



2022 Energy Code

Solar PV, Solar Ready, Energy Storage Systems, Electric Ready – Single-Family



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.



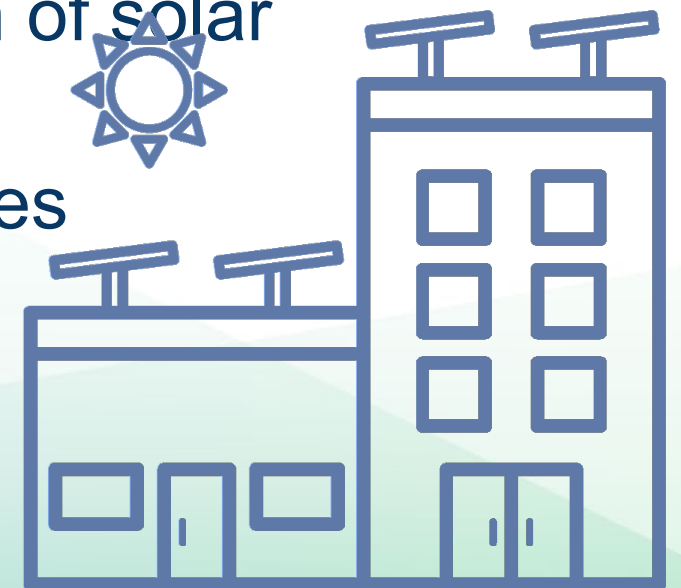
CALIFORNIA
ENERGY COMMISSION
Gavin Newsom, Governor

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



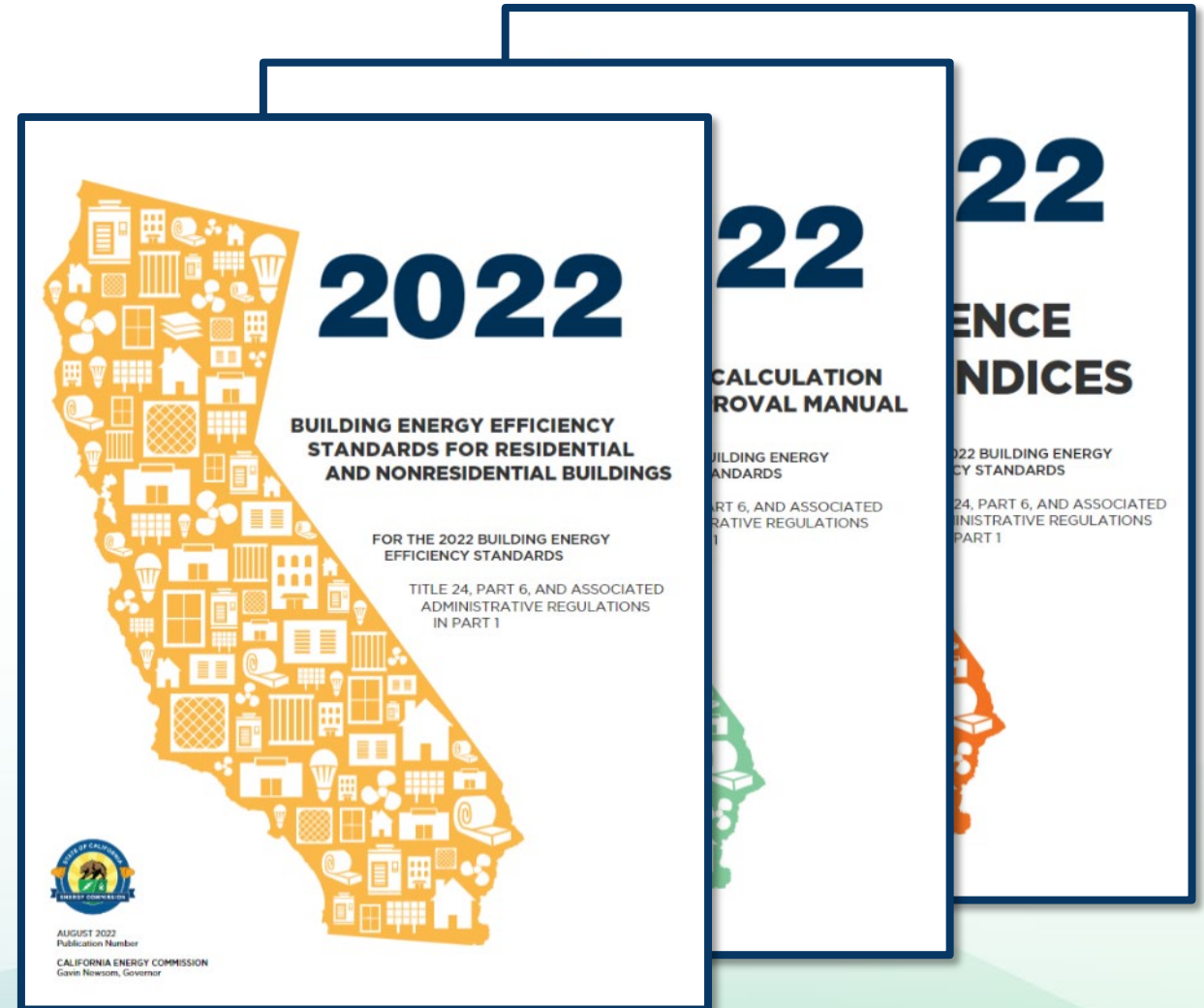
Source: CEC Impact Analysis 2005, 2008, 2013, 2016, 2019, 2022



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

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Building Energy Efficiency Standards

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SUBSCRIBE

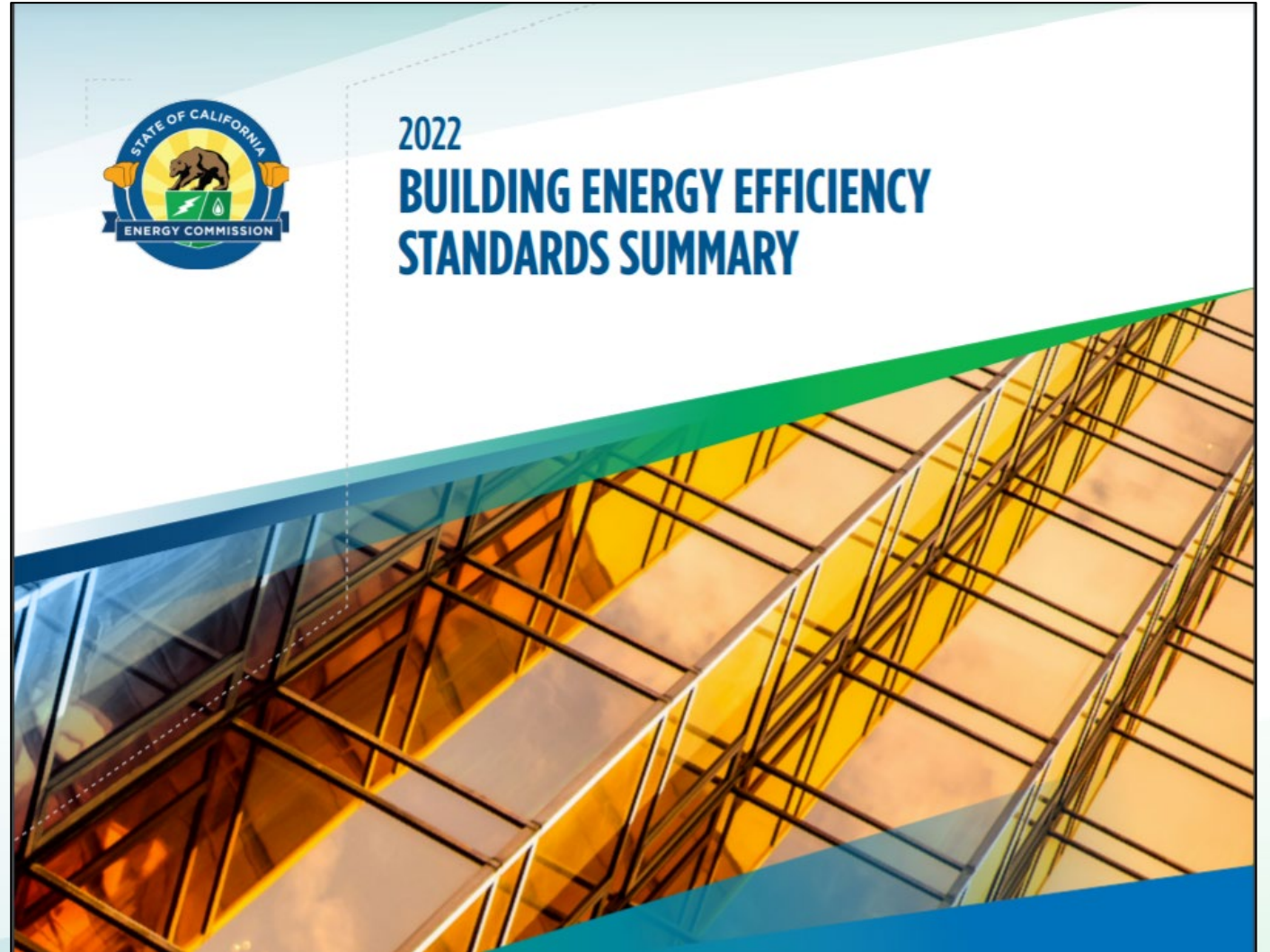
- Energy Code
- Reference Appendices
- Compliance Manuals
- Software
- Forms





2022 Energy Code Highlights

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





Energy Code Requirements

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**
- Single-family
 - EDR1: hourly source energy
 - EDR2: time dependent valuation (TDV)
 - Efficiency EDR, solar PV + flexibility EDR, total EDR

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, Single Family

	Mandatory	Prescriptive	Performance
Solar PV	N/A	150.1(c)14	150.1(b)
ESS Ready	150.0(s)	N/A	N/A
Electric Ready	150.0(t),(u),(v)	N/A	N/A
Solar Ready	110.10	N/A	N/A

- Newly constructed buildings (NCBs) only – no requirements for additions and alterations
- Energy Storage System (ESS)/battery not required; just need to be ready for future install
 - Battery, if used, must meet JA12



Solar Photovoltaic (Solar PV) Requirements



§150.1(c)14A&B – Solar PV System Sizing

- *Prescriptive*, not mandatory
- All newly constructed single-family (SF) buildings must have *new* solar PV system/modules meeting JA11
- Minimum annual output = (whichever is smaller):
 - Equation 150.1-C
 - Max. possible for Solar Access Roof Area (SARA)



§150.1(c)14A&B – Solar PV System Sizing (cont.)

Equation 150.1-C:

$$kW_{PV} = \left(\frac{CFA \times A}{1000} \right) + [N_{DU} \times B]$$

- kW_{PV} = Solar PV size (kW)
- CFA = conditioned floor area (ft²)
- N_{DU} = number of dwelling units
- A = CFA adjustment, [Table 150.1-C](#)
- B = dwelling unit adjustment, [Table 150.1-C](#)



§150.1(c)14A&B – 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, Part 2, §1511.9)
 - e.g. – covered parking areas, carports

SARA excludes roof area(s):

- < 70% annual solar access.
 - *Annual solar access* =
$$\frac{[\textit{annual solar insolation, minus shading}]}{[\textit{annual solar insolation if unshaded}]}$$
 - Roofs \geq 2:12 – only shading from existing permanent external obstructions counted
 - Roofs < 2:12 – all obstructions including external obstructions and those that are part of the building design and elevation
- Occupied roof areas (CBC §503.1.4)
- Unavailable due to other building code requirements



§150.1(c)14 Exceptions

1. Steep roofs – SARA excludes roof area with azimuth 90-300°. No solar PV system if SARA < 80 ft², contiguous.
2. No solar PV system if minimum size < 1.8 kW_{dc}
3. No solar PV if AHJ determines solar PV cannot meet ASCE Standard 7-16, Chapter 7, Snow Loads



§150.1(c)14 Exceptions (cont.)

4. If building approved before Jan. 1, 2020 with mandatory approval conditions:
 - a. Steep-sloped roofs – shading from roof designs must be counted into annual solar access calculations
 - b. Roof areas disallowed by those mandatory conditions to have solar PV, must be excluded from SARA
5. Reduce solar PV system size per Equation 150.1-C by 25%, if installed with battery meeting $JA12 \geq 7.5$ kWh



Reference Joint Appendix JA11 – Solar Photovoltaic System Requirements

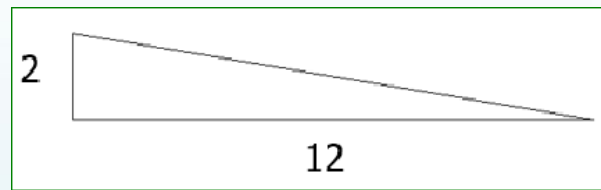
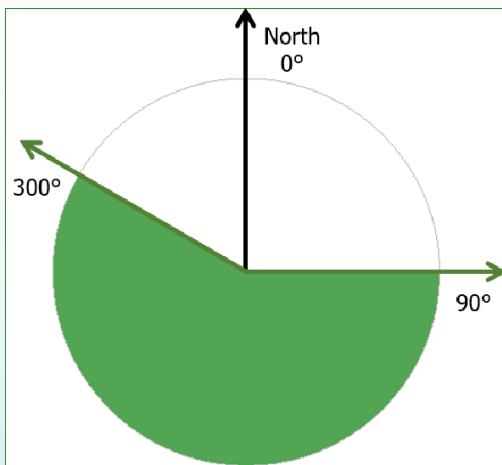


JA11.2 – Orientation

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°) – $90-300^\circ$, 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 of solar PV installed:
 - Meets prescriptive limit (JA11.3.1)
 - Meets conditions modeled in the Performance method (CF1R-PRF-01)
 - Qualifies for exceptions in § 150.1(c)14
- 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

- 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 is met
 - Verified by AHJ and uploaded into CEC-approved registry
- 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



§150.1(b) – Performance Standards

- Proposed Design \leq Standard Design energy budget; must use CEC-approved compliance software
- Newly Constructed Buildings – budgets in EDR (Energy Design Rating); **3 scores must be met**
 - EDR1 – Source energy based; must be met
 - EDR2
 - Efficiency EDR must be met
 - Total EDR must be met
 - Solar Generation & Demand Flexibility EDR



Solar Ready Requirements



§110.10(a)1 – Scope

- Mandatory, but only triggers if solar PV doesn't apply
- Single-family residential (SFR) buildings without solar PV must meet §110.10(b)-(e) if located in:
 - Subdivisions with ≥ 10 SFRs
 - Areas where tentative subdivision map application deemed complete, approved by AHJ



§110.10(b)1A – Min. Solar Zone Area

- Solar zone must:
 - Comply with access, pathway, smoke ventilation, and spacing requirements in Title 24, Part 9 or any local ordinance
 - Have dimensions ≥ 5 -ft
 - Be at least 80 ft^2 , if total roof area $\leq 10,000 \text{ ft}^2$; or 160 ft^2 , if total roof area $> 10,000 \text{ ft}^2$
 - Be on roof or overhang and have total area $\geq 250 \text{ ft}^2$, unless Exception applies (next slide)



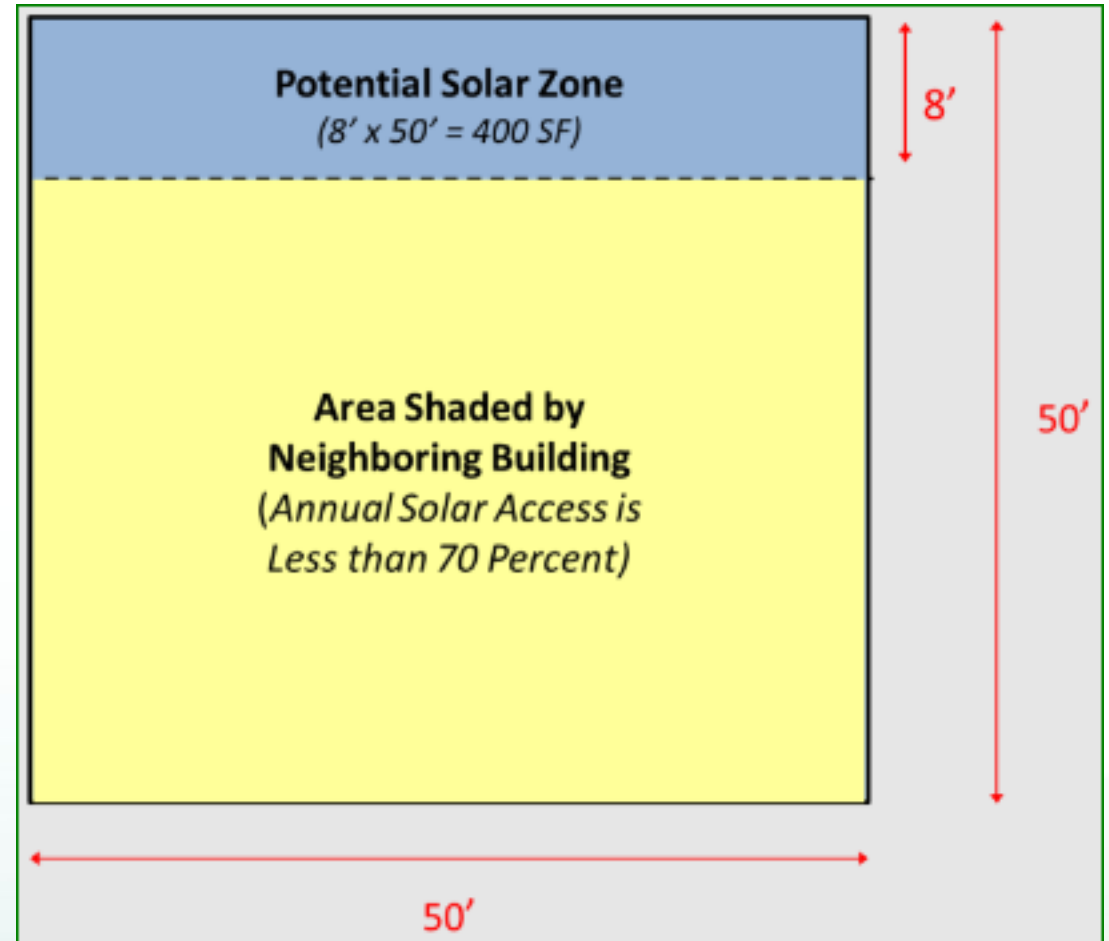
§110.10(b)1A Exceptions; Reduce Solar Zone

Exception	Requirements	Min. Solar Zone (ft ²)
2	≥ 3 habitable stories, total floor area $\leq 2,000$ ft ²	150
3	Located in Wildland-Urban Interface Fire Area, per Title 24, Part 2; whole-house fan	150
4	Designated solar zone (50% of potential solar zone) < 250 ft ²	Designated solar zone (<u>see example</u>)
5	All thermostats are demand responsive (DR), meeting §110.12(a), prior to occupancy permit	150



§110.10(b)1A Exception 4 Example

- 2,500 ft² roof; if unshaded, min. solar zone = 250 ft²
- 2,100 ft² shaded by neighboring building; potential solar zone = 400 ft²
 - Per Exc. 4, designated solar zone = 400 ft² x 50% = 200 ft² < 250 ft²
 - **Thus, min. solar zone is 200 ft²**





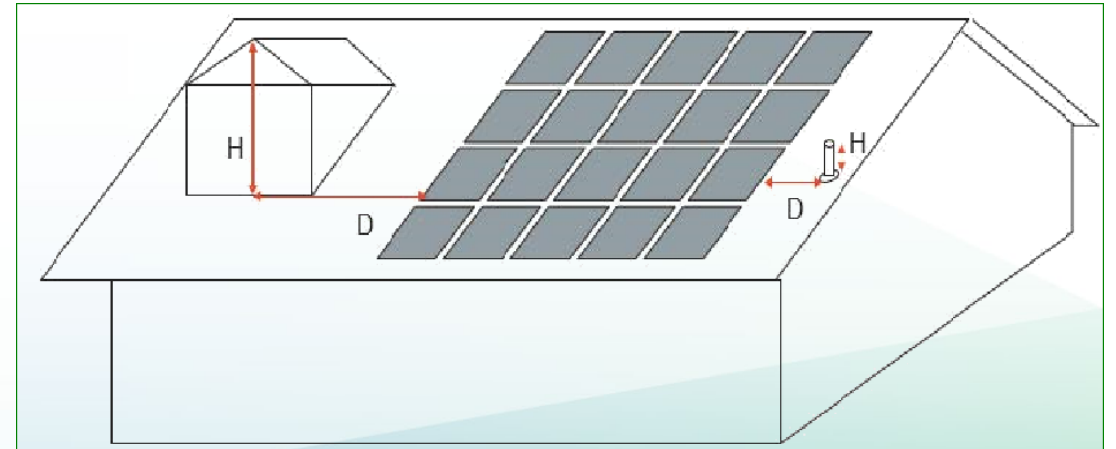
§110.10(b)1A Exceptions; Eliminate Solar Zone

Exception	Requirements
1	Solar water-heating meeting RA4, solar savings fraction (SSF) \geq 0.50
6	<ul style="list-style-type: none">• All thermostats DR, meeting §110.12(a), prior to occupancy permit• Choose one:<ul style="list-style-type: none">i. ENERGY STAR dishwasher & refrigerator, whole-house fan with electronic motor, or EV Charger \geq 40Aii. DR home automation for dwelling appliances and lightingiii. Plumbing that uses wastewater from clothes washer and all bathing fixtures to irrigate landscapeiv. Rainwater catchment using rainwater flowing from \geq 65% of available roof area



§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)-(e) – Documents and Main Electrical Service Panel

- Construction documents must indicate:
 - Reserved location for inverters and metering equipment
 - Reserved pathway for conduit from solar zone to electrical service connection
 - Pathway for plumbing from solar zone to water-heating system
- Occupant gets construction documents or information from §110.10(b)-(c)
- Main Electrical Service Panel
 - Busbar rating $\geq 200A$
 - Reserved space for double pole circuit breaker for future solar PV, permanently marked “For Future Solar Electric”



Energy Storage Systems (ESS) Requirements



§150.0(s)1 – Energy Storage Systems (ESS) Ready

1. Meet one or more of the following:

- A. ESS-ready interconnection equipment, backed up capacity \geq 60A, and 4+ ESS-supplied branch circuits; or
- B. Dedicated raceway from main service to subpanel supplying branch circuits in §150.0(s)2
 - Raceway trade size \geq 1-in.
 - Panelboard supplying subpanel labeled “Subpanel shall include all backed-up load circuits”



§150.0(s)2&3 – Energy Storage Systems (ESS) Ready (cont.)

2. 4+ branch circuits identified with supply collocated at one ESS-suitable panelboard. At least:
 - 1 circuit to supply refrigerator
 - 1 lighting circuit near primary exit
 - 1 circuit to supply sleeping room receptacle outlet
3. Main panelboard busbar rating $\geq 225A$

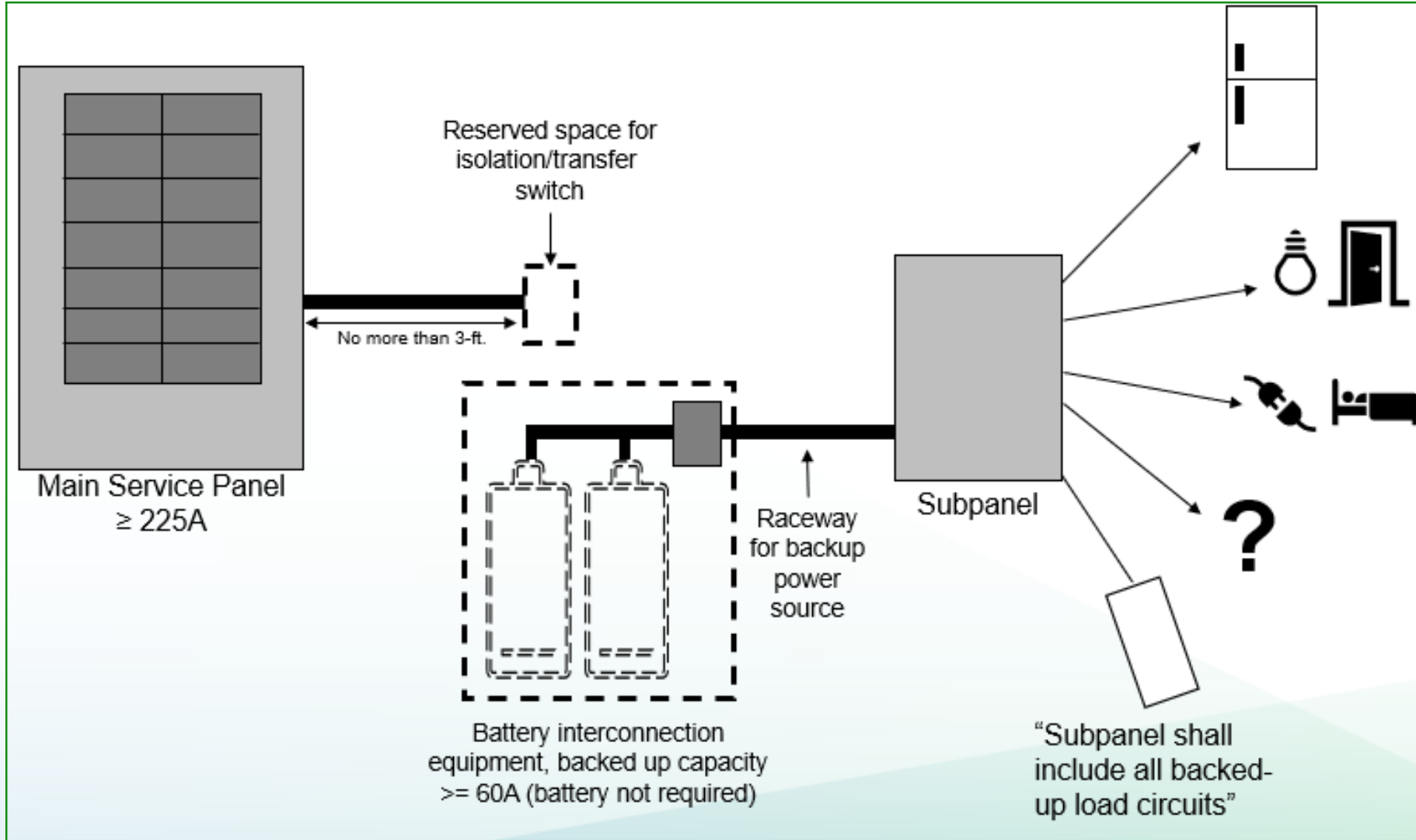


§150.0(s)4 – Energy Storage Systems (ESS) Ready (cont.)

4. Space for system isolation equipment/transfer switch reserved within 3-ft. of main panelboard
 - Raceways between panelboard and switch location to allow backup power source

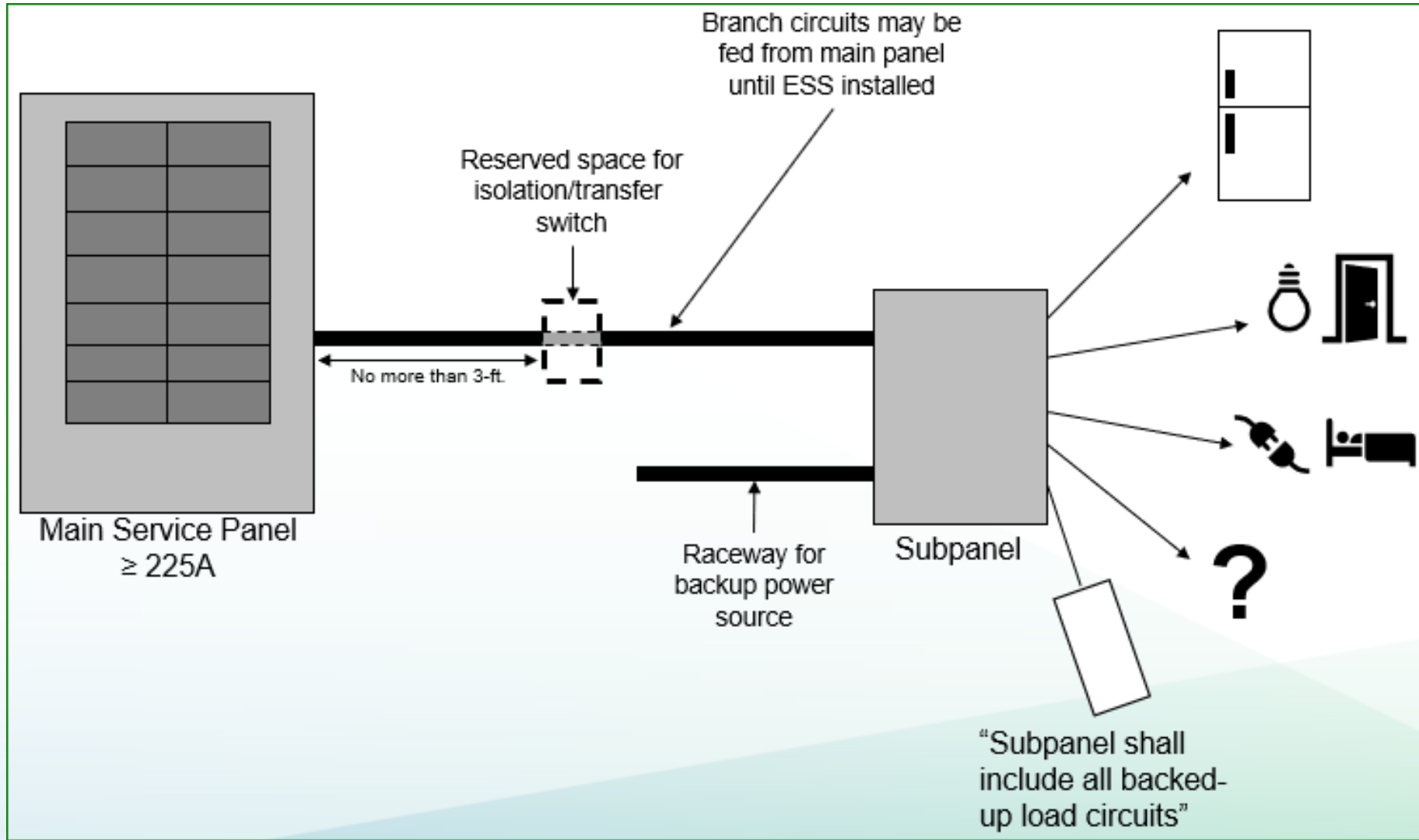


§150.0(s)1A-4 Example





§150.0(s)1B-4 Example





Reference Joint Appendix JA12 – Battery Requirements



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">• Energy capacity retention of 70% of nameplate capacity after 4,000 cycles covered by warranty; or• 70% of nameplate capacity under 10-year warranty	X	X



JA12.2 – Control Requirements

- Battery must:
 - At inspection, be installed for approved control strategy
 - Be able to remotely switch control strategies and change charge/discharge periods
 - Prioritize electrical load of dwelling unit(s)
 - 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">• Schedule factory preprogrammed, updated remotely, or programmed at install• At minimum, able to program 3 separate seasonal TOU schedules
Advanced Demand Flex (JA12.2.3.3)	[Basic or TOU control]	[Basic or TOU control]	<ul style="list-style-type: none">• Control meets §110.12(a)• Can change charging/discharging periods per local utility signal



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



JA12.3 & 12.4 – Interconnection & Enforcement

- Battery and associated components, including inverters, must meet Rule 21 and Net Energy Metering (NEM) rules adopted by CPUC
- AHJ must verify all CF2Rs
 - 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 CF1R



Electric Ready Requirements



§150.0(t)-(v) – Electric Ready

- If gas/propane furnace, cooktop, or clothes dryer systems used:
 - Dedicated unobstructed 240V branch circuit wiring installed within 3-ft. of appliance
 - Conductors:
 - Furnaces, dryers: 30A
 - Cooktops: 50A
 - Blank cover marked “240V ready”
 - Main panel space reserved for double pole circuit breaker, permanently marked “For Future 240V use”



Plan Review & Field Inspection



Plan Review

- Verify the following match plan and meet JA11:
 - Solar PV system size (kW_{dc})
 - Modules and array type
 - Azimuth and array angle
 - Tilt
 - Inverter efficiency
 - Annual solar access
- CF2R-SRA-01-E (Solar Ready) triggered if solar PV system is not required
- Newly constructed buildings are ESS ready; and electric ready (if certain gas appliances are installed)

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD						CF1R-PRF-01E
Project Name: 2 Story 2 Zone PV, Battery, Self-Utilization			Calculation Date/Time: 2023-09-06T14:55:48-07:00			(Page 1 of 14)
Calculation Description: 2 Zone Top/Bot, 2 GasFurn SplitAC Systems			Input File Name: 2story2zoneExample.rbd22			
GENERAL INFORMATION						
01	Project Name	2 Story 2 Zone PV, Battery, Self-Utilization				
02	Run Title	2 Zone Top/Bot, 2 GasFurn SplitAC Systems				
03	Project Location	715 P Street				
04	City	Sacramento, CA	05	Standards Version	2022	
06	Zip code	95814	07	Software Version	CSECC-Res 2022.3.0	
08	Climate Zone	9	09	Front Orientation (deg/ Cardinal)	30	
10	Building Type	Single family	11	Number of Dwelling Units	1	
12	Project Scope	Newly Constructed	13	Number of Bedrooms	4	
14	Addition Cond. Floor Area (ft ²)	0	15	Number of Stories	2	
16	Existing Cond. Floor Area (ft ²)	n/a	17	Fenestration Average U-factor	0.3	
18	Total Cond. Floor Area (ft ²)	2700	19	Glazing Percentage (%)	20.00%	
20	ADU Bedroom Count	n/a	21	ADU Conditioned Floor Area	n/a	
22	Fuel Type	natural gas	23	Occupancy Use	No	
COMPLIANCE RESULTS						
01	Building Complies with Computer Performance					
02	This building incorporates features that require field testing and/or verification by a certified HERS rater under the supervision of a CEC-approved HERS provider.					
03	This building incorporates one or more Special Features shown below.					

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD							CF1R-PRF-01E
Project Name: 2 Story 2 Zone PV, Battery, Self-Utilization			Calculation Date/Time: 2023-09-06T14:55:48-07:00			(Page 2 of 14)	
Calculation Description: 2 Zone Top/Bot, 2 GasFurn SplitAC Systems			Input File Name: 2story2zoneExample.rbd22				
ENERGY DESIGN RATINGS							
	Energy Design Ratings			Compliance Margins			
	Source Energy (EDR ₁)	Efficiency ¹ EDR (EDR ₂ efficiency)	Total ² EDR (EDR ₂ total)	Source Energy (EDR ₁)	Efficiency ¹ EDR (EDR ₂ efficiency)	Total ² EDR (EDR ₂ total)	
Standard Design	36.2	39.4	26.7				
Proposed Design	29.4	39.1	22.8	6.8	0.3	3.9	
RESULT ³ : PASS							
¹ Efficiency EDR includes improvements like a better building envelope and more efficient equipment.							
² Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries.							
³ Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded.							
• Standard Design PV Capacity: 3.23 kWdc							
• PV System resized to 3.23 kWdc (a factor of 1.078) to achieve 'Standard Design PV' PV scaling							
Registration Number: CA Building Energy Efficiency							
Registration Date/Time:		Registration Date/Time:		HERS Provider:			
CA Building Energy Efficiency Standards - 2022 Residential Compliance			Report Version: 2022.0.000		Report Generated: 2023-09-06 13:56:48		
			Schema Version: rev 20220901				



CF1R-PRF-01E sample form

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 2 Story 2 Zone PV, Battery, Self-Utilization

Calculation Date/Time: 2023-09-06T13:55:48-07:00

(Page 2 of 14)

Calculation Description: 2 Zone Top/Bot, 2 GasFurn SplitAC Systems

Input File Name: 2story2zoneExample.ribd22

ENERGY DESIGN RATINGS

	Energy Design Ratings			Compliance Margins		
	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)	Source Energy (EDR1)	Efficiency ¹ EDR (EDR2efficiency)	Total ² EDR (EDR2total)
Standard Design	36.2	39.4	26.7			
Proposed Design	29.4	39.1	22.8	6.8	0.3	3.9

RESULT³: PASS

¹Efficiency EDR includes improvements like a better building envelope and more efficient equipment

²Total EDR includes efficiency and demand response measures such as photovoltaic (PV) system and batteries

³Building complies when source energy, efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded

- Standard Design PV Capacity: 3.23 kWdc
- PV System resized to 3.23 kWdc (a factor of 1.078) to achieve 'Standard Design PV' PV scaling



CF1R-PRF-01E sample form (cont.)

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD

CF1R-PRF-01E

Project Name: 2 Story 2 Zone PV, Battery, Self-Utilization

Calculation Date/Time: 2023-09-06T13:55:48-07:00

(Page 4 of 14)

Calculation Description: 2 Zone Top/Bot, 2 GasFurn SplitAC Systems

Input File Name: 2story2zoneExample.ribd22

ENERGY USE INTENSITY

	Standard Design (kBtu/ft ² - yr)	Proposed Design (kBtu/ft ² - yr)	Compliance Margin (kBtu/ft ² - yr)	Margin Percentage
Gross EUI ¹	11.71	11.73	-0.02	-0.17
Net EUI ²	4.74	4.77	-0.03	-0.63

Notes

- Gross EUI is Energy Use Total (not including PV) / Total Building Area.
- Net EUI is Energy Use Total (including PV) / Total Building Area.

REQUIRED PV SYSTEMS

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

BATTERY SYSTEMS

01	02	03	04	05	06	07
Control	Capacity (kWh)	Charging		Discharging		Round Trip Efficiency
		Charging Efficiency	Charging Rate (kW)	Discharging Efficiency	Discharging Rate (kW)	
Basic	5	0.95	n/a	0.95	n/a	0.9



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

- **Performance Approach**
 - CF1R-PRF-01-E
- **Certificate of Installation (CF2R)**
 - CF2R-PVB-01-E Solar PV
 - CF2R-PVB-02-E Battery Storage
 - CF2R-SRA-01-E Solar Ready - NC
 - CF2R-SRA-02-E Min. Solar Zone Area
 - CF2R-ELC-01-E Electric Ready



Resources





Online Resource Center

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



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April - June 2022

BLUEPRINT

CALIFORNIA ENERGY COMMISSION
EFFICIENCY DIVISION

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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)

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



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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

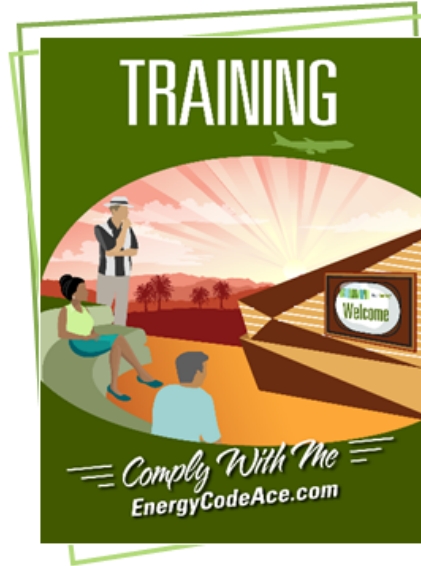


Email

- Title24@energy.ca.gov



Energy Code Ace



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

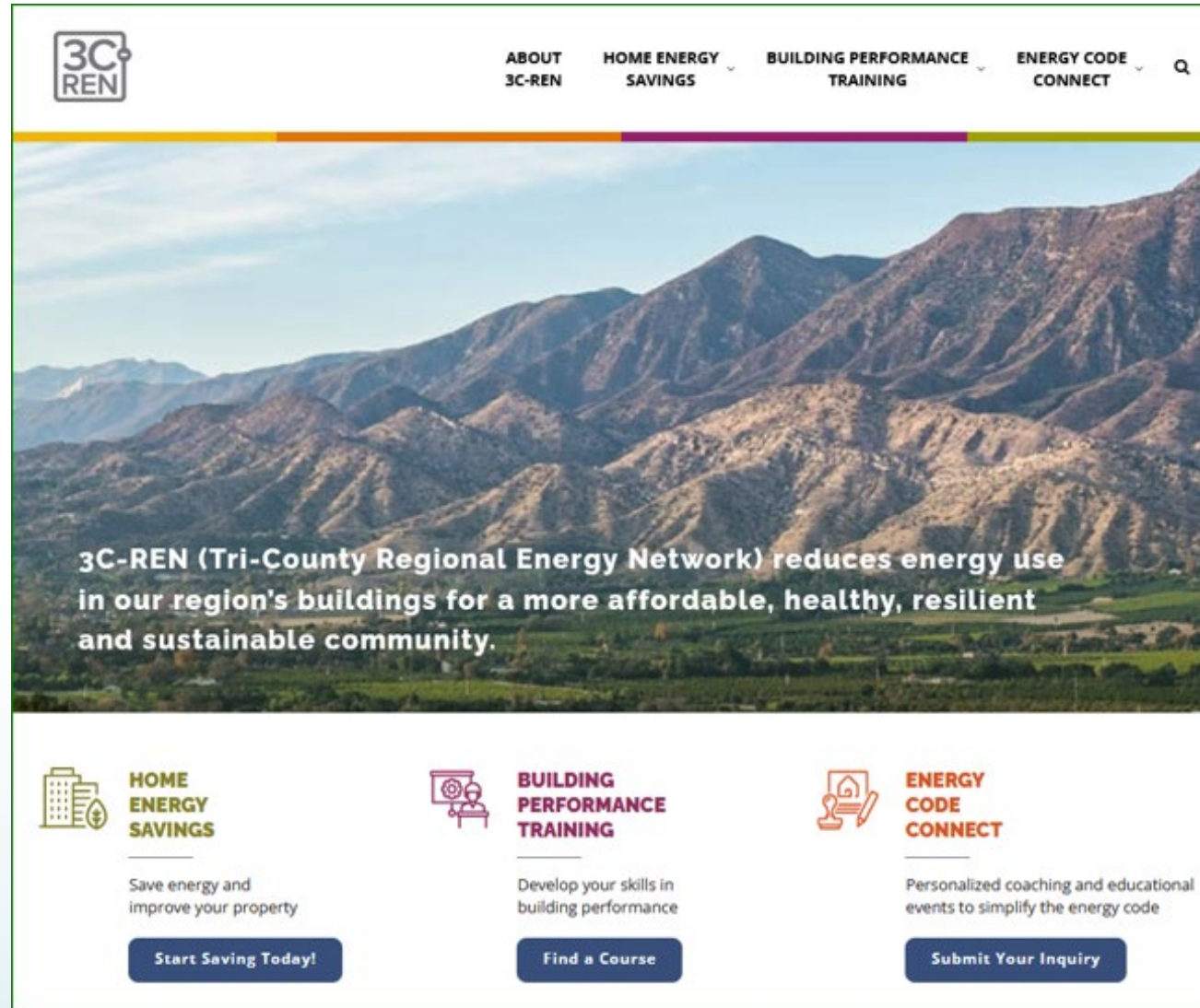
- Training is activity based and delivered in a variety of formats:**
- ✦ Live Online instructor-led
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- Resources provide quick, useful guidance:**
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 - ✦ Checklists
 - ✦ Application Guides
 - ✦ Submit a Question
 - ✦ Trigger Sheets
 - ✦ Useful Links

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3C-REN



The screenshot shows the homepage of the 3C-REN website. At the top left is the 3C-REN logo. To its right is a navigation menu with four items: 'ABOUT 3C-REN', 'HOME ENERGY SAVINGS', 'BUILDING PERFORMANCE TRAINING', and 'ENERGY CODE CONNECT'. A search icon is located to the right of the navigation menu. Below the navigation is a large banner image of a mountain range. Overlaid on the bottom of the banner is the text: '3C-REN (Tri-County Regional Energy Network) reduces energy use in our region's buildings for a more affordable, healthy, resilient and sustainable community.' Below the banner are three columns of content. The first column is titled 'HOME ENERGY SAVINGS' and includes the subtext 'Save energy and improve your property' and a 'Start Saving Today!' button. The second column is titled 'BUILDING PERFORMANCE TRAINING' and includes the subtext 'Develop your skills in building performance' and a 'Find a Course' button. The third column is titled 'ENERGY CODE CONNECT' and includes the subtext 'Personalized coaching and educational events to simplify the energy code' and a 'Submit Your Inquiry' button.

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.

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Save energy and improve your property
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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
- 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

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



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Thank you