2022 CODE BREAKER

Single Family All Electric & Zero Net Carbon Design

Solving the Energy Code Puzzle One Piece at a Time

Participant Workbook

November 2023

Energy Code Ace™

SDGE™

Southern California Edison® Energy for What's Ahead®

Pacific Gas and Electric Company®

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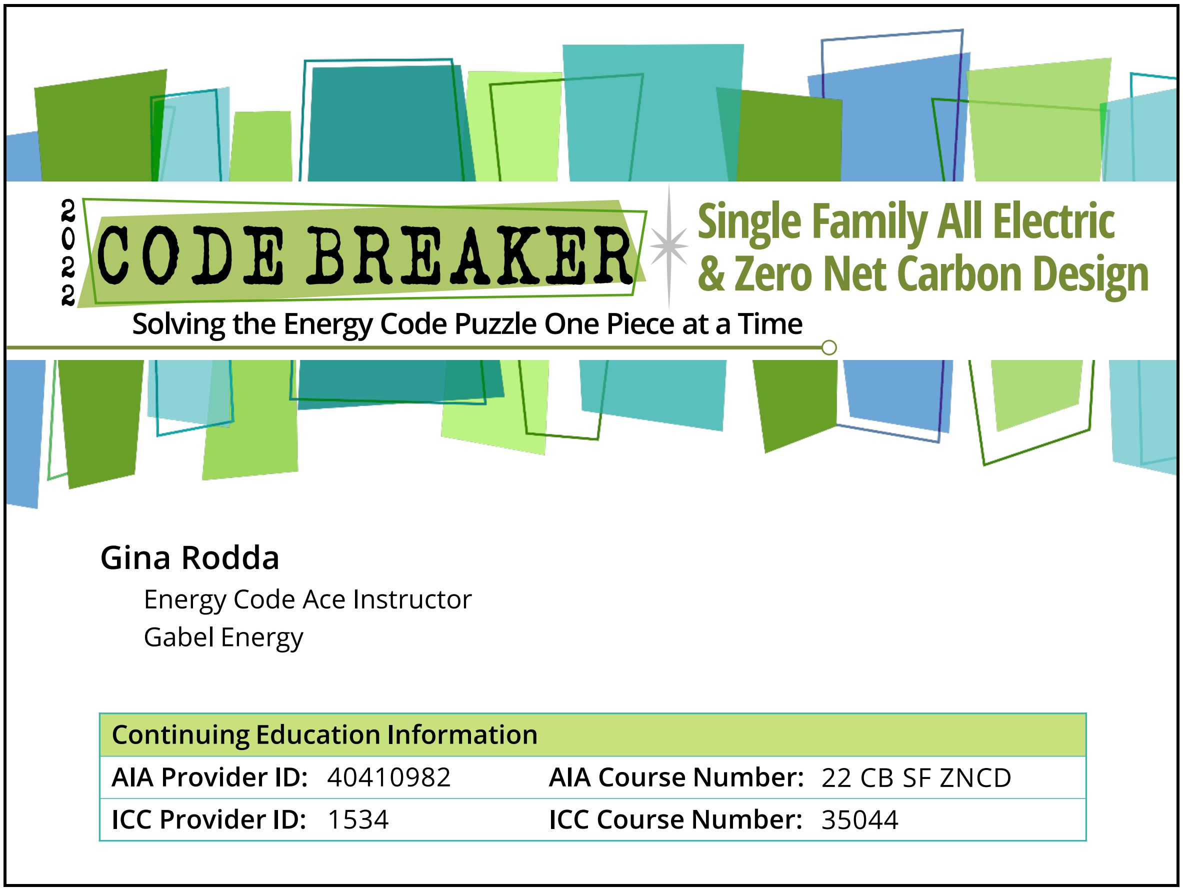
ABOUT THE STATEWIDE CODES AND STANDARDS PROGRAM

The Statewide Codes and Standards Program (C&S Program) is jointly managed by PG&E, SDG&E, and SCE. The C&S Program saves energy on behalf of ratepayers by directly influencing standards and code-setting bodies to strengthen energy efficiency regulations, by improving compliance with existing codes and standards, and working with local governments to develop ordinances that exceed statewide minimum requirements.

This class is one of many free courses, tools, and resources that the C&S Program offers. Please visit http://energycodeace.com/ or contact info@energycodeace.com to find out more about all program offerings.

Welcome



2022
CODE BREAKER
Single Family All Electric
& Zero Net Carbon Design
Solving the Energy Code Puzzle One Piece at a Time
Gina Rodda
Energy Code Ace Instructor
Gabel Energy
Continuing Education Information
AIA Provider ID: 40410982
AIA Course Number: 22 CB SF ZNCD
ICC Provider ID: 1534
ICC Course Number: 35044

Code Breaker:
Single Family All Electric &
Zero Net Carbon Design —
2022 Energy Code

Learning Units: 1.0 AIA LU | HSW

Energy Code Ace
Provider Number: 404109083

AIA Continuing Education Provider

Course Description

The 2022 Energy Code marks significant changes for Residential occupancies, including new Mandatory and Prescriptive measures that pave the way for future single-family all-electric residences and zero net carbon design (ZNCD). Join us for this one-hour presentation where we review the all-electric preparation requirements of the Energy Code (Title 24, Part 6, the California Building Energy Efficiency Standards), associated solar photovoltaic (PV) exemptions, requirements for heat pump space heating and domestic hot water, and battery-ready electrical panel configuration, as well as how all-electric homes relate to ZNCD.

Course Objectives

- Describe how Residential occupancy classifications have been reorganized in 2022 Energy Code
- Discuss updates to the 2022 Energy Code that set the stage for future all electric single-family residences, including Mandatory requirements and Prescriptive requirements involving heat pump space heating and domestic hot water
- Recognize when solar photovoltaic and battery systems are required in single-family homes.
- Explain how "all electric" is a necessary, but not necessarily sufficient, requirement for achieving zero net carbon design, or ZNCD.
- Given examples of alternative design options for a single-family home, identify which, if any, of the options achieve ZNCD.
- Identify online resources for more guidance on these topics.

AIA Continuing Education Provider

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

AIA Continuing Education Provider

Documenting Continuing Education Units (CEUs)

- Attendees who meet the completion criteria receive "standard" certificates of completion:
  - Typically sent within two weeks of course delivery
  - Certificate includes:
    - Course IDs (AIA & ICC)
    - Energy Code Ace Provider info (AIA & ICC)
- You may use this certificate to "self-certify" with a number of organizations in addition to AIA & ICC

  If you entered your AIA member number when you registered, we will submit your course-completion information to AIA for you
- If you want a **certificate specific to ZNCD**, contact us at online.training@energycodeace.com

  Please include the following, which is called for in the ZNCD certificate:
  - Your CA Architect license number
  - The date when your license expires

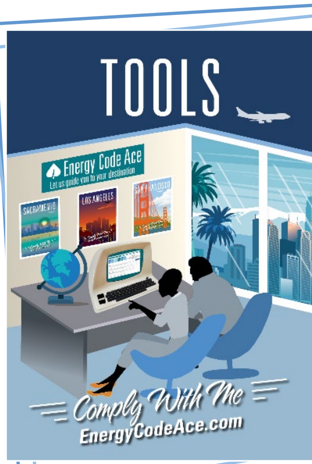
Ace Tools™

Ace Training™

Ace Resources™

Your one-stop shop for no-cost tools, training and resources to help you comply with California's Title 24, Part 6 building energy code and Title 20 appliance standards.

We're powered by the California Statewide Codes & Standards Program and vetted by the California Energy Commission.



Ace Training™

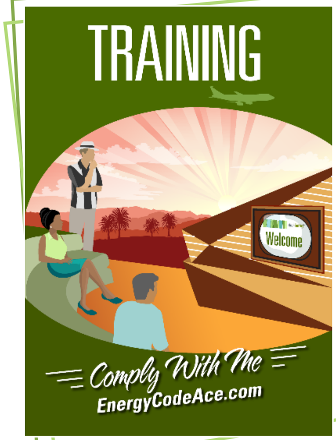
Ace Resources™

A suite of interactive tools to help you understand the compliance process, required forms, installation techniques and energy efficiency regulations applicable to building projects and appliances in California

Our Tools include:

- Energy Code Product Finder
- Forms Ace
- Image Ace
- Navigator Ace
- Nonres. Indoor Lighting Wheel
- Q&Ace
- Reference Ace
- Timeline Ace
- Virtual Compliance Assistant

Ace Tools™



Ace Resources™

A portfolio of on-demand and live online and in-person training alternatives on California's Energy Code and Title 20 regulations, tailored to a variety of industry professionals and addressing key measures

Our Training includes a variety of formats:

- In-person instructor-led
- Online instructor-led
- Online self-study
- Recorded webinars
- YouTube — live streaming & videos

Ace Tools™

Ace Training™

An array of downloadable materials providing practical and concise guidance on how and when to comply with California's building and appliance energy efficiency standards

Our Resources include:

- Application Guides
- Checklists
- Fact Sheets
- Submit a Question
- Trigger Sheets
- Useful Links

Join us at

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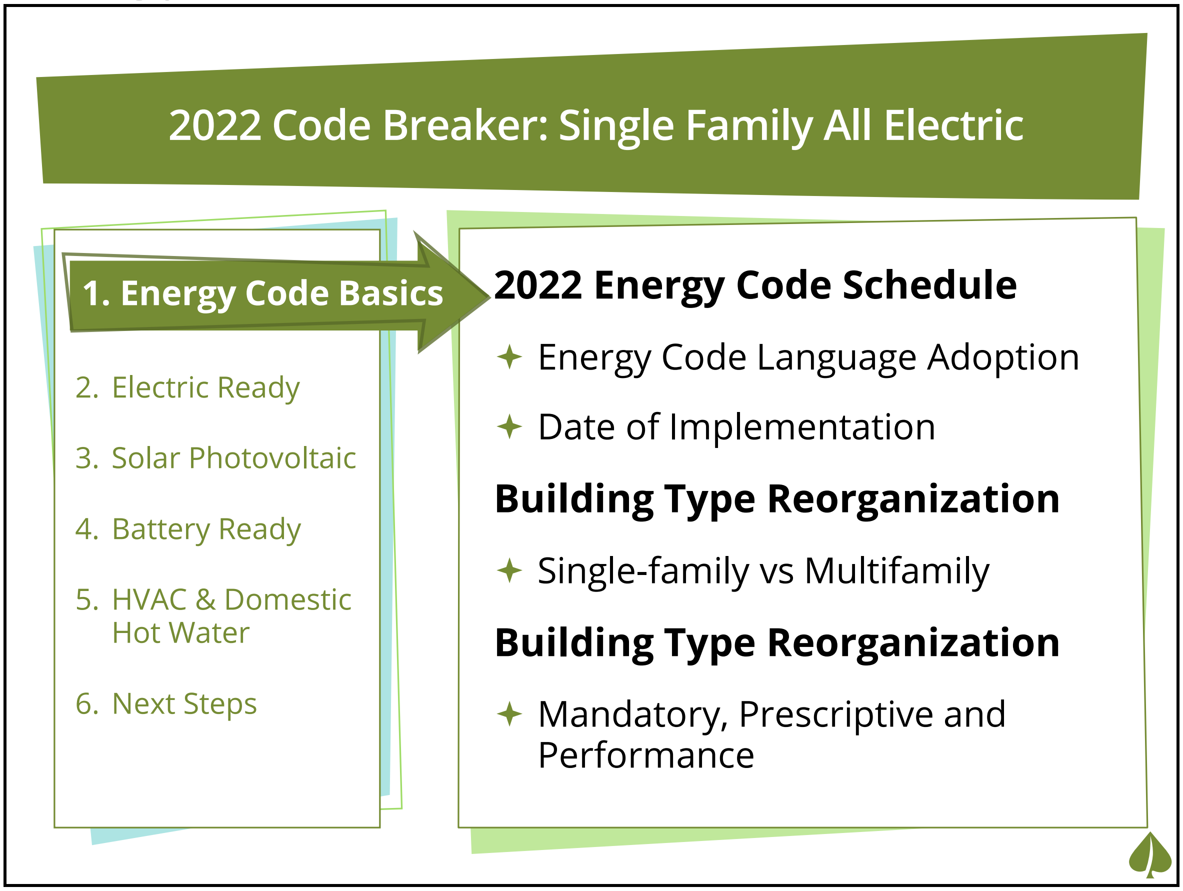
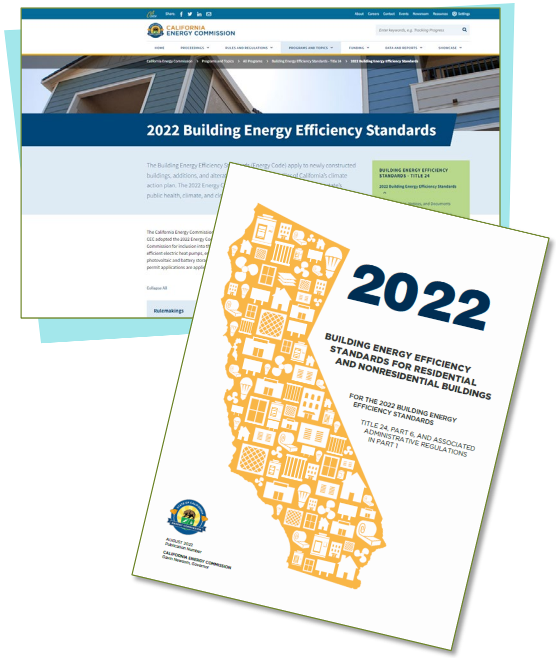
Energy Code Basics



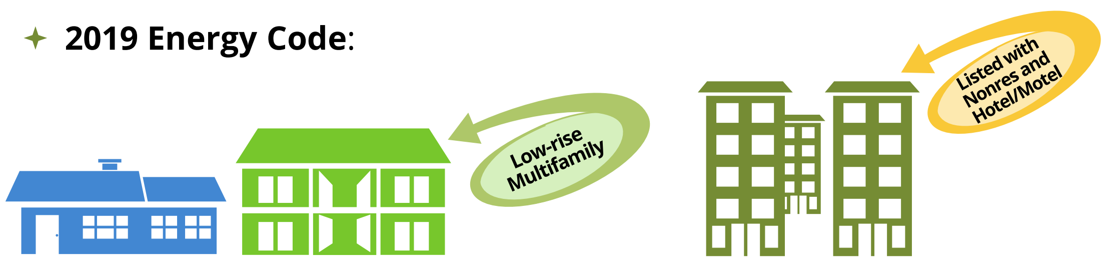
2022 Energy Code



- **Implementation Date**
  - **January 1, 2023**
  - Any projects that apply for a permit on or after this date will be subject to the 2022 Energy Code requirements
- Information and documents available on the CA Energy Commission website at:
  - https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency

Building Type Reorganization

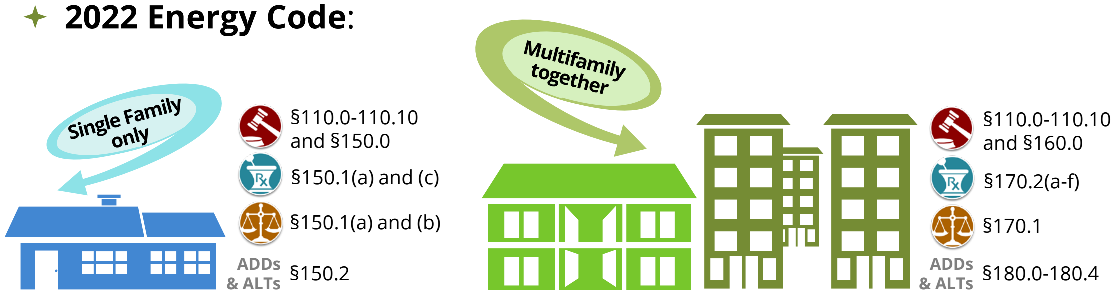
- **2019 Energy Code**:



Low-rise Residential

High-rise Residential

- **2022 Energy Code**:



Single-family Buildings
§150.0-150.2

Multifamily Buildings
§160.0-180.4

Course Conventions

Mandatory

- Always required regardless of compliance approach used

Prescriptive

- Required when using the Prescriptive compliance approach

Performance

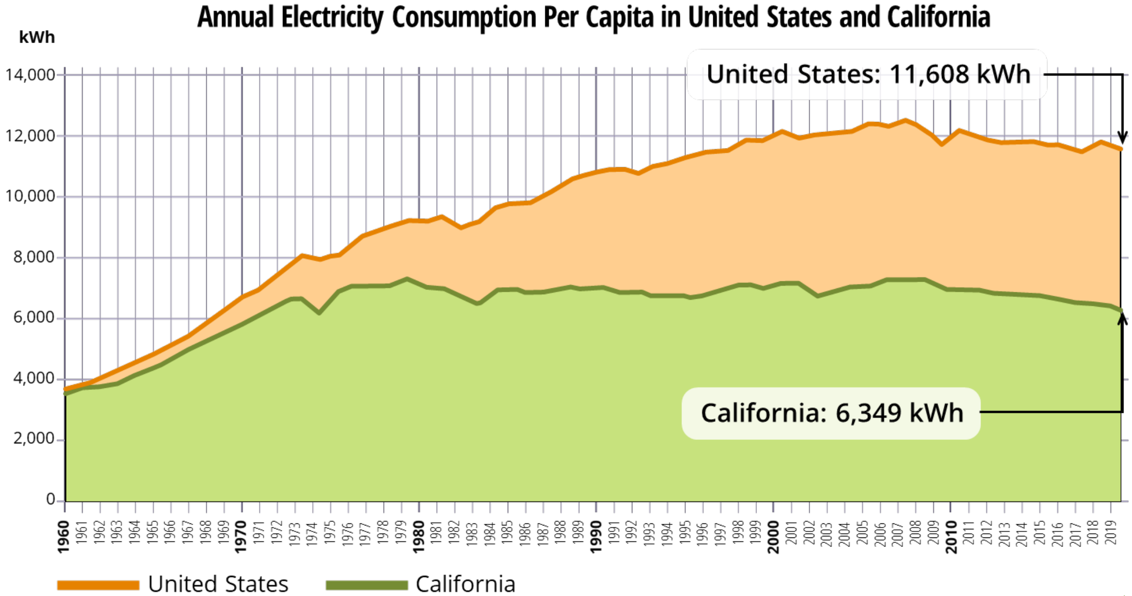
- Optional feature accounted for when doing Performance-based computer modeling

Californians Use a Lot Less Energy than the National Average

Compared to the average American, Californians use about:

- 46% less electricity
- 31% less energy overall

Annual Electricity Consumption Per Capita in United States and California



Source: 2022 BUILDING ENERGY EFFICIENCY STANDARDS SUMMARY; California Energy Commission (CEC); August 2021
https://www.energy.ca.gov/sites/default/files/2021-08/CEC_2022_EnergyCodeUpdateSummary_ADA.pdf

Check Your Understanding #1

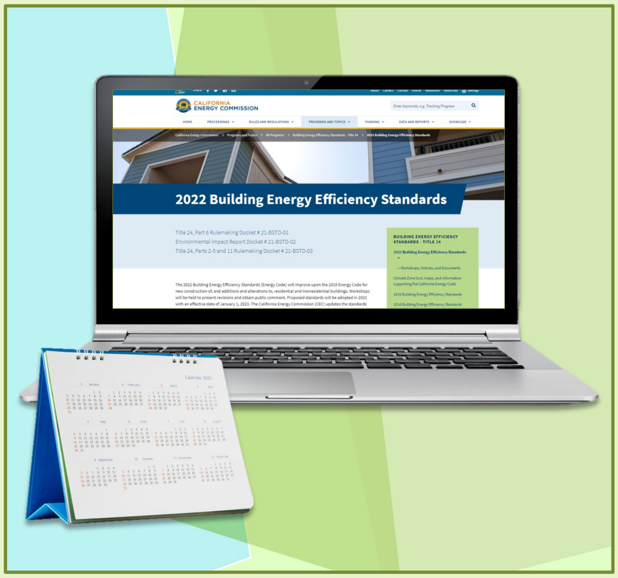
What do you think?

On what date did enforcement of the 2022 Energy Code begin?

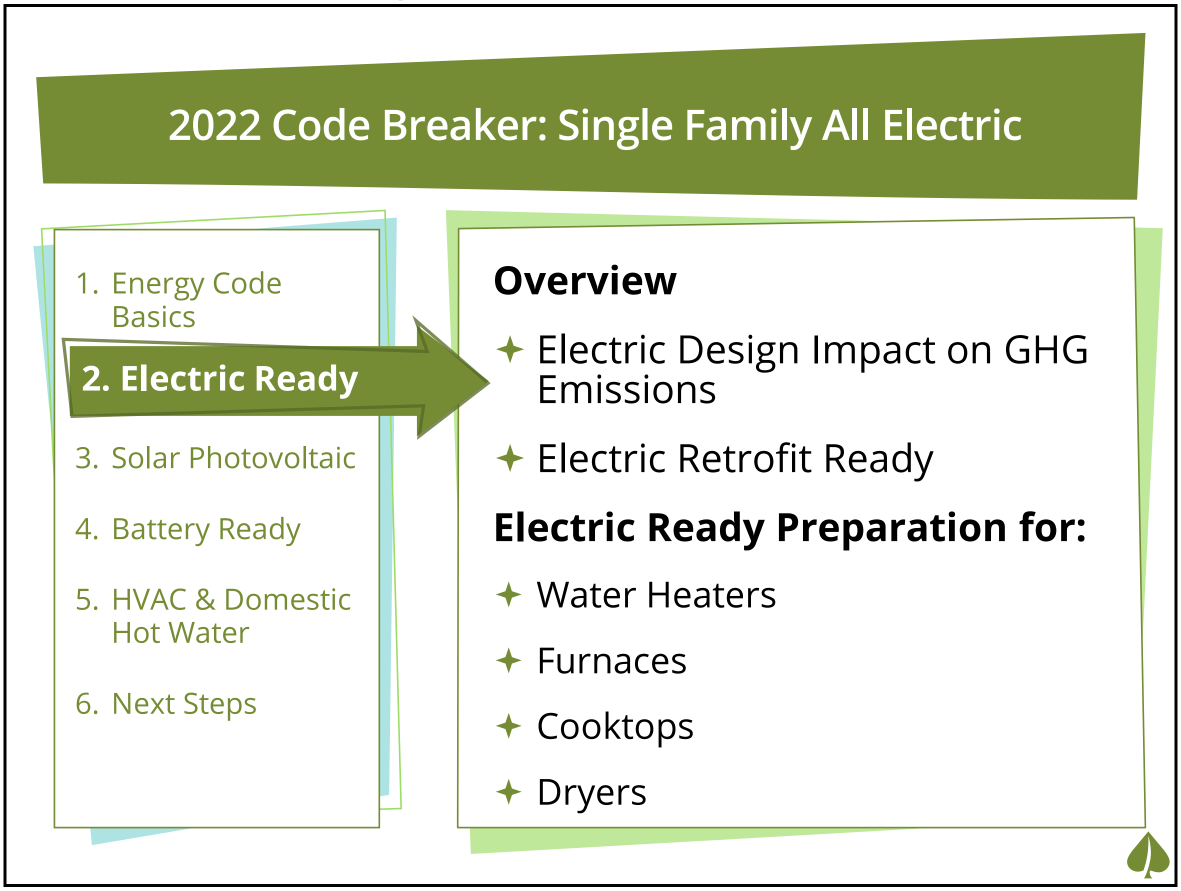
a) January 1, 2022

b) January 1, 2023

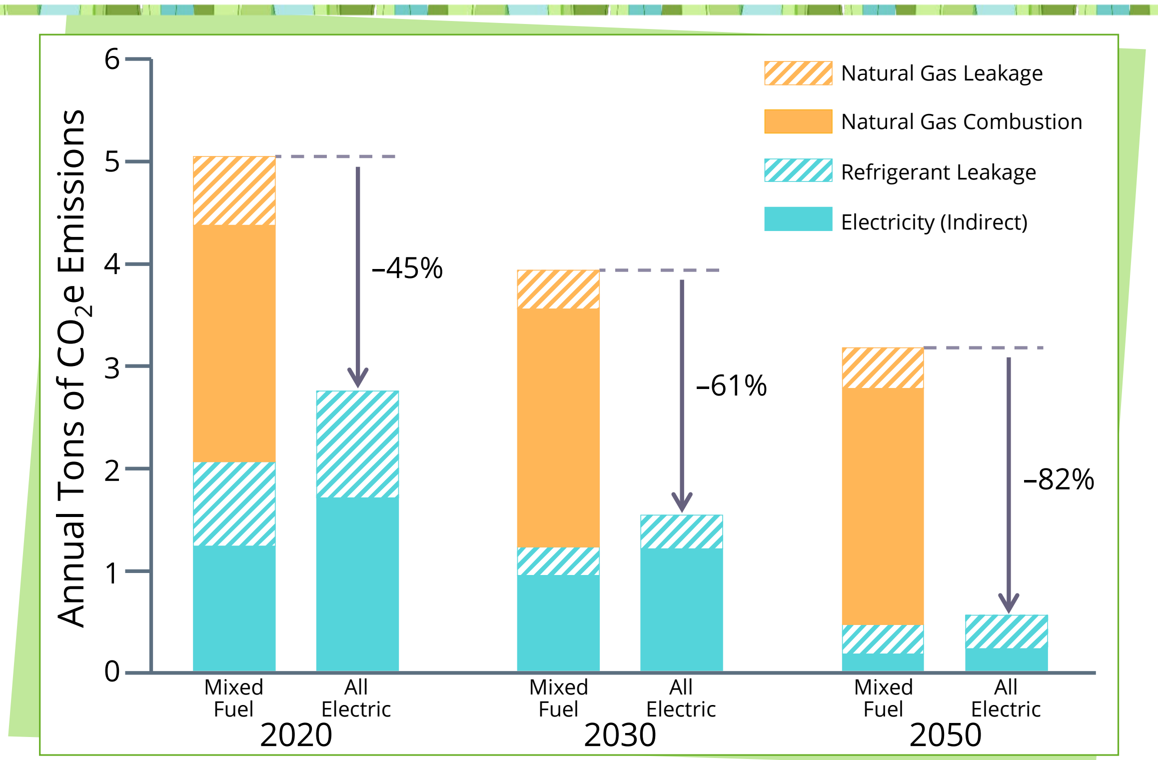
c) Immediately after the California Energy Commission officially adopts the language



Electric Ready

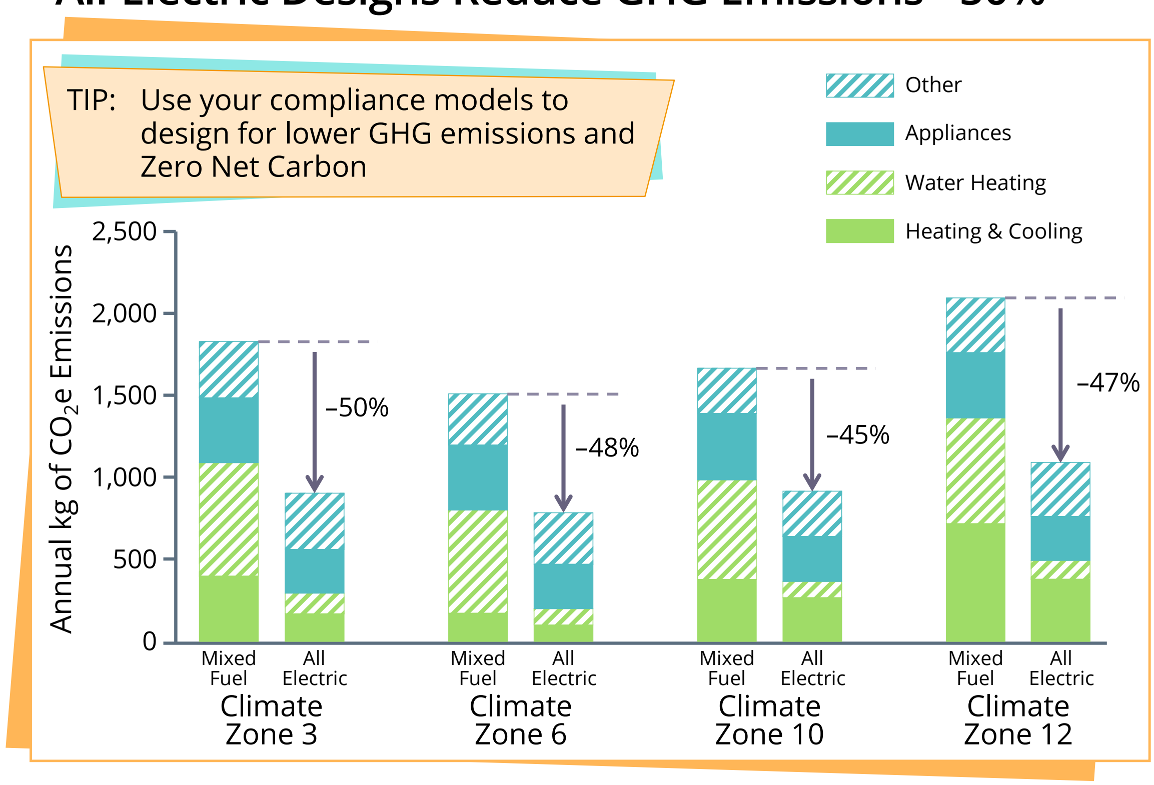


Electric Homes Have 45% Lower GHG Emissions



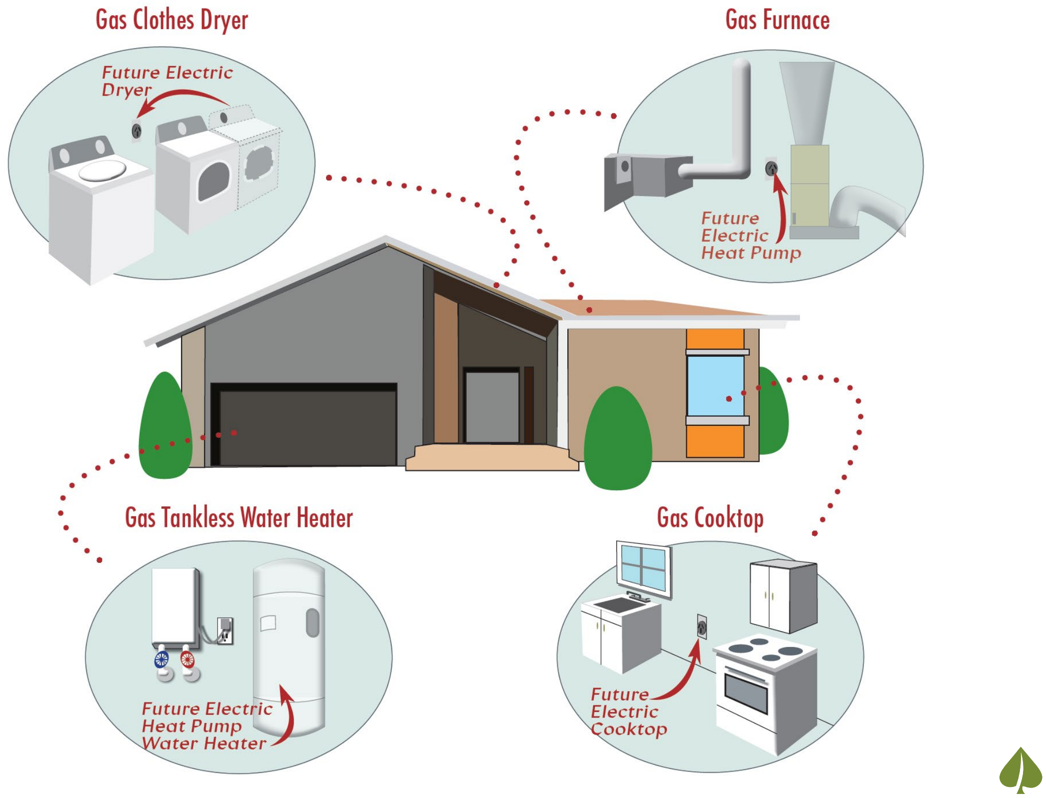
Source: Energy & Environmental Economics Inc., "Residential Building Electrification in California," Key Findings: Greenhouse Gas Savings, 2019. Available: https://www.ethree.com/wp-content/uploads/2019/04/E3_Residential_Building_Electrification_in_California_April_2019.pdf [accessed January 6, 2023].

All-Electric Designs Reduce GHG Emissions ~50%

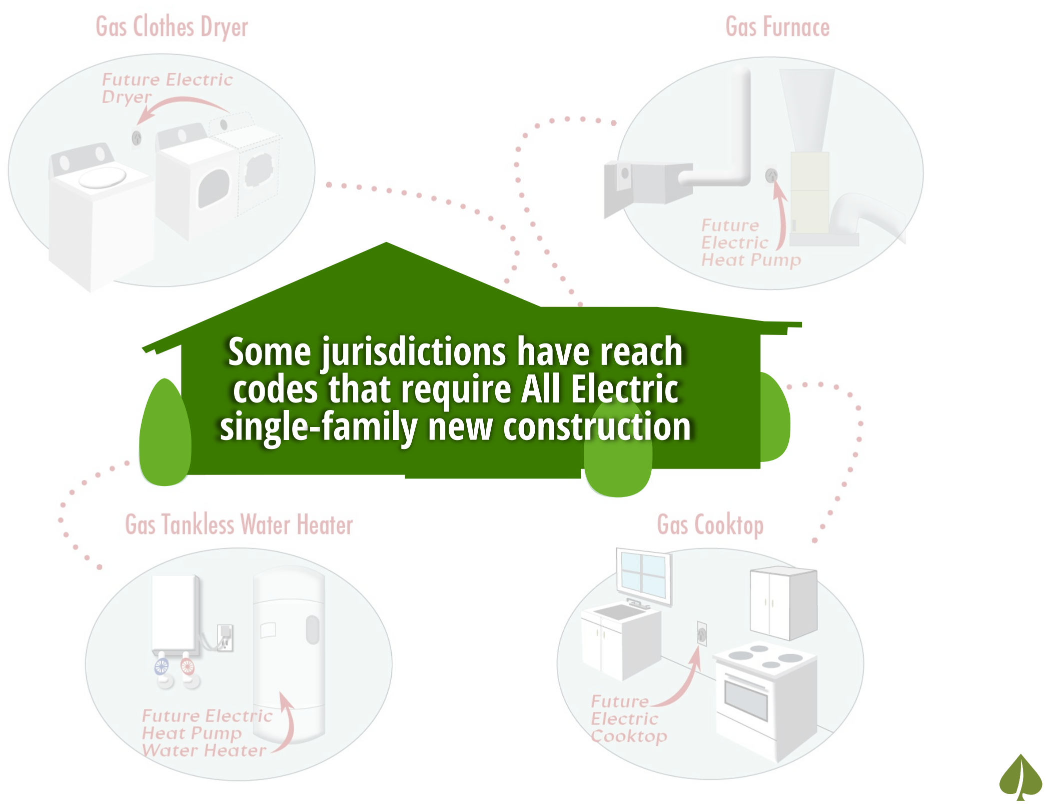


Source: CBECC-Res 2022 modeling results: New construction, 1,751 ft² single-family dwelling with standard efficiency gas furnace or heat pump, gas tankless or heat pump water heater, gas or electric appliances, and code-required PV systems.

Electric Retrofit Ready



Electric Retrofit Ready



Water Heaters

§150.0(n)

Provide for a future Heat Pump Water Heater (HPWH)

- **Make Space** - If your design includes a gas or propane water heater (storage tank or tankless style), you must provide a space large enough to accommodate a future Heat Pump Water Heater
  - This can be the space where the water heater is installed or a space adjacent to the water heater
  - The space must be a **minimum of 2.5′ x 2.5′ x 7′** tall
- **Condensate Drain -** A condensate drain must be plumbed that is **no more than 2 inches higher** than the base of the installed water heater, and allows natural draining without pump assistance

Water Heaters (cont.)

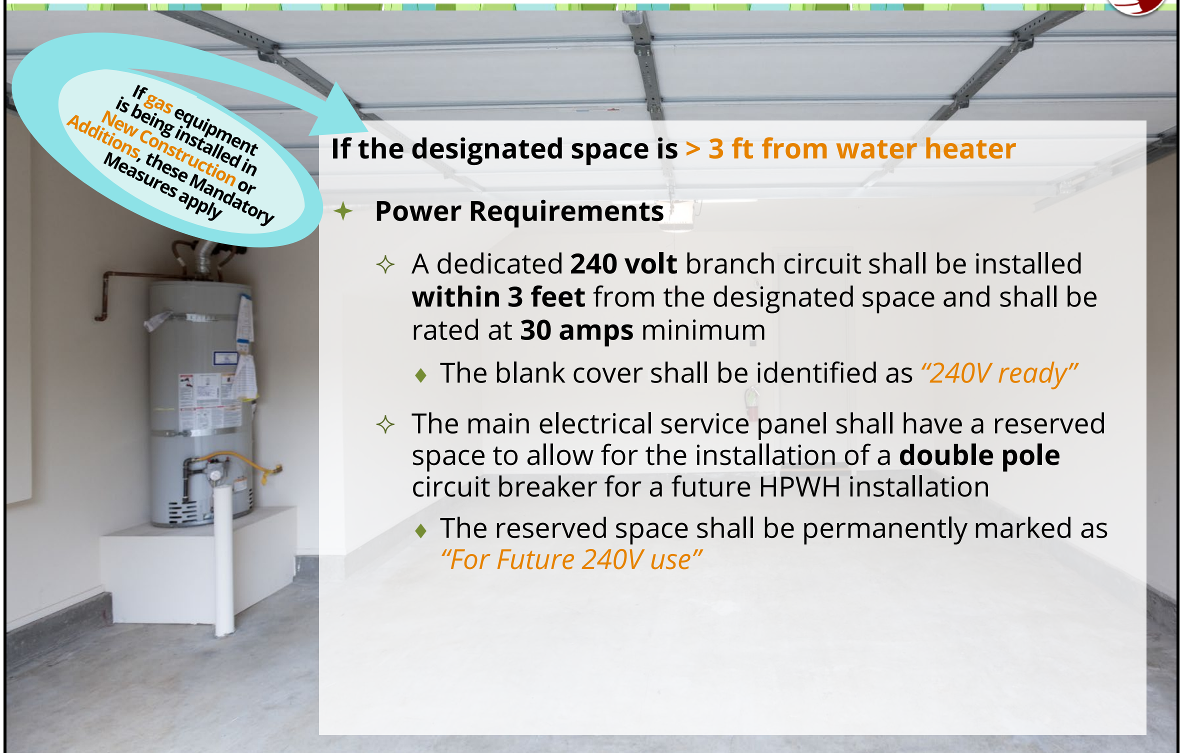
§150.0(n)

If the designated space is within 3 ft of water heater

- **Power Requirements**
  - A dedicated **125 volt, 20 amp** electrical receptacle that is connected to the electric panel with a **120/240 volt** 3 conductor, **10 AWG** copper branch circuit accessible to the water heater with **no obstructions**
  - Both ends of the unused conductor shall be labeled with the word *"Spare"* and be electrically isolated
  - A reserved **single pole** circuit breaker space in the electrical panel to be labeled *"Future 240V Use"*

Water Heaters (cont.)

§150.0(n)

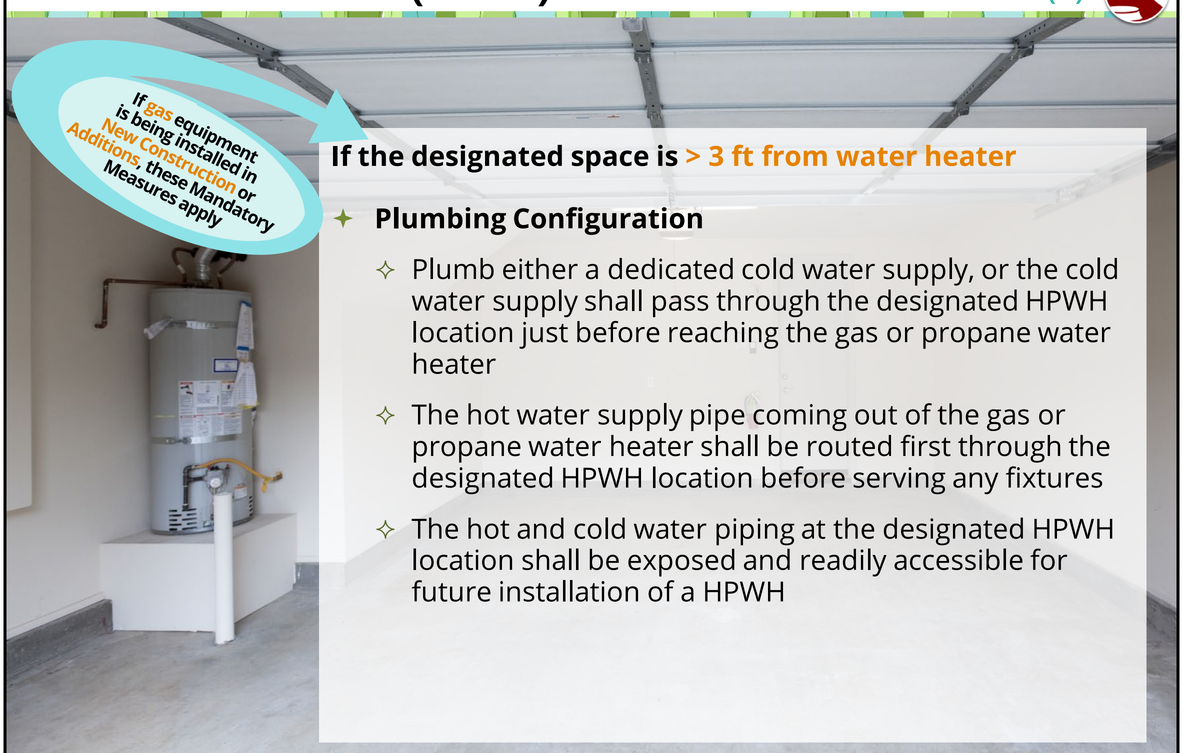


If the designated space is > 3 ft from water heater

- **Power Requirements**
  - A dedicated **240 volt** branch circuit shall be installed **within 3 feet** from the designated space and shall be rated at **30 amps** minimum
    - The blank cover shall be identified as *"240V ready"*
  - The main electrical service panel shall have a reserved space to allow for the installation of a **double pole** circuit breaker for a future HPWH installation
    - The reserved space shall be permanently marked as *"For Future 240V use"*

Water Heaters (cont.)

§150.0(n)



If the designated space is > 3 ft from water heater

- **Plumbing Configuration**
  - Plumb either a dedicated cold water supply, or the cold water supply shall pass through the designated HPWH location just before reaching the gas or propane water heater
  - The hot water supply pipe coming out of the gas or propane water heater shall be routed first through the designated HPWH location before serving any fixtures
  - The hot and cold water piping at the designated HPWH location shall be exposed and readily accessible for future installation of a HPWH

Furnaces

Mandatory Measures for New Construction

§150.0(t)

If your design includes a furnace (central or wall style)

- **Power Requirements**
  - Provide a dedicated **240 volt branch circuit** wiring **within 3 feet** from the furnace and accessible to the furnace with **no obstructions**
  - The branch circuit conductors shall be rated at **30 amps** minimum
    - The blank cover shall be identified as *"240V ready"*
    - All electrical components shall be installed in accordance with the California Electrical Code
  - The main electrical service panel shall have a reserved space to allow for the installation of a **double pole** circuit breaker for a future heat pump space heater installation
    - The reserved space shall be permanently marked as *"For Future 240V use"*

Cooktops

Mandatory Measures for New Construction

§150.0(u)

If your design includes a gas or propane cooktop

- **Power Requirements**
  - Provide a dedicated **240 volt** branch circuit wiring that shall be installed **within 3 feet** from the cooktop and accessible to the cooktop with **no obstructions**
  - The branch circuit conductors shall be rated at **50 amps** minimum
    - The blank cover shall be identified as *"240V ready"*
    - All electrical components shall be installed in accordance with the California Electrical Code
  - The main electrical service panel shall have a reserved space to allow for the installation of a **double pole** circuit breaker for a future electric cooktop installation
    - The reserved space shall be permanently marked as *"For Future 240V use"*

Electric cooktops require less local ventilation than gas cooktops under the 2022 energy code

Dryers

Mandatory Measures for New Construction

§150.0(v)

If any dryer location is plumbed with gas or propane

- **Power Requirements**
  - Provide a dedicated **240 volt** branch circuit wiring that shall be installed **within 3 feet** from the clothes dryer location and accessible to the clothes dryer location with **no obstructions**
  - The branch circuit conductors shall be rated at **30 amps** minimum
    - The blank cover shall be identified as *"240V ready"*
    - All electrical components shall be installed in accordance with the California Electrical Code
  - The main electrical service panel shall have a reserved space to allow for the installation of a **double pole** circuit breaker for a future electric clothes dryer installation
    - The reserved space shall be permanently marked as *"For Future 240V use"*

Check Your Understanding #2

What do you think?

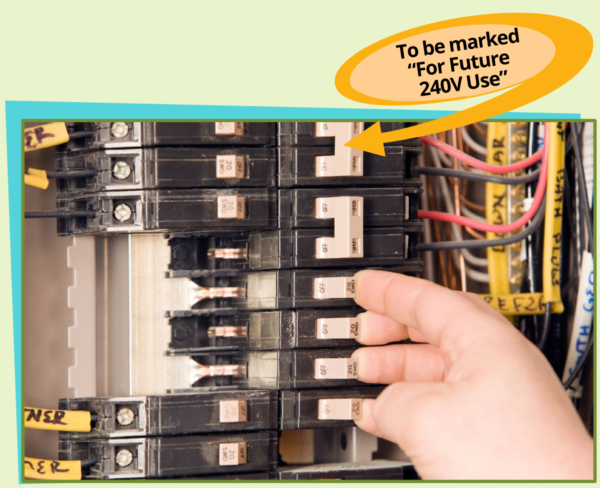
Which of the following will require a reserved double pole circuit breaker in the main electrical panel to allow for a future electric installation?

a) Furnace

b) Cooktop

c) Dryer

d) All of the above



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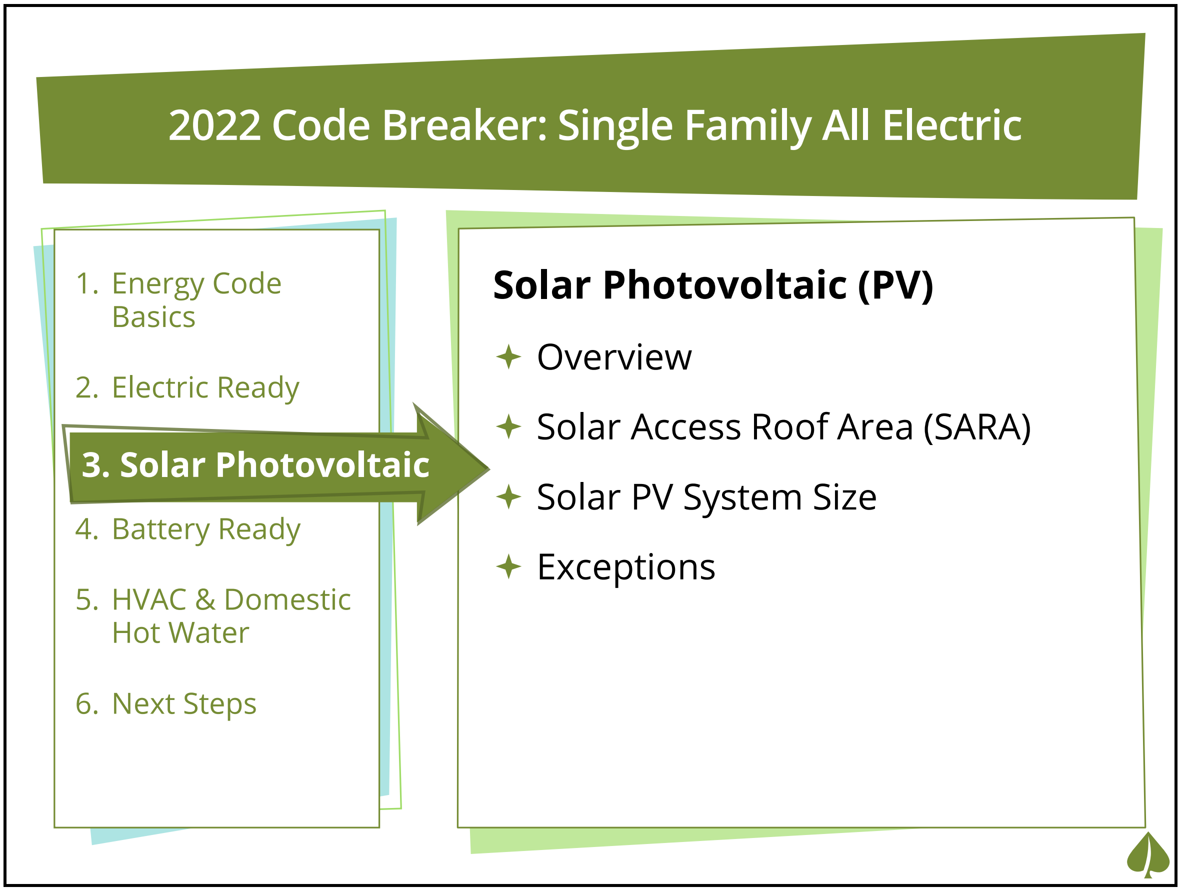
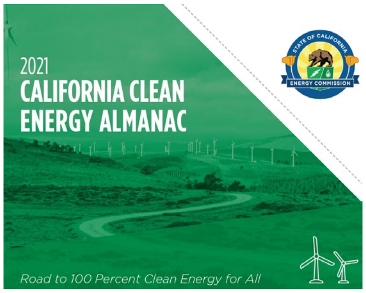
Solar Photovoltaic (PV)



Why Energy Code Requires Renewables



Source: https://www.energy.ca.gov/data-reports/energy-almanac

- California legislature has committed us to:
  - 40% reduced GHG emissions by 2030
  - 40% reduced GHG emissions in buildings by 2030
- Onsite renewable energy production reduces greenhouse gas emissions and can provide for Zero Net Carbon buildings.
- Onsite PV on rooftops has advantages over utility scale PV (less distribution losses, improved resiliency when paired with batteries)
- Solar plus storage has Grid harmony benefits

Solar Access Roof Area (SARA)

§150.1

- **SARA includes:**
  - The **area of a building's roof space** capable of structurally supporting a PV system **AND**
  - The area of **all roof space on covered parking areas**, **carports** and all **other newly constructed structures** on the site that are compatible with supporting a PV system per CA Building Code **§1511.2**
- **SARA does NOT include:**
  - Any roof area that has < 70% annual solar access
  - Occupied roof areas as specified by CA Building Code **§503.1.4**
  - Roof area that is otherwise not available due to compliance with other building code requirements if confirmed by the Executive Director

PV System Size

§150.1(c)14

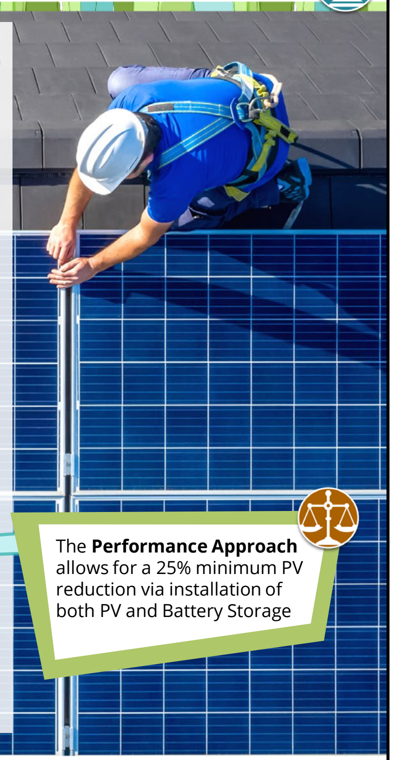
***Table 150.1-C:** CFA and Dwelling Unit Adjustment Factors*

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	0.613	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

- **Prescriptive requirement** for PV system size is based on:
  - Size of home (conditioned square footage)
  - Solar Access Roof Area (SARA)
- Expressed as a kW (DC Rating)
- **DC Rating = (CFA x A) / 1000 + B**
  - **CFA** = Conditioned floor area
  - **A** = CFA adjustment factor from **Table 150.1-C**
  - **B** = Dwelling unit adjustment factor from **Table 150.1-C**

PV Exceptions

§150.1(c)14



No PV system is required if:

- The **SARA is < 80 contiguous square feet**
  - For steep-slope roofs, SARA shall not consider roof areas with a northerly azimuth that lies between 300 degrees and 90 degrees from true north
- The minimum PV system size specified by §150.0(c)14 is **< 1.8 kWdc**
- The building has an enforcement-authority-approved roof design, and the enforcement authority determines it is **not possible** for the PV system to meet **ASCE 7-16, Chapter 7, Snow Loads**
  - “PV System” includes panels, modules, components, supports and attachments to the roof structure
- The building is approved by the local planning department **prior to January 1, 2020** with mandatory conditions for approval

Required minimum PV system may be reduced by 25% if:

- Installed in conjunction with a **battery storage system**
  - Battery storage system shall meet Joint Appendix JA12 qualification requirements and have a minimum **usable capacity of 7.5 kWh**

The **Performance Approach** allows for a 25% minimum PV reduction via installation of both PV and Battery Storage

Check Your Understanding #3

What do you think?

Below what threshold does 2022 Energy Code NOT require a PV system?

a) 500 ft^2

b) 2.0 kW

c) 1.8 kW

Check Your Understanding #4

What do you think?

The compliance modeling software can be used to design for lower Carbon emissions and Zero Net Carbon. If you were building a new home in CZ12 and had modeled Carbon emissions of 2.29 mt/yr for a typical mixed fuel design, what upgrades would you choose from the list as part of a Zero Net Carbon package?

a) Battery only

b) All of these features

c) Additional PV panels

	Total CO2 Potential: (excl. Solar & Flexibility) (metric tons/yr)	CO2 Saved by Solar Electricity: Self Consumed (metric tons/yr)	Exported to Grid (metric tons/yr)	CO2 Generated: Total (metric tons/yr)	Excluding Exports (metric tons/yr)
Standard Design	1.75	0.10	0.04	1.60	1.65
Proposed Design	2.44	0.10	0.05	2.29	2.34

Feature	Upgrade	Carbon Emissions Savings (mt/yr)
Envelope	High-performance walls and attic	0.20
HVAC	Ducted code-minimum heat pump	0.46
Water Heating	Heat Pump Water Heater 50 gallon	0.53
Battery	7.5 kWh in Time of Use control mode	0.34
PV panels	Additional 1.5 kW (~5 panels)	0.01

What do you think... Are any of these ZNCD?

Example Project One

The Basics

- Single-family new construction
- 1-story house
- 1,751 sf conditioned floor area
- Climate Zone 12 (Cooling Dominated)

What's your "guess-timate" on Carbon Generated for this design?

Feature	Typical Mixed Fuel	All-electric Prescriptive Std	All-electric Upgraded
Envelope	2x6 R-21 walls; R-38 attic	HPW 2x6 R-21+R-5; HPA R-38+R-19	HPW 2x6 R-21+R-5; HPA R-38+R-19
HVAC	Standard gas furnace & A/C unit, ducts in attic	Ducted code-minimum heat pump, ducts in attic	Variable Capacity Heat Pump
Water Heating	Standard gas tankless water heater, .81 uef	Heat Pump Water Heater, 50 gallon in garage	Heat Pump Water Heater, 50 gallon in garage
Battery	None	None	20 kWh, TOU control mode
PV panels	2.9 kW (prescriptive standard)	2.9 kW (prescriptive standard)	5.4 kW
Carbon Generated	**2.29** mt/yr	**1.07** mt/yr	**-0.04** mt/yr
	not very close	closer...	Zero Net Carbon!

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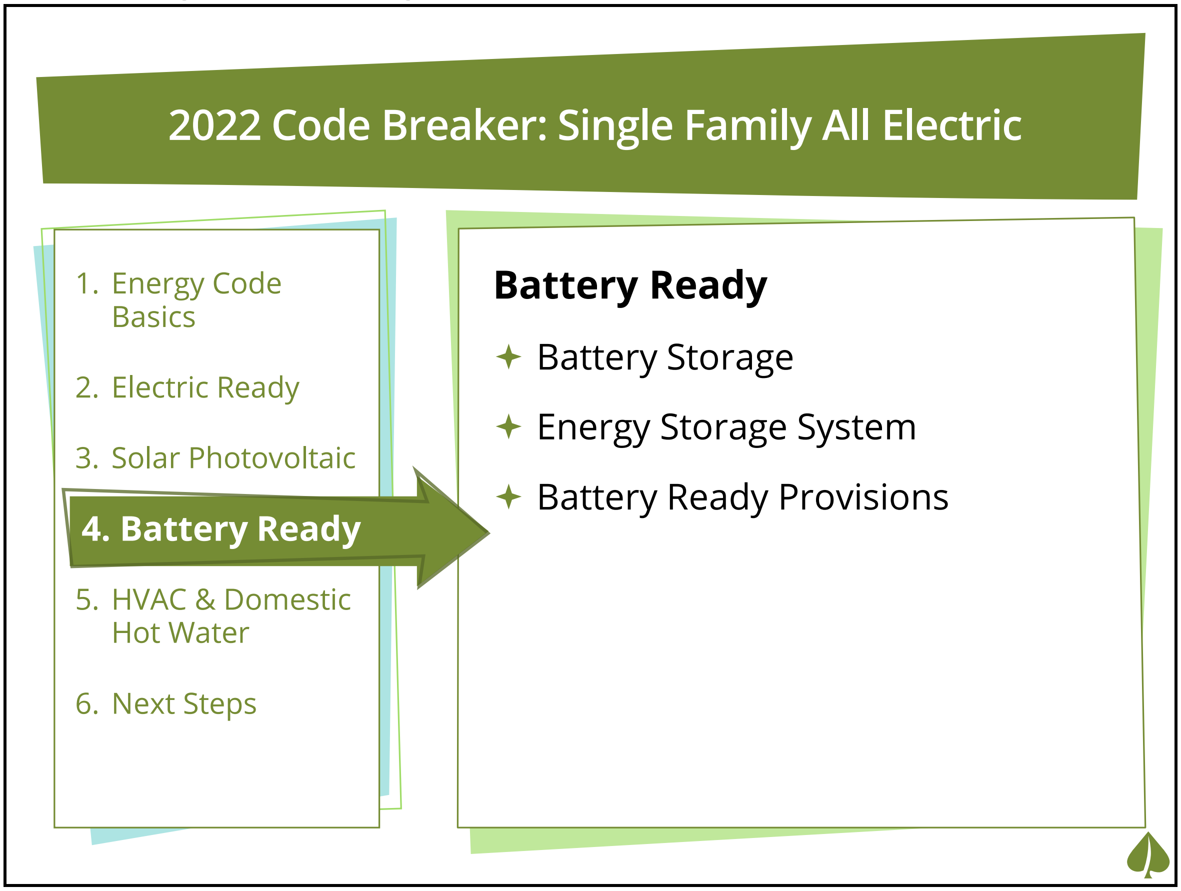
Battery Ready



Battery Storage

- Batteries store renewable energy produced by onsite PV to promote "self-consumption" of renewable energy onsite later in the day during peak grid periods

  Buildings with PV and battery have lower GHG emissions than buildings with PV alone

- Additional demand response controls on battery system can be used to respond to critical peak periods on the grid by exporting electricity back to the grid

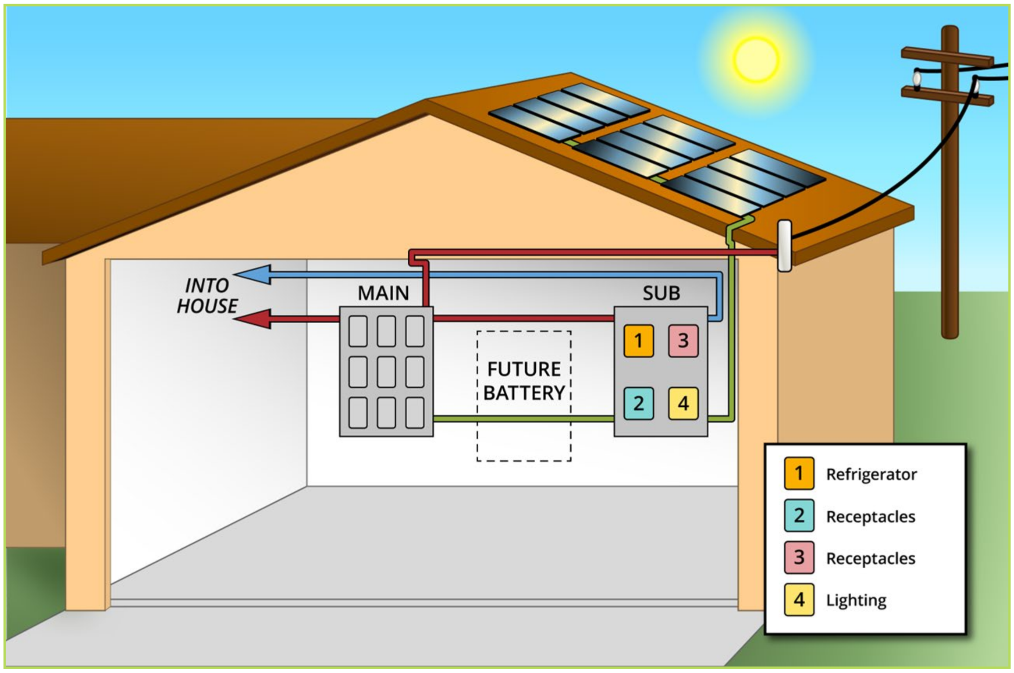
This is called 'grid harmonization.'

Energy Storage System (Battery Ready)

§150.0(s)

- **At least one of the following** shall be provided:
  - Interconnection equipment with a minimum backed-up capacity of 60 amps
  - A dedicated raceway from the main service to a subpanel that supplies the branch circuits
- A **minimum of four branch circuits** shall be identified feeding:
  - Refrigerator
  - One lighting circuit near the primary egress
  - A sleeping room receptacle outlet
  - One wherever desired
- Main panel must be **minimum 225 amps busbar rating**
- Sufficient space shall be reserved to allow future installation of a system isolation equipment or transfer switch within 3 feet of the main panelboard
- Raceways shall be installed between the panelboard and the system isolation equipment or transfer switch location to allow the connection of backup power source

Battery Ready Provisions



Check Your Understanding #5

What do you think?

When does the 2022 Energy Code mandate the installation of battery systems?

a) Never

b) Starting January 1, 2023

c) Only if the main panel is 225 amps or greater

Check Your Understanding #6

What do you think?

A self-utilization credit is available for new single family projects that install batteries. If you were building a new home in CZ10 and had a compliance deficit of 4 Efficiency EDR points, what upgrades would you choose from the list provided here ?

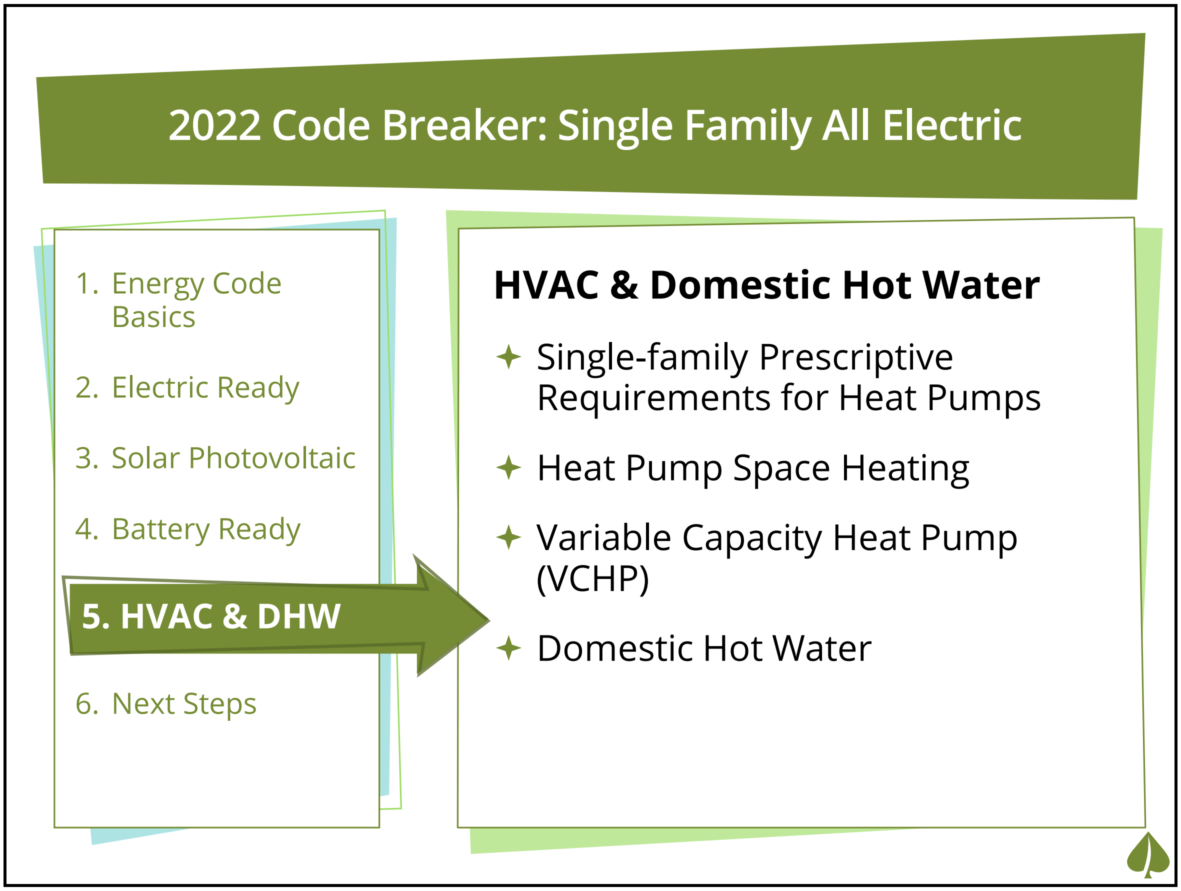
a) Battery only

b) Roof, HVAC, and water heating upgrades

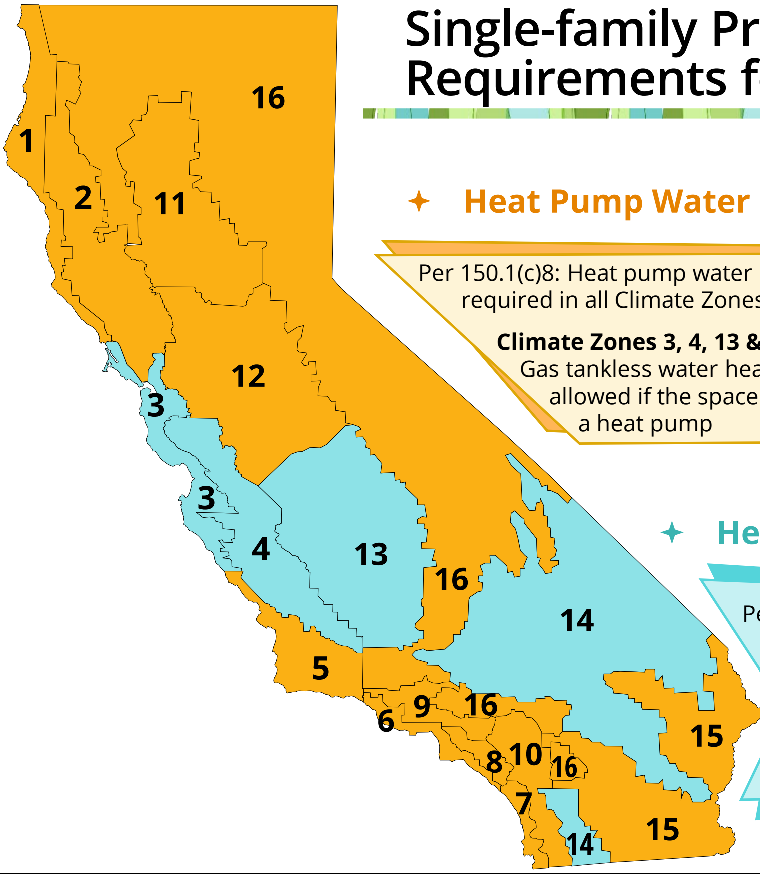
c) Additional PV panels

Feature	Upgrade	Efficiency EDR Impact
Roof	Unvented attic R-38 under roof deck	0.8
HVAC	Ducted code minimum heat pump	1.3
Water Heating	Heat Pump Water Heater 50 gallon	2.5
Battery	5 kWh in Time of Use control mode	5.0
PV panels	Additional 1.5 kW (~5 panels)	0.0

HVAC & Domestic Hot Water



Single-family Prescriptive Requirements for Heat Pumps



- Heat Pump Water Heater

Per 150.1(c)8: Heat pump water heater Prescriptively required in all Climate Zones.

Climate Zones 3, 4, 13 & 14:
Gas tankless water heaters Prescriptively allowed if the space heating system is a heat pump

- Heat Pump HVAC

Per 150.1(c)6: Heat pump space heating Prescriptively required in Climate Zones 3, 4, 13 & 14

All other Climate Zones:
Either gas or heat pump space heating is allowed Prescriptively

Heat Pump Space Heating

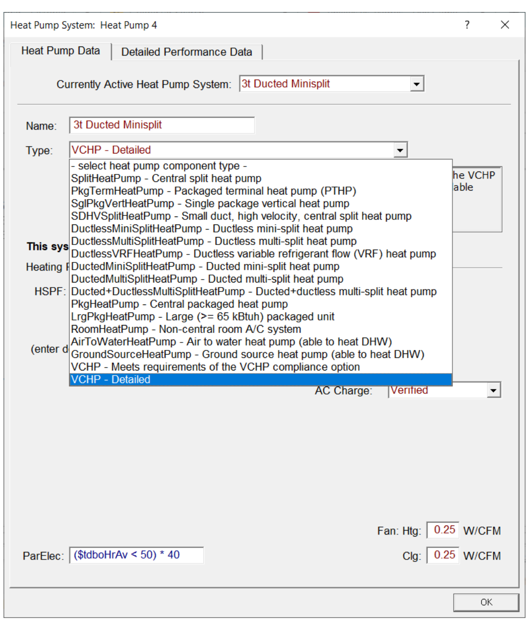
§150.1(c)6

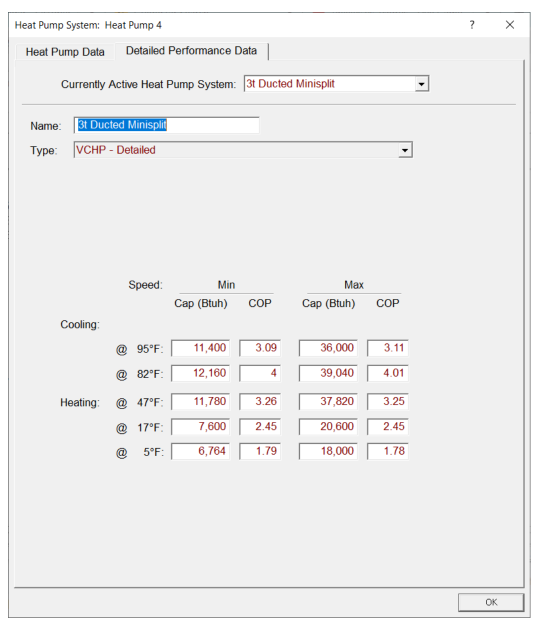
- Heat pump space heating is **required in New Construction** when:
  - Located in: **Climate Zones 3, 4, 13 and 14** AND
  - Using **Prescriptive Approach**
- Alternative is to comply via the Performance Approach

Variable Capacity Heat Pump (VCHP)

- Modulate heating & cooling to match load
  - Maintains comfort continuously
- Both indoor and outdoor units are quiet
- Equipment has long lifespan
- Can be 60% or more efficient (SEER rating)
- The 2022 CA Energy Code (Title 24, Part 6) offers compliance credit for VCHPs
- The 2022 code extends VCHP credit to a wider variety of ducted units

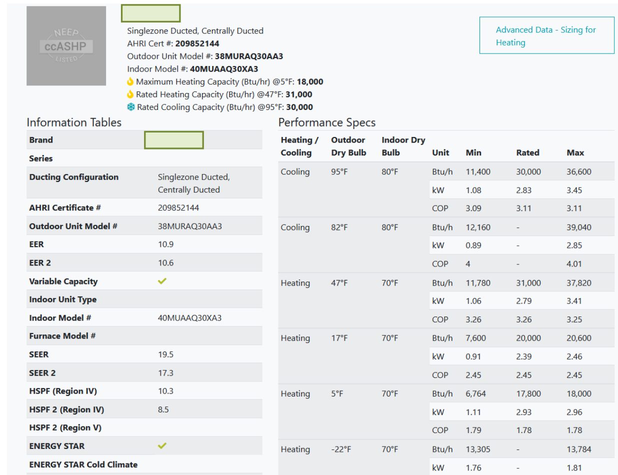
2022 Software Supports Detailed VCHP Modeling





Detailed VCHP

- NEEP websitehas detailed performance specs
- Allows for Ducted Minisplits to help compliance
- Eliminates requirement that all VCHPs be low-static models



Singlezone Ducted, Centrally Ducted
AHRI Cert #: **209852144**
Outdoor Unit Model #: **38MURAQ30AA3**
Indoor Model #: **40MUAAQ30XA3**
Maximum Heating Capacity (Btu/hr) @5°F: **18,000**
Rated Heating Capacity (Btu/hr) @47°F: **31,000**
Rated Cooling Capacity (Btu/hr) @95°F: **30,000**

Advanced Data - Sizing for Heating

Information Tables

Brand	
Series	
Ducting Configuration	Singlezone Ducted, Centrally Ducted
AHRI Certificate #	209852144
Outdoor Unit Model #	38MURAQ30AA3
EER	10.9
EER 2	10.6
Variable Capacity	✓
Indoor Unit Type	
Indoor Model #	40MUAAQ30XA3
Furnace Model #	
SEER	19.5
SEER 2	17.3
HSPF (Region IV)	10.3
HSPF 2 (Region IV)	8.5
HSPF 2 (Region V)	
ENERGY STAR	✓
ENERGY STAR Cold Climate	

Performance Specs

Heating / Cooling	Outdoor Dry Bulb	Indoor Dry Bulb	Unit	Min	Rated	Max
Cooling	95°F	80°F	Btu/h	11,400	30,000	36,600
			kW	1.08	2.83	3.45
			COP	3.09	3.11	3.11
Cooling	82°F	80°F	Btu/h	12,160	-	39,040
			kW	0.89	-	2.85
			COP	4	-	4.01
Heating	47°F	70°F	Btu/h	11,780	31,000	37,820
			kW	1.06	2.79	3.41
			COP	3.26	3.26	3.25
Heating	17°F	70°F	Btu/h	7,600	20,000	20,600
			kW	0.91	2.39	2.46
			COP	2.45	2.45	2.45
Heating	5°F	70°F	Btu/h	6,764	17,800	18,000
			kW	1.11	2.93	2.96
			COP	1.79	1.78	1.78
Heating	-22°F	70°F	Btu/h	13,305	-	13,784
			kW	1.76	-	1.81

Domestic Hot Water

§150.1(c)8

- **Required Prescriptively in New Construction:**
  - A single 240 volt Heat Pump Water Heater (HPWH)* OR
  - Solar water-heating system with electric backup and a minimum 70% solar savings fraction (SSF)
- **Exceptions:**
  1. Climate Zones 3, 4, 13 and 14 can use gas tankless
  2. New dwelling units ≤ 500 ft² CFA with point of use distribution may have instantaneous electric water heater
  3. New dwellings with 1 bedroom or less may use 120 volt HPWH

- **Additions & Alterations:**
  - Prescriptive heat pump requirements of **§150.1(c)8** do NOT apply

** Additional requirements may apply for Heat Pump Water Heaters in CZ 1 & 16. See Energy Code §150.1(c)8.*

Check Your Understanding #7

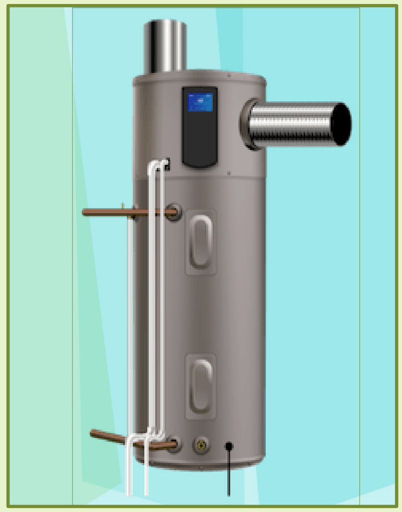
What do you think?

True or False?

Per 2022 Energy Code, a single 240-volt heat pump water heater will be Prescriptively required in new homes across all climate zones.

a) True

b) False



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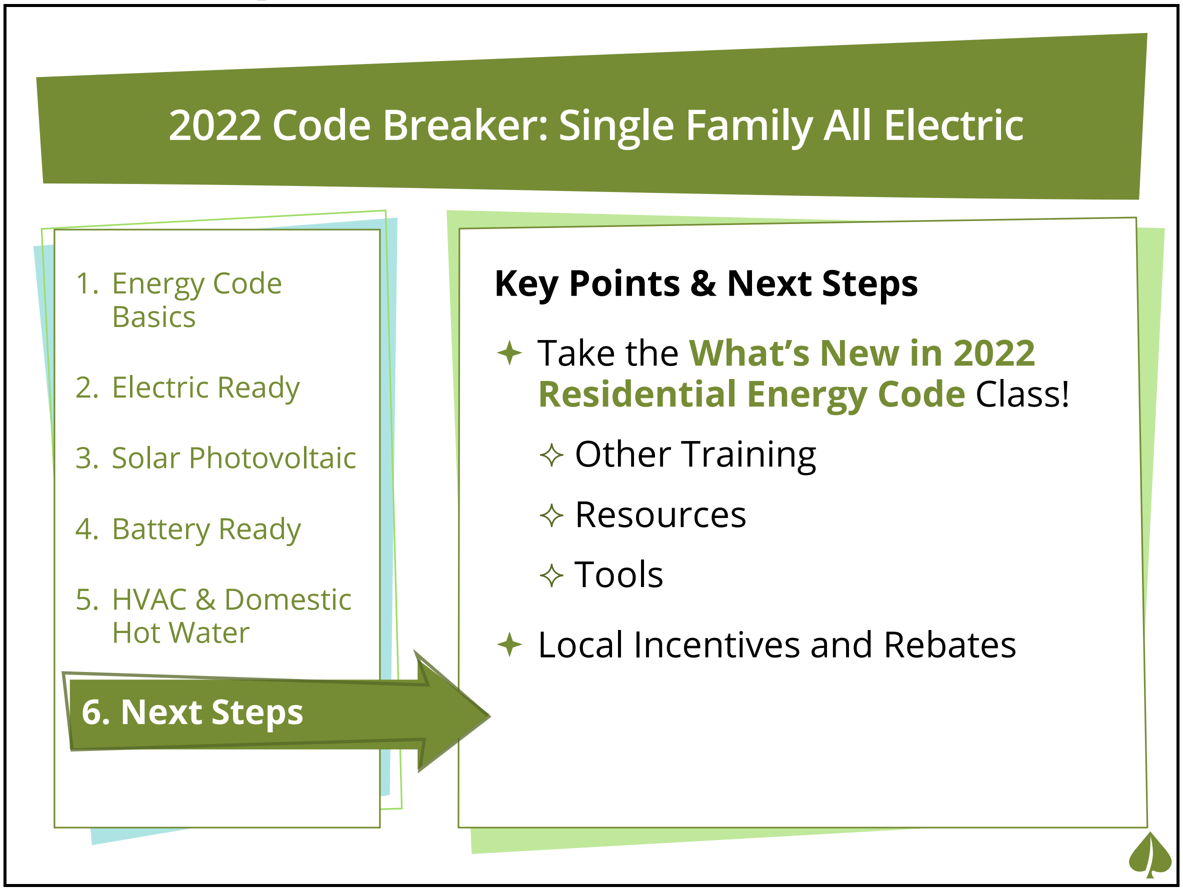
Next Steps

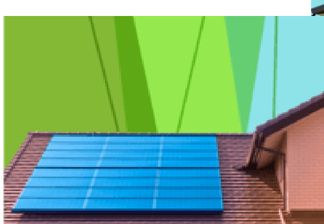

2022 Code Breaker: Single Family All Electric
1. Energy Code Basics
2. Electric Ready
3. Solar Photovoltaic
4. Battery Ready
5. HVAC & Domestic Hot Water
6. Next Steps
Key Points & Next Steps
Take the What's New in 2022 Residential Energy Code Class!
Other Training
Resources
Tools
Local Incentives and Rebates

Key Points

- 2022 SF requirements pave the way for more aggressive carbon reduction by facilitating future conversion from mixed-fuel to all-electric homes; some key requirements include:
  - **Mandatory** — Circuitry and outlets to support:
    - Electric appliances
    - Energy Storage Systems (ESS; battery storage for PV)
  - **Prescriptive:**
    - PV system
    - Heat pump space heating (CZs 3, 4, 13, 14)
    - Heat pump water heater (all CZs **except** 3, 4, 13, 14)
- Some jurisdictions have adopted reach codes that require new construction homes to be all-electric
- An all-electric home may — or may not — be a ZNCD home; some features that can help achieve zero net carbon include:
  - High-performance building envelope
  - Variable Capacity Heat Pumps
  - Heat/Energy Recovery Ventilators
  - Battery Storage and additional PV beyond prescriptive size

Virtual Classes

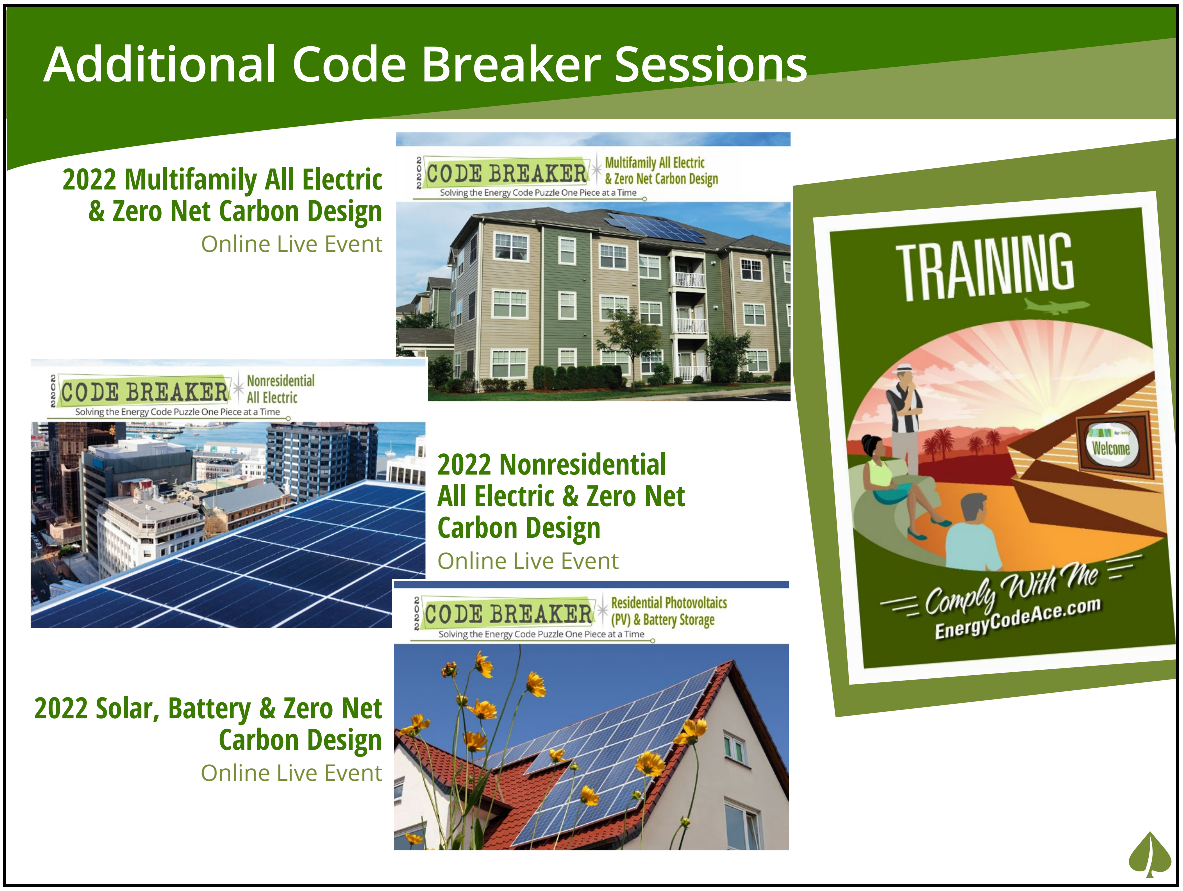
What's New in 2022 Residential Energy Code
Online Live Event



2022 Single-family Standards: Solar & Battery Storage
Online Live Event

2022 Single-family Standards for Architects & Designers
Online Live Event

2022 Nonresidential Standards for Architects & Designers
Online Live Event


Additional Code Breaker Sessions
2022 Multifamily All Electric & Zero Net Carbon Design
Online Live Event
CODE BREAKER
Multifamily All Electric & Zero Net Carbon Design
Solving the Energy Code Puzzle One Piece at a Time
CODE BREAKER
Nonresidential All Electric
Solving the Energy Code Puzzle One Piece at a Time
2022 Nonresidential All Electric & Zero Net Carbon Design
Online Live Event
CODE BREAKER
Residential Photovoltaics (PV) & Battery Storage
Solving the Energy Code Puzzle One Piece at a Time
2022 Solar, Battery & Zero Net Carbon Design
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TRAINING
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Resources
2022 ENERGY CODE
Ace Resources
Title 24, Part 6
Fact Sheet
Residential
Electric Readiness
What Is Electrification and What Are Its Benefits?
How Does this Fact Sheet Apply to Your Project?
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Hit target 4 years early
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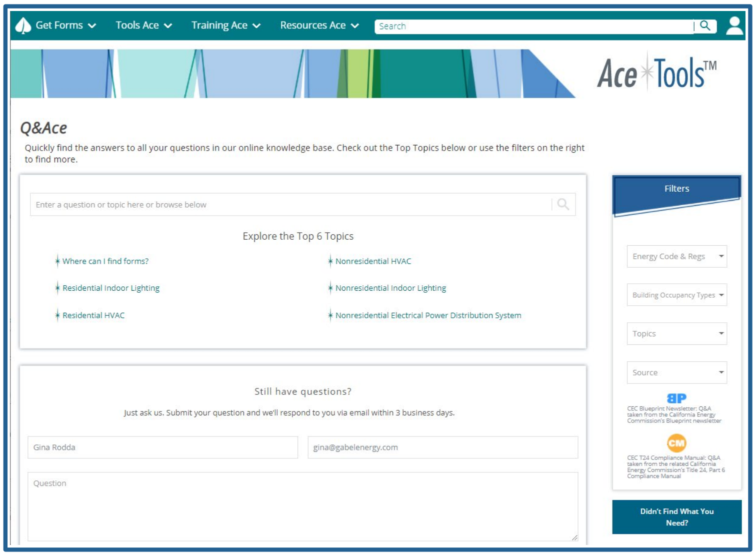
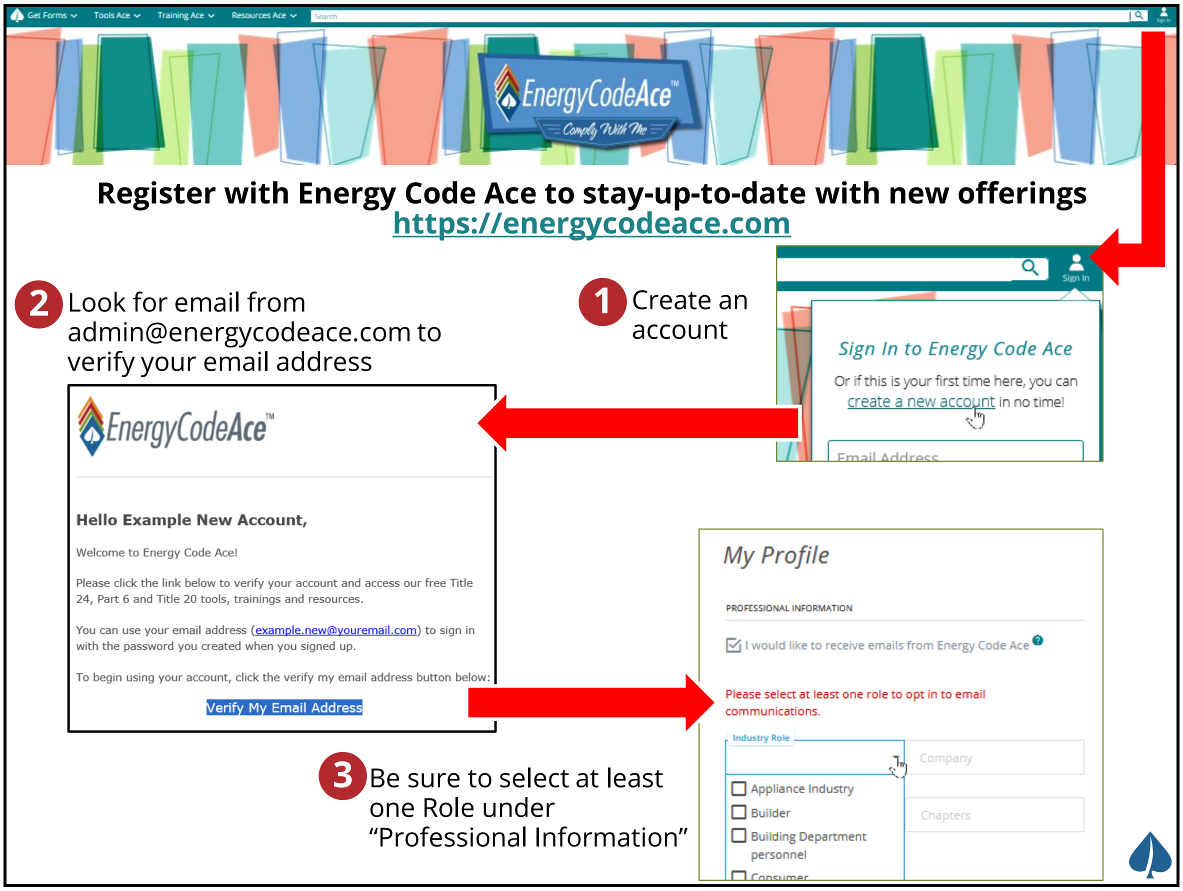


Local Resources for Assistance

Research local incentives and rebates that may be applicable to your project

- **Investor-Owned Utilities:**
  - Pacific Gas and Electric Company (PG&E)
  - San Diego Gas & Electric Company (SDG&E)
  - Southern California Edison Company (SCE)
- **Regional Energy Networks:**
  - The Bay Area Regional Energy Network (BayREN)
  - Southern California Regional Energy Network (SoCalREN)
  - Tri-County Regional Energy Network (3C-REN)
- **Public Utilities:**
  - Sacramento Municipal Utility District (SMUD)
  - Los Angeles Department of Water and Power (LADWP)
- **Community Choice Aggregator (CCA):**
  - https://cal-cca.org/about/members/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Hello Example New Account,
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Please click the link below to verify your account and access our free Title 24, Part 6 and Title 20 tools, trainings and resources.
You can use your email address (example.new@youremail.com) to sign in with the password you created when you signed up.
To begin using your account, click the verify my email address button below:
Verify My Email Address
3 Be sure to select at least one Role under "Professional Information"
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Please select at least one role to opt in to email communications.
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Appliance Industry
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Building Department personnel
Chapters
Consumer

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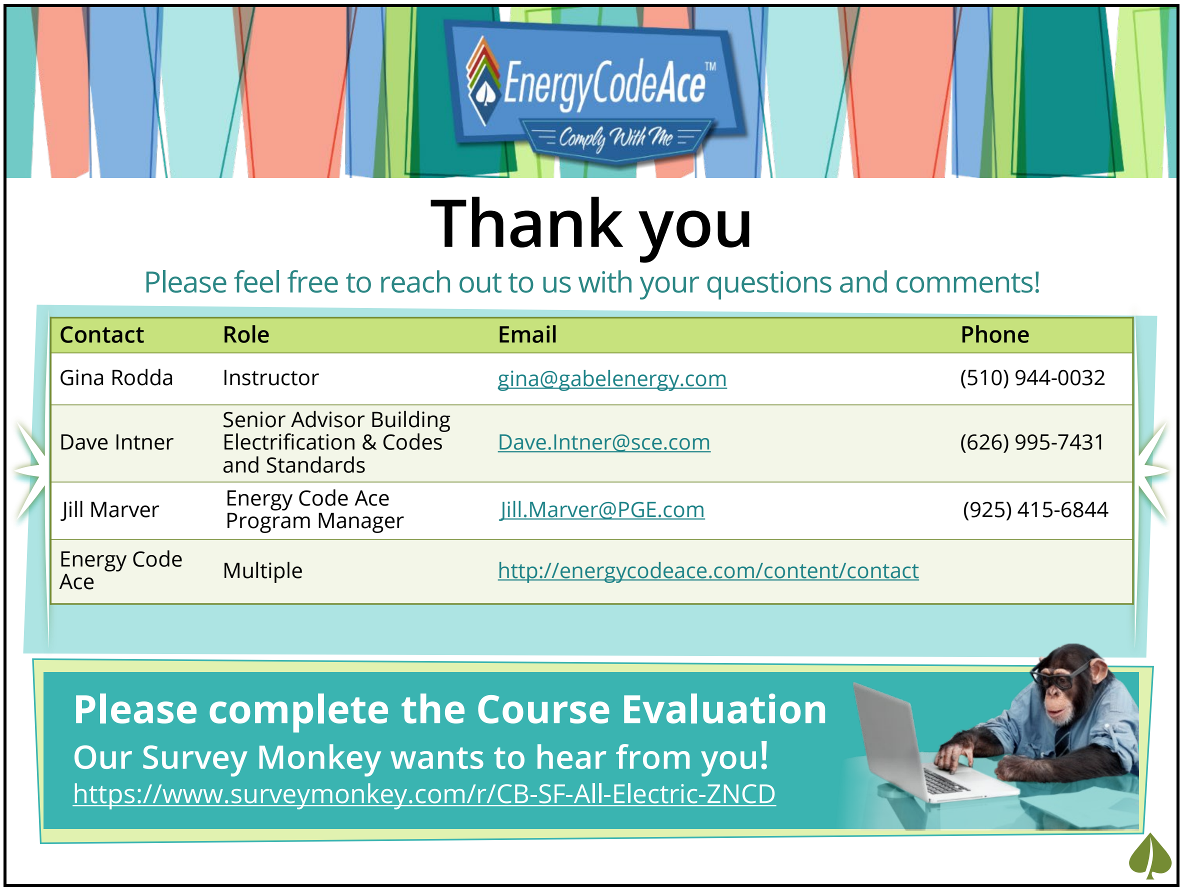
Contacts & Course Evaluation



Please take our course evaluation: https://www.surveymonkey.com/r/CB-SF-All-Electric-ZNCD

This program is funded by California utility customers and administered by Pacific Gas and Electric Company (PG&E), San Diego Gas & Electric Company (SDG&E®), and Southern California Edison Company (SCE) under the auspices of the California Public Utilities Commission.

This concludes the American Institute of Architects Continuing Education Systems Course