

2022 CA Energy Code

Single-Family Changes – Decarbonization



California Energy Commission
Christopher Olvera
Town of Paradise
November 2, 2022



Agenda

- Energy Code basics
- Navigating Energy Code
- All buildings significant changes
- Mandatory requirements significant changes
- Prescriptive requirements significant changes
- Additions and alterations requirements significant changes
- Resources



Energy Code Basics

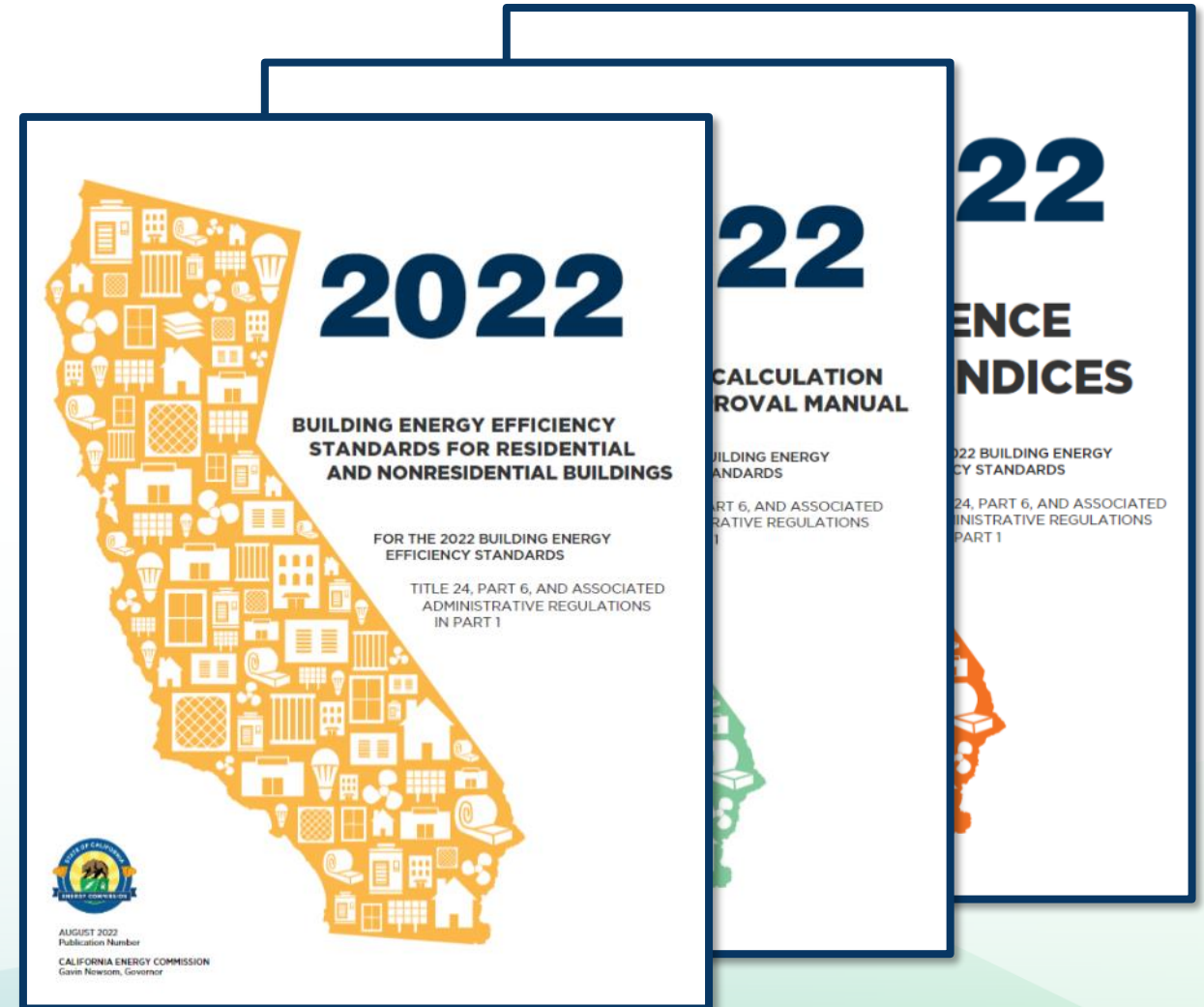




2022 Energy Code

Effective January 1, 2023

- Building permit applications submitted on or after effective date
- Must use 2022 software and 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 Performance Metrics

New for 2022

Source energy performance calculations

- Single-family
 - EDR1: hourly source energy
 - EDR2: time dependent valuation (TDV)
 - Efficiency EDR, PV + flexibility EDR, total EDR
- Nonresidential and multifamily
 - Hourly source energy
 - TDV Efficiency
 - TDV Total
 - Efficiency, PV + battery

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



2022 Compliance Software

Performance approach must use approved compliance software versions

- Single-family
 - CBECC-Res 2022.2.0
 - v 2022.1.0 decertified beginning 1/16/23
 - Additional software approvals coming soon



Single-family Defined

All Buildings § 100.1



Single-family building

- Occupancy group R-3
 - Two or less dwelling units
 - Not multifamily, hotel or motel
- Townhouse
- Occupancy group R-3.1
- Occupancy group U on residential site



All Buildings Significant Changes

Administrative §§ 10-115

Mandatory §§ 100.0, 100.1, 110.2, 110.12



Mandatory Requirements for Space-Conditioning Equipment

All buildings § 110.2(a)

Department of Energy (DOE)

- Equipment meets new SEER2 federal requirements after January 1, 2023
 - Split AC based on install date
 - Package AC and split heat pump based on manufacture date



System Type		New SEER	New SEER2	NEW SEER/HSPF	NEW SEER2/HSPF2
Split System AC	AC < 45K Btu/h	14.0 SEER 12.2 EER*	14.3 SEER2 11.7 EER2**	-	-
	AC ≥ 45K Btu/h	14.0 SEER 11.7 EER*	13.8 SEER2 11.2 EER2**	-	-
Split System Heat Pump	-	-	-	14.0 SEER 8.2 HSPF	14.3 SEER2 7.5 HSPF2
Single Packaged Unit	-	-	-	14.0 SEER 8.0 HSPF	13.4 SEER2 6.7 HSPF2

* 10.2 EER if SEER > 16.0 SEER

** 9.8 EER if SEER2 > 15.2 SEER



Single-family Significant Changes

Mandatory §150.0



Ventilation and IAQ Mandatory Requirements

Single-family Table 150.0-G

New for 2022

*Table 150.0-G Kitchen Range Hood Airflow Rates (cfm) and ASTM E3087 Capture Efficiency (CE) Ratings
According to Dwelling Unit Floor Area and Kitchen Range Fuel Type*

Dwelling Unit Floor Area (ft²)	Hood Over Electric Range	Hood Over Natural Gas Range
>1500	50% CE or 110 cfm	70% CE or 180 cfm
>1000 - 1500	50% CE or 110 cfm	80% CE or 250 cfm
750 - 1000	55% CE or 130 cfm	85% CE or 280 cfm
<750	65% CE or 160 cfm	85% CE or 280 cfm



Electric Ready Mandatory Requirements

Single-family § 150.0(n)

Updated for 2022

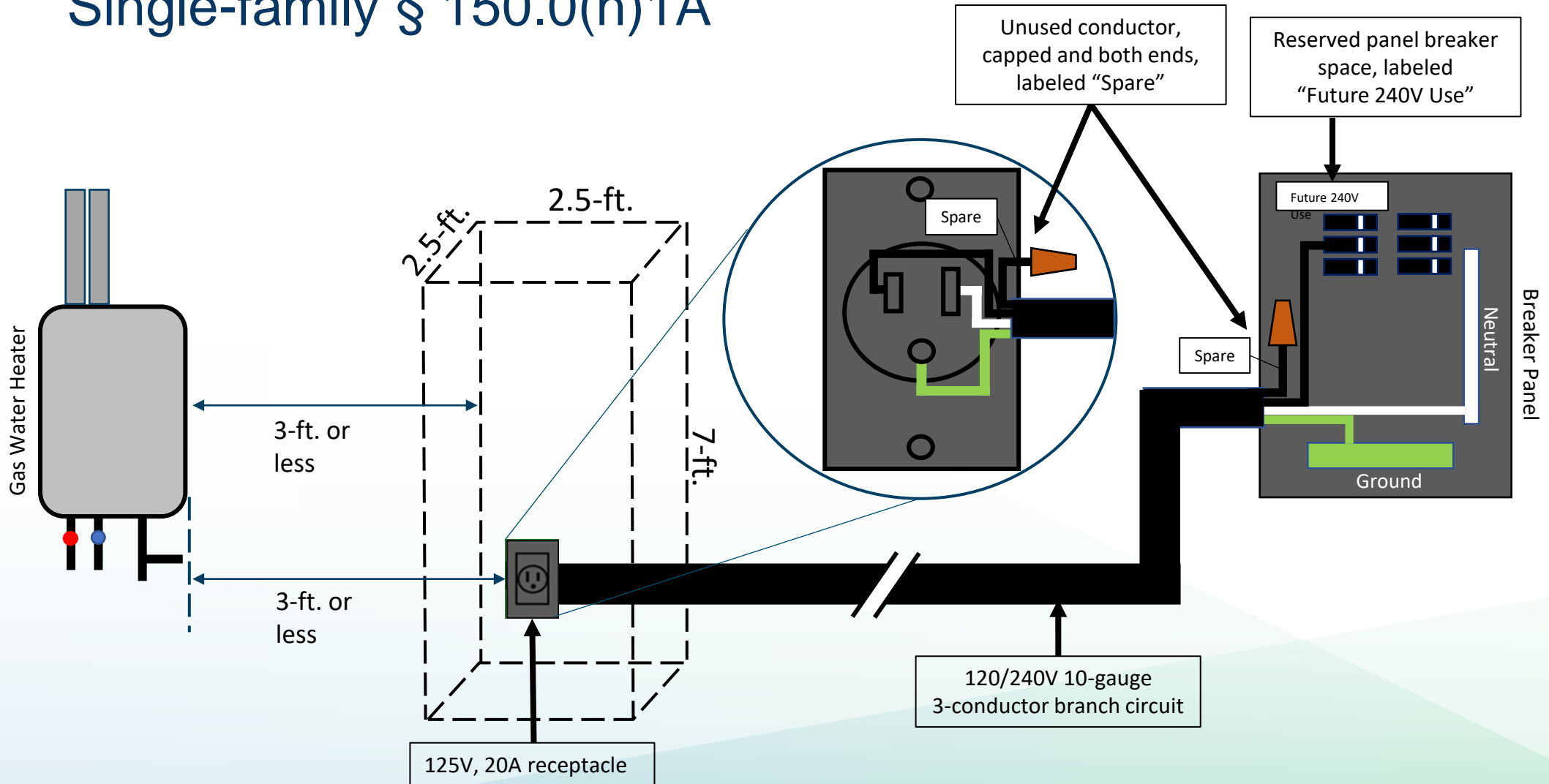
Water heating system

- If using gas or propane provide **designated space for future heat pump water heater at least 2.5 feet by 2.5 feet and 7 feet tall**
 - **If within 3 feet of water heater**
 - 125V, 20A circuit with 120/240V 3 conductor
 - Reserve and label single pole breaker in main panel
 - **If more than 3 feet from water heater**
 - **240V, 30A circuit with termination 3 feet from designated space**
 - **Reserve and label double pole breaker in main panel**
 - **Water lines, both hot and cold, route through designated space before reaching gas or propane water heater**
 - **Condensate drain**



HPWH Electric Ready

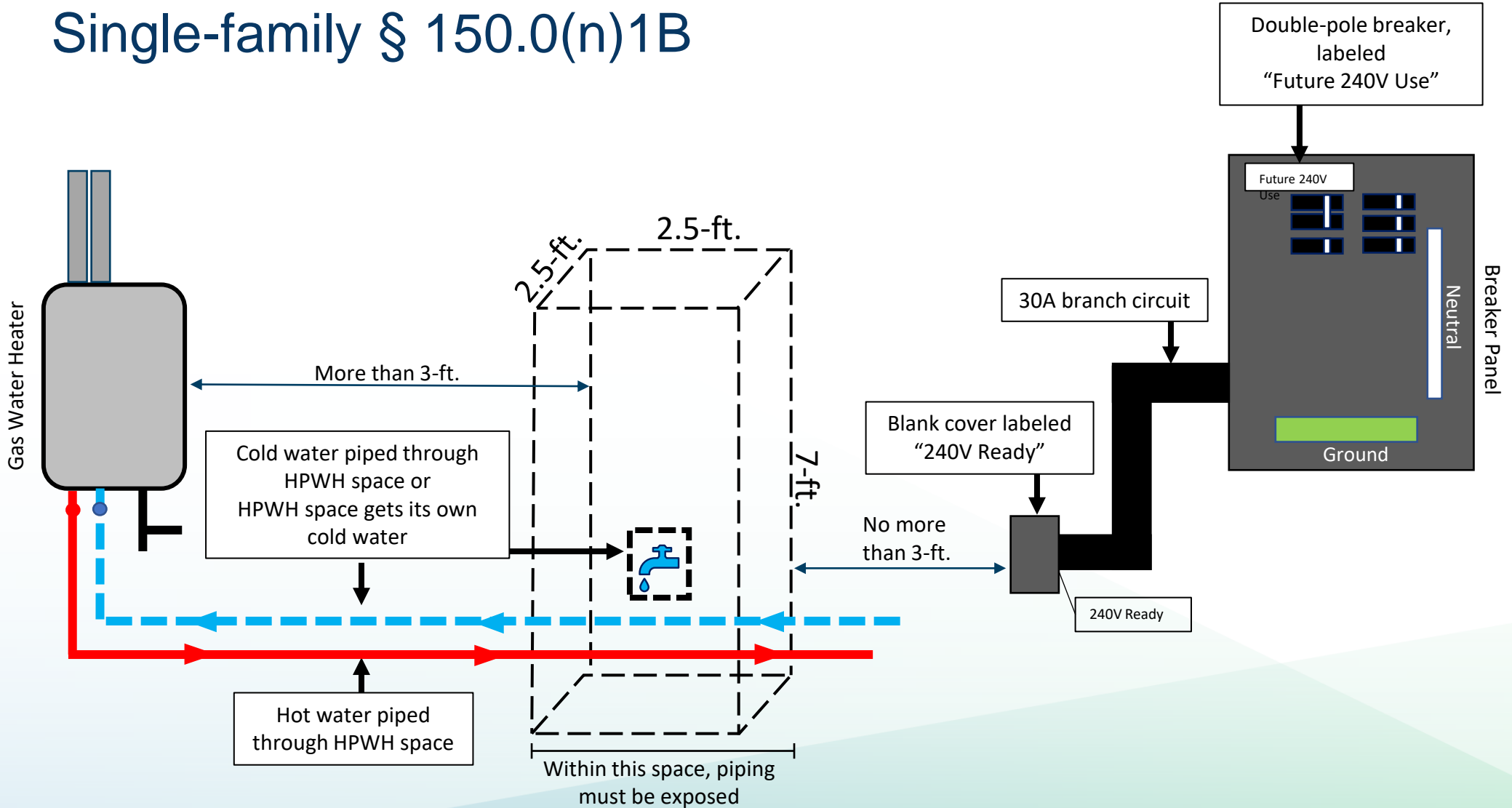
Single-family § 150.0(n)1A





HPWH Electric Ready

Single-family § 150.0(n)1B





Energy Storage Systems Ready Mandatory Requirements

Single-family § 150.0(s)

New for 2022

Adds energy storage systems (ESS) ready

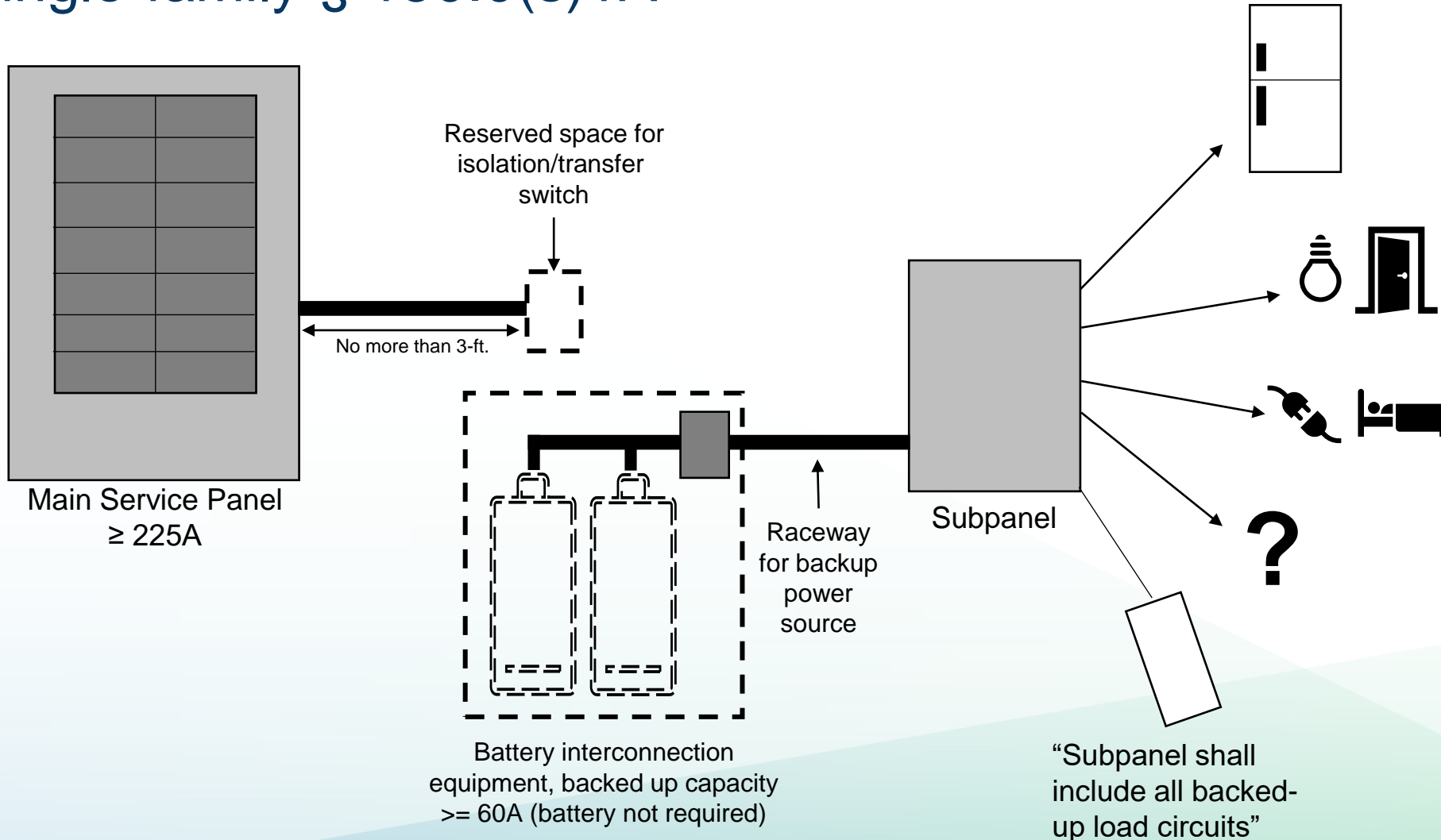
- At least one shall be provided
 - ESS ready interconnection equipment with minimum backed up capacity of 60A and 4 ESS supplied branch circuits
 - Dedicated raceway from main service to subpanel that supplies branch circuits
- Identify at least 4 branch circuits for emergency use
 - Supply refrigerator, lighting near front door, one outlet in bedroom
- Main panel minimum busbar rating of 225A
- Space for future system isolation equipment or transfer switch within 3 feet of main panel
 - Raceways installed between panel and system isolation equipment or transfer switch location to allow the connection of backup power source





Energy Storage System Ready

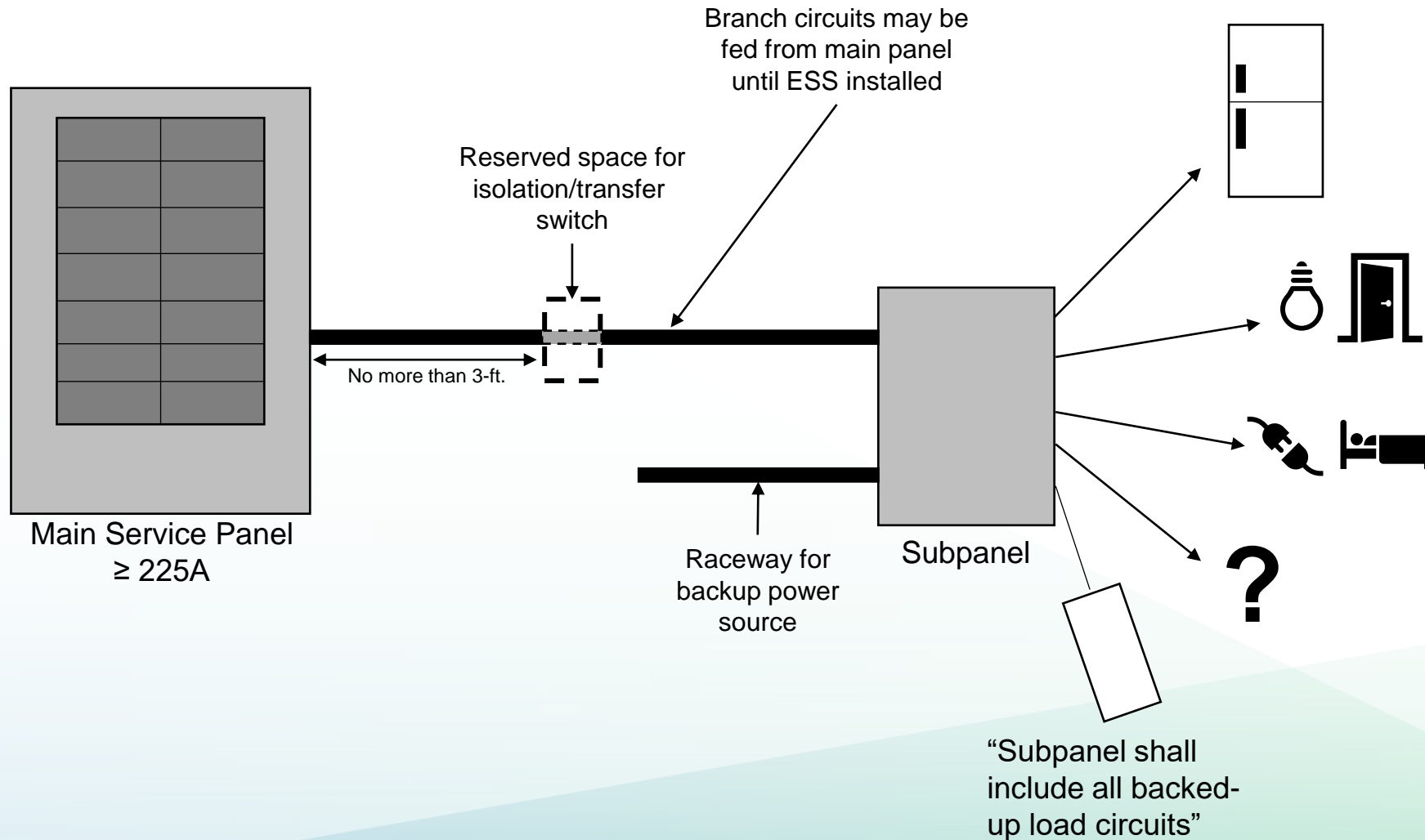
Single-family § 150.0(s)1A





Energy Storage System Ready

Single-family § 150.0(s)1B





Electric Ready Mandatory Requirements

Single-family §§ 150.0(t, u, v)

New for 2022

Adds heat pump space heater ready

- 240V, 30A circuit with termination 3 feet from furnace
- Reserve and label double pole breaker in main panel

Adds electric cooktop ready

- 240V, 50A circuit with termination 3 feet from cooktop
- Reserve and label double pole breaker in main panel

Adds electric clothes dryer ready

- 240V, 30A circuit with termination 3 feet from clothes dryer location
- Reserve and label double pole breaker in main panel





Single-family Significant Changes

Prescriptive: § 150.1



HVAC

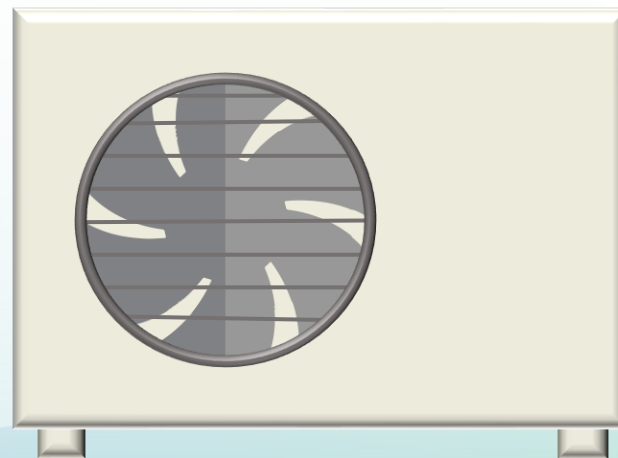
Prescriptive Requirements

Single-family § 150.1(c)6

New for 2022

Heating system type

- Heating system types installed per TABLE 150.1-A
- Climate zones 3, 4, 13, 14 use heat pump space conditioning
 - Note: other types may comply using performance method





Water Heating Prescriptive Requirements

Single-family § 150.1(c)8

Updated for 2022

Domestic water-heating systems

- Heat pump water heater (HPWH) **in all climate zones** located in garage or conditioned space
 - HPWH **240V**
 - Compact distribution in **climate zones 1, 16**
 - Drain water heat recovery in **climate zone 16**
 - HPWH **240V** meets NEEA Tier 3 or higher
 - Drain water heat recovery in **climate zone 16**
- **Solar water-heating system with electric backup**
- Note: other types may comply using performance method





Water Heating Prescriptive Requirements

Single-family § 150.1(c)8

Updated for 2022

Domestic water-heating systems

- Exceptions
 - Climate zones 3, 4, 13, 14 may install instantaneous gas water heater and must use heat pump for space conditioning system
 - New dwelling unit with 500 square feet or less may install instantaneous electric water heater with point of use distribution per RA4.4.5
 - New dwelling unit with 1 bedroom or less may install 120V HPWH in place of 240V HPWH



Photovoltaic Systems Prescriptive Requirements

Single-family § 150.1(c)14

New for 2022

Photovoltaic (PV) systems

- No larger than what can be installed in available solar access roof area (SARA) or per Equation 150.1-C
- SARA includes area of building's roof space, area of roof space on covered parking areas, carports, and other newly constructed structures on site that can structurally support PV system
- SARA does not include any roof area with less than 70% annual solar access
 - Annual solar access - divide total annual solar insolation with shading, by total annual solar insolation without shading



Photovoltaic Systems Prescriptive Requirements

Single-family § 150.1(c)14

Updated for 2022

PV system exceptions

- Steep slope roofs areas with azimuth between 300 degrees and 90 degrees not included in SARA, no PV if SARA is less than 80 square feet
- No PV systems required when PV size is less than 1.8 kWdc
- Areas with high snow loads where PV is not possible
- Buildings approved by AHJ prior to January 1, 2020
 - Shading from roof designs and configurations for steep-sloped roofs included in SARA
 - Roof areas that are not allowed to have PV, not considered in SARA
- PV system size reduced by 25% if battery storage system minimum 7.5 kWh installed per Reference Joint Appendix JA12



Single-family Significant Changes

Additions and Alterations: § 150.2



Additions

Mandatory Requirements

Single-family § 150.2(a)

Updated for 2022

Additions to existing single-family buildings

- Meet mandatory §§ 110.0-110.9, §§ 150.0(a-n, p, q)
- Meet either § 150.2(a)1 or 2
- **Exception 4: Space conditioning system ducts**
 - Any length of ducts extended from existing duct system to serve the addition to meet duct sealing and duct insulation requirements per Section 150.2(b)1Di and 150.2(b)1Dii
- **Exception 7: Space heating system**
 - New or replacement space heating systems serving addition may be heat pump or gas



Water Heating Additions Prescriptive Requirements

§ 150.2(a)1D

Updated for 2022

Water heating

- Heat pump water heater meet either
 - Not located outdoor, on R10 surface, demand responsive
 - High efficiency NEEA Tier 3
- Gas or propane instantaneous water heater
 - 200,000 BTU or less
 - No storage tank
- Additions less than 500 square feet
 - Instantaneous electric allowed
 - Point-of-use distribution per RA4.4.5



HVAC Alterations Prescriptive Requirements

Single-family § 150.2(b)1G

Updated for 2022

Altered or replaced space heating system

- No electric resistance as primary heat source
- Exceptions
 - If existing equipment is electric resistance either
 - Non-ducted systems
 - Ducted systems only replacing heating
 - Climate zones 7 or 15



Water Heating Alterations Prescriptive Requirements

Single-family § 150.2(b)1H

Updated for 2022

Water heater options

- Expands HPWH to all climate zones
- Natural gas or propane water heater
- Single heat pump water heater
 - Storage tank not located outdoors, on rigid R-10 surface
 - Demand responsive
 - Meets § 110.12(a) or has ANSI/CTA-2045-B communication port
- Single heat pump water heater
 - NEEA Tier 3 or higher
- If existing water heater is electric resistance
 - May replace with electric water heater
- Water-heating system approved by the Executive Director



Single-family Summary

What's New for Single-family

- Summary of significant changes
- Code references
- Mandatory requirements summary is also available
- Download from the [Online Resource Center](#)



California Energy Commission
2022 Building Energy Efficiency Standards
What's New for Single-Family Residential

Single-Family What's New for 2022 Summary

The most significant change in the 2022 Building Energy Efficiency Standards (Energy Code) affecting single-family residential buildings is a single fuel prescriptive heat pump baseline for either water heating or space heating, depending on the climate zone. There are also new requirements for indoor air quality (IAQ). There are also new requirements and revisions for additions and alterations. The definition for single-family buildings is updated and all multifamily requirements are moved to Sections 160.0 to 180.4.

Mandatory Requirements

- New roof deck insulation maximum area-weighted average U-factor requirement of U-0.184 in climate zones 4 and 8-16. §150.0(a)1
- Simplifies hot water piping language and defers to California Plumbing Code. §150.0(g)
- Simplifies and reorganizes language for lighting requirements. §150.0(k)
- Ducts in conditioned space do not require insulation if specific criteria are met, and ducts are located entirely inside the building's thermal envelope. §150.0(m)1B
- Filter racks or grilles shall be gasketed or sealed to prevent air from bypassing the filter. §150.0(m)12Bv
- Gas water heater installations must provide a designated space for a future heat pump water heater (HPWH) installation. §150.0(n)
- New requirements for central fan integrated ventilation systems requiring a motorized controlled damper, damper controls, and variable ventilation. §150.0(o)1B
- Vented kitchen range hoods require ventilation rates or capture efficiencies based on conditioned floor area and fuel type (see Tables 150.0-E, F, & G). §150.0(o)1G
- Installed heat recovery ventilation (HRV) and energy recovery ventilation (ERV) systems must have a Home Energy Rating System (HERS) verified maximum fan efficacy of 1.0 W/cfm. §150.0(o)2C
- New energy storage system (ESS) ready requirements, including interconnection equipment or a dedicated raceway, a minimum of four branch circuits, a minimum busbar rating of 225 amps, and space for future installation of a system isolation equipment or transfer switch. §150.0(s)
- New electric ready requirements for space heating, cooking, and clothes dryers when gas equipment is installed. Electrical infrastructure must be provided and reserved to the equipment location for the future installation of electrical appliances. §150.0(t)-(v)

Performance Compliance:

- New energy design rating (EDR) metrics – EDR1, based on source energy; efficiency EDR and solar generation/flexibility EDR are now under EDR2. Compliance requires separately meeting EDR1, efficiency EDR2, and total EDR2. §150.1(b)1

Prescriptive Compliance:

- Space heating equipment must be a heat pump in climate zones 3, 4, 13, and 14. In other climate zones it can be either a heat pump or a gas heating system. §150.1(c)6
- Water heating equipment must be a HPWH meeting certain criteria or solar water heating system with electric backup. §150.1(c)8
- In climate zones 3, 4, 13, and 14, a gas instantaneous water heater (max input 200,000 Btu/h, no storage tank) is allowed if the space conditioning system is a heat pump. §150.1(c)8
- New dwelling units with a conditioned floor area 500 square feet (SF) or less may install an instantaneous electric water heater with point of use distribution. §150.1(c)8
- New dwelling units with a conditioned floor area 500 SF or less do not require a whole-house fan. §150.1(c)12
- Revises and updates photovoltaic (PV) language for clarity, including solar access roof area (SARA). §150.1(c)14



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



HERS Program

HERS Program information

- 2022 Energy Code approvals in process
- Providers for 2019 Energy Code



- Newly constructed buildings
- Additions
- Alterations of residential and nonresidential buildings
- California whole-house home energy ratings
- HERS building performance contractors



- Newly constructed buildings
- Additions
- Alterations of residential and nonresidential buildings



Blueprint Newsletter

Energy Code quarterly newsletter

- Updates
- Clarifications
- Frequently asked questions





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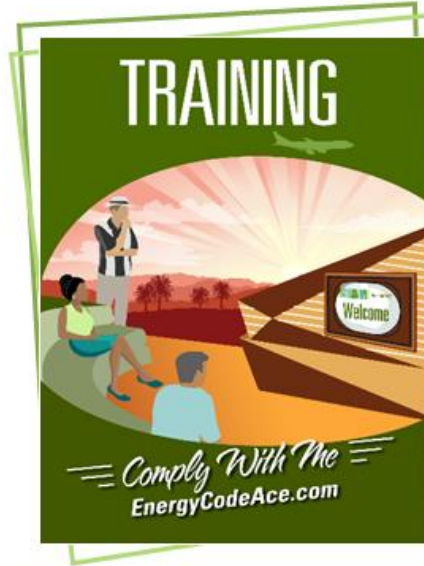
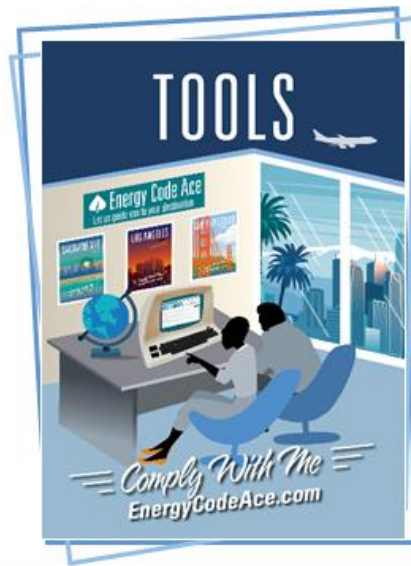


Email

- Title24@energy.ca.gov



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
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