal</li></ul>



# JA12.2 – Control Strategies (cont.)

Strategy	Charge	Discharge	Notes
Separate Battery Storage Systems (JA12.2.3.4)	Lowest-priced TOU hours	Highest-priced TOU hours	<ul style="list-style-type: none"><li>• Battery separate from onsite solar PV (e.g., using community solar PV)</li><li>• Battery meets §110.12(a), and able to change charge/discharge periods per local utility signal</li></ul>
Alternative Control Approved by the Executive Director (JA12.2.3.5)	N/A	N/A	<ul style="list-style-type: none"><li>• Executive Director approved</li><li>• Must have equal or greater benefits to approved strategies</li><li>• Clear and easily-implemented algorithms for incorporation into compliance software</li></ul>





# JA12.3 & 12.4 – Interconnection & Enforcement

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- Battery and associated components, including inverters, must meet Rule 21 and Net Energy Metering (NEM) rules adopted by CPUC
- AHJ must verify all NRCCI-SAB-ES
  - Battery model must be certified to CEC as qualified for credit
  - Battery using approved control strategy; programmed control strategy at final inspection and commissioning must match NRCCI



# Plan Review & Field Inspection





# Plan Review

- Verify the following match plan and meet JA11:
  - Solar PV system size (kW<sub>dc</sub>)
  - Modules and array type
  - Azimuth and array angle
  - Tilt
  - Inverter efficiency
  - Annual solar access
- Battery storage triggered if solar PV is required
- NRCC-SAB-E triggered if solar PV system is not required

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD				NRCC-PRF-E	
Nonresidential Performance Compliance Method				(Page 1 of 21)	
Project Name:			010012-SchSml-CECStd22	Date Prepared:	
				2023-09-06	
<b>A. General Information</b>					
1	Project Name	010012-SchSml-CECStd22			
2	Run Title				
3	Project Location	- specify -			
4	City	- specify -	5	Standards Version	Compliance 2022
6	Zip code	95814	7	Compliance Software (version)	CBCECC 2022.3.0 (1302)
8	Climate Zone	12	9	Building Orientation (deg)	0
10	Building Type(s)	• Nonresidential		11	Weather File
12	Project Scope	• New complete scope		13	Number of Dwelling Units
14	Total Conditioned Floor Area in Scope (ft <sup>2</sup> )	24412.7	15	Total # of hotel/motel rooms	0
16	Total Unconditioned Floor Area (ft <sup>2</sup> )	0	17	Fuel Type	Natural gas
18	Nonresidential Conditioned Floor Area	24412.7	19	Total # of Stories (Habitable Above Grade)	1
20	Residential Conditioned Floor Area	0			

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD				NRCC-PRF-E	
Nonresidential Performance Compliance Method				(Page 2 of 38)	
<b>B. PROJECT SUMMARY</b>					
Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within the permit application.					
<b>Building Components Complying via Performance</b>			<b>Building Components Complying Prescriptively</b>		
Envelope (See Table G)	Nonres	Performance	Solar Thermal Water Heating (See Table I3)	<input checked="" type="checkbox"/> Performance	The following building components are ONLY eligible for prescriptive compliance and should be documented on the NRCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the NRCC-PRF-E).
	Multifam	Not Included		<input type="checkbox"/> Not Included	
Mechanical (See Table H)	Nonres	Performance	Covered Process: Commercial Kitchens (see Table J)	<input type="checkbox"/> Performance	Indoor Lighting (Unconditioned) 140.6 & 170.2(e)
	Multifam	Not Included		<input checked="" type="checkbox"/> Not Included	
Domestic Hot Water (See Table I)	Nonres	Performance	Covered Process: Laboratory Exhaust (see Table J)	<input type="checkbox"/> Performance	Outdoor Lighting 140.7 & 170.2(e)
	Multifam	Not Included		<input checked="" type="checkbox"/> Not Included	
Lighting (Indoor Conditioned, see Table K)	Nonres	Performance	Photovoltaics (see Table S)	<input checked="" type="checkbox"/> Performance	Sign Lighting 140.8 & 170.2(e)
	Multifam	Not Included		<input type="checkbox"/> Not Included	
			Battery (see Table F)	<input checked="" type="checkbox"/> Performance	Electrical power systems, commissioning, solar ready, elevator and escalator requirements are mandatory and should be documented on the NRCC form listed if applicable (i.e. compliance will not be shown on the NRCC-PRF-E).
				<input type="checkbox"/> Not Included	
				<input checked="" type="checkbox"/> Performance	Electrical Power Distribution 110.11
				<input type="checkbox"/> Not Included	NRCC-ELC-E is required
				<input checked="" type="checkbox"/> Performance	Commissioning 120.8
				<input type="checkbox"/> Not Included	NRCC-CXR-E is required
				<input checked="" type="checkbox"/> Performance	Solar and Battery 110.10
				<input type="checkbox"/> Not Included	NRCC-SAB-E is required



# NRCC-PRF-E sample form

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD	NRCC-PRF-E
Nonresidential Performance Compliance Method	(Page 9 of 21)

C8. ENERGY USE INTENSITY (EUI)				
	Standard Design (kBtu/ft <sup>2</sup> / yr)	Proposed Design (kBtu/ft <sup>2</sup> / yr)	Margin (kBtu/ft <sup>2</sup> / yr)	Margin Percentage
GROSS EUI <sup>1</sup>	29.43	29.42	0.01	0.03
NET EUI <sup>1</sup>	20.01	19.86	0.15	0.75

<sup>1</sup> Notes: Gross EUI is Energy Use Total (not including PV)/Total Building Area. Net EUI is Energy Use Total (including PV)/Total Building Area.

D1. EXCEPTIONAL CONDITIONS
<ul style="list-style-type: none"> <li>The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.</li> </ul>

F1. REQUIRED PV SYSTEMS											
01	02	03	04	05	06	07	08	09	10	11	12
DC System Size (kWdc)	Exception <sup>1</sup>	Module Type	Array Type	Power Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)	Annual Solar Access (%)
43.76	n/a	Standard (14-17%)	Fixed	none	true	150-270	n/a	n/a	<=7:12	96	98

<sup>1</sup> See Table D1 for any PV exceptions used.



# Field Inspection

Field inspector verifies:

- Building and product information are in accordance with the approved plans, specifications, and energy compliance documentation
- No shading from permanent natural and man-made obstructions
- No shading from roof penetrations
- Rooftop solar PV system meets the Fire Code requirements

## 2022 Energy Code forms

### • **Certificate of Compliance**

- NRCC-PRF-01-E Perf. Approach
- NRCC-SAB-E Solar and Battery
- NRCC-SRA-E Solar Ready

### • **Certificate of Installation**

- NRCI-SAB-E Solar and Battery
- NRCI-SRA-E Solar Ready
- NRCI-ELC-E Electric Ready



# Resources





# Online Resource Center

[www.energy.ca.gov/orc](http://www.energy.ca.gov/orc)



- **Handouts**
- Fact sheets
- Guides
- **Tools**
- Checklists
- Blueprint newsletter
- **Training**
- Presentations
- Videos
- **Links**
- Internal resources
- External resources



# Blueprint Newsletter

- Energy Code quarterly newsletter
- Updates
- Clarifications
- Frequently asked questions



Issue 138
April - June 2022

## BLUEPRINT

CALIFORNIA ENERGY COMMISSION  
EFFICIENCY DIVISION

### IN THIS ISSUE

- 2022 Energy Code: Multifamily Summary
- 2022 Energy Code: Compliance Software
- 2019 Energy Code: HERS Verifications
- Q&A
  - Solar PV for Multifamily Buildings
  - Multifamily Water Heating
  - Multifamily Common Use Areas

For additional help with the Energy Code see Energy Code Ace's **online offerings** of trainings, tools, and resources.

### 2022 Energy Code: Multifamily Summary

The 2022 Building Energy Efficiency Standards (Energy Code) reorganizes low-rise (three or fewer habitable stories) and high-rise (four or more habitable stories) multifamily buildings into one building type, updates the multifamily buildings definition in § 100.1, and moves all requirements for multifamily buildings to §§ 160.0-180.4. This and other significant changes include:

*Mandatory Requirements*

- Updates minimum efficiencies for HVAC equipment; adds minimum efficiency requirements for dedicated outdoor air systems (DOAS), heat pump, and heat recovery chiller packages. § 110.2
- Changes demand responsive lighting controls trigger to 4,000 watts or more; adds requirements for controlled receptacles. §§ 110.12, 160.5(b)4E

- Unifies envelope insulation, vapor retarder, and fenestration requirements. § 160.1
- For dwelling units
  - Adds requirements for central fan integrated ventilation systems requiring a motorized controlled damper, damper controls, and variable ventilation. § 160.2(b)2Aii
  - Requires vented kitchen range hoods ventilation rates or capture efficiencies based on conditioned floor area and fuel type per Tables 160.2-E, F, G. § 160.2(b)2Avic2
  - Requires a HERS-verified maximum fan efficacy of 1.0 Watts per cfm for heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems. § 160.2(b)2Biii
  - Adds mechanical acceptance testing requirements. § 160.3(d)2
  - Adds electric-ready requirements when gas equipment is installed for space heating, cooking, and clothes dryers. § 160.9(a-c)

1





# Energy Code Hotline



Monday through Friday

- 8:00 a.m. to 12:00 p.m.
- 1:00 p.m. to 4:30 p.m.

Call

- 800-772-3300 in CA
- 916-654-5106 outside CA



Email

- [Title24@energy.ca.gov](mailto:Title24@energy.ca.gov)



# Stay Connected

## Receive Energy Code updates

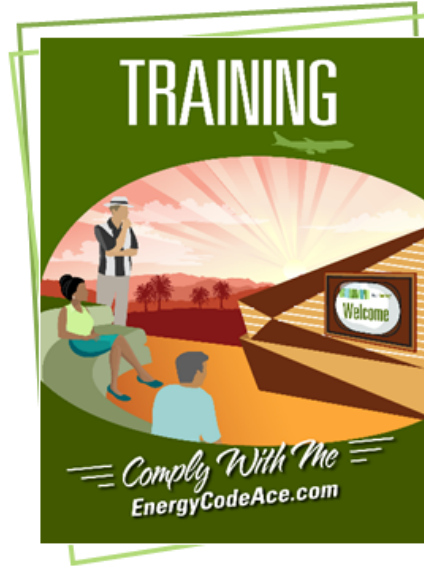
- [Subscribe to Efficiency Division emails](#)
  - Appliances
  - Blueprint
  - Building Standards
- Respond to confirmation email

## Follow the California Energy Commission





# Energy Code Ace



- Tools help automate tasks:**
- ✦ Energy Code Product Finder
  - ✦ Forms Ace
  - ✦ Image Ace
  - ✦ Navigator Ace
  - ✦ Nonres. Indoor Lighting Wheel
  - ✦ Q&Ace
  - ✦ Reference Ace
  - ✦ Timeline Ace
  - ✦ Virtual Compliance Assistant


- Training is activity based and delivered in a variety of formats:**
- ✦ Live Online instructor-led
  - ✦ Online self-study
  - ✦ Recorded webinars
  - ✦ YouTube — live streaming & videos

- Resources provide quick, useful guidance:**
- ✦ Fact Sheets
  - ✦ Checklists
  - ✦ Application Guides
  - ✦ Submit a Question
  - ✦ Trigger Sheets
  - ✦ Useful Links

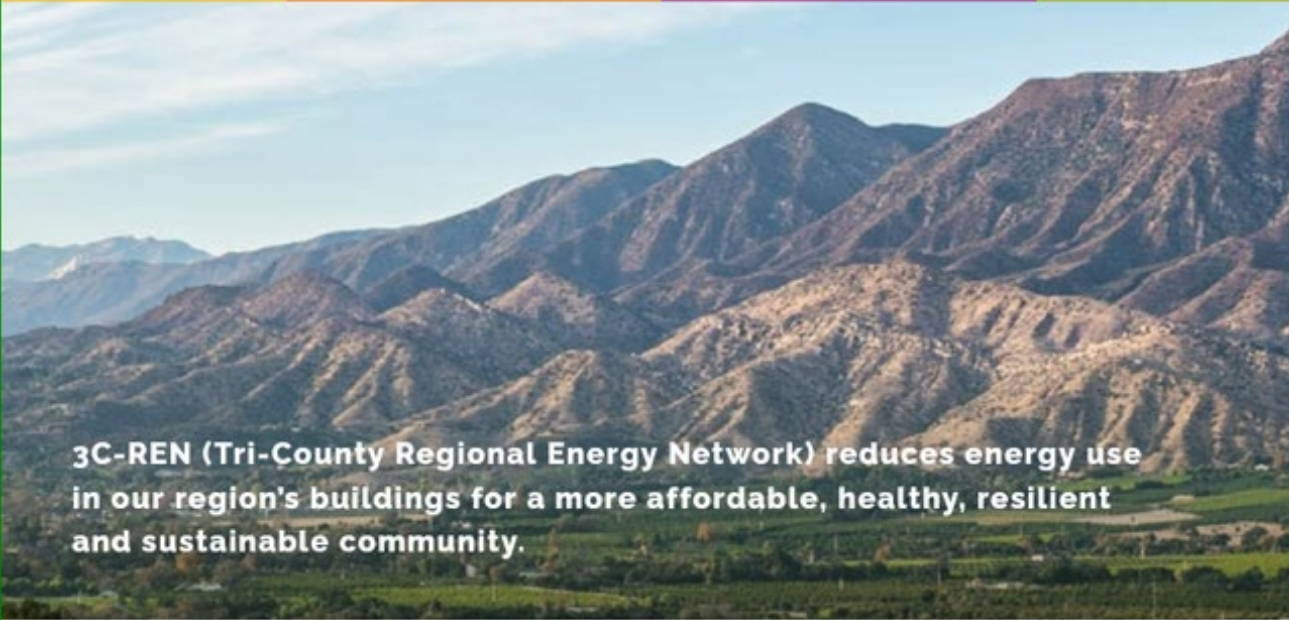
Join us at [EnergyCodeAce.com](http://EnergyCodeAce.com)




# 3C-REN



- [ABOUT 3C-REN](#)
- [HOME ENERGY SAVINGS](#)
- [BUILDING PERFORMANCE TRAINING](#)
- [ENERGY CODE CONNECT](#)




**3C-REN (Tri-County Regional Energy Network) reduces energy use in our region's buildings for a more affordable, healthy, resilient and sustainable community.**



**HOME ENERGY SAVINGS**

Save energy and improve your property


[Start Saving Today!](#)



**BUILDING PERFORMANCE TRAINING**

Develop your skills in building performance

[Find a Course](#)



**ENERGY CODE CONNECT**

Personalized coaching and educational events to simplify the energy code

[Submit Your Inquiry](#)



# BayREN

The screenshot shows the BayREN website interface. At the top left is the BayREN logo with the tagline "Local Governments Empowering Our Communities". To the right of the logo is a navigation bar with links: "» HOW TO GET STARTED", "» FIND A CONTRACTOR", "» FIND AN ASSESSOR", and "» PARTNER WITH US". Further right is an accessibility icon (A) and a search bar with a magnifying glass icon and the text "Search".

On the left side, there is a vertical menu with the following items: "REBATES & FINANCING", "HOME LEARNING CENTER", "EVENTS & TRAINING", "LOCAL GOVERNMENT RESOURCES", and "ABOUT". Below the menu are social media icons for Facebook, LinkedIn, Twitter, Instagram, and YouTube.

The main content area features a large background image of a park with people sitting at tables. Overlaid on the right side of this image is a dark purple circular graphic containing the text: "Score big with smart energy upgrades." Below this text is a sub-headline: "Upgrade your multifamily building and earn cash back — starting at \$750/unit." At the bottom of the graphic is a yellow button labeled "Learn More".



# Other Available Resources – Inland Regional Energy Network (I-REN)



**iren.gov**  
**info@iren.gov**

## Codes and Standards

### Training and Education Program

- Free ICC-approved training sessions for 2022 Energy Code (Title 24, Part 6) requirements → [www.iren.gov/161/CS-Trainings](http://www.iren.gov/161/CS-Trainings)
- Requested training courses can also be scheduled

### C&S Technical Support Program

Request Free Technical Assistance from Local Code Experts—Reach Code Development, Permit Guides, Etc. → [www.iren.gov/162/CS-Technical-Support](http://www.iren.gov/162/CS-Technical-Support)

### Ask a Code Mentor an Energy Code Question

Submit queries online and receive a personalized response addressed by energy code experts within two business days! → [www.iren.gov/162/CS-Technical-Support](http://www.iren.gov/162/CS-Technical-Support)



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Coachella Valley Association of Governments (CVAG)  
San Bernardino Council of Governments (SBCOG)  
Western Riverside Council of Governments (WRCOG)

\* Not affiliated with, or endorsed by, the CEC



**Thank you**