We will be starting soon!

Thanks for joining us

2022 Energy Code –ADUs

Central Coast and Ventura ICC Chapter Series

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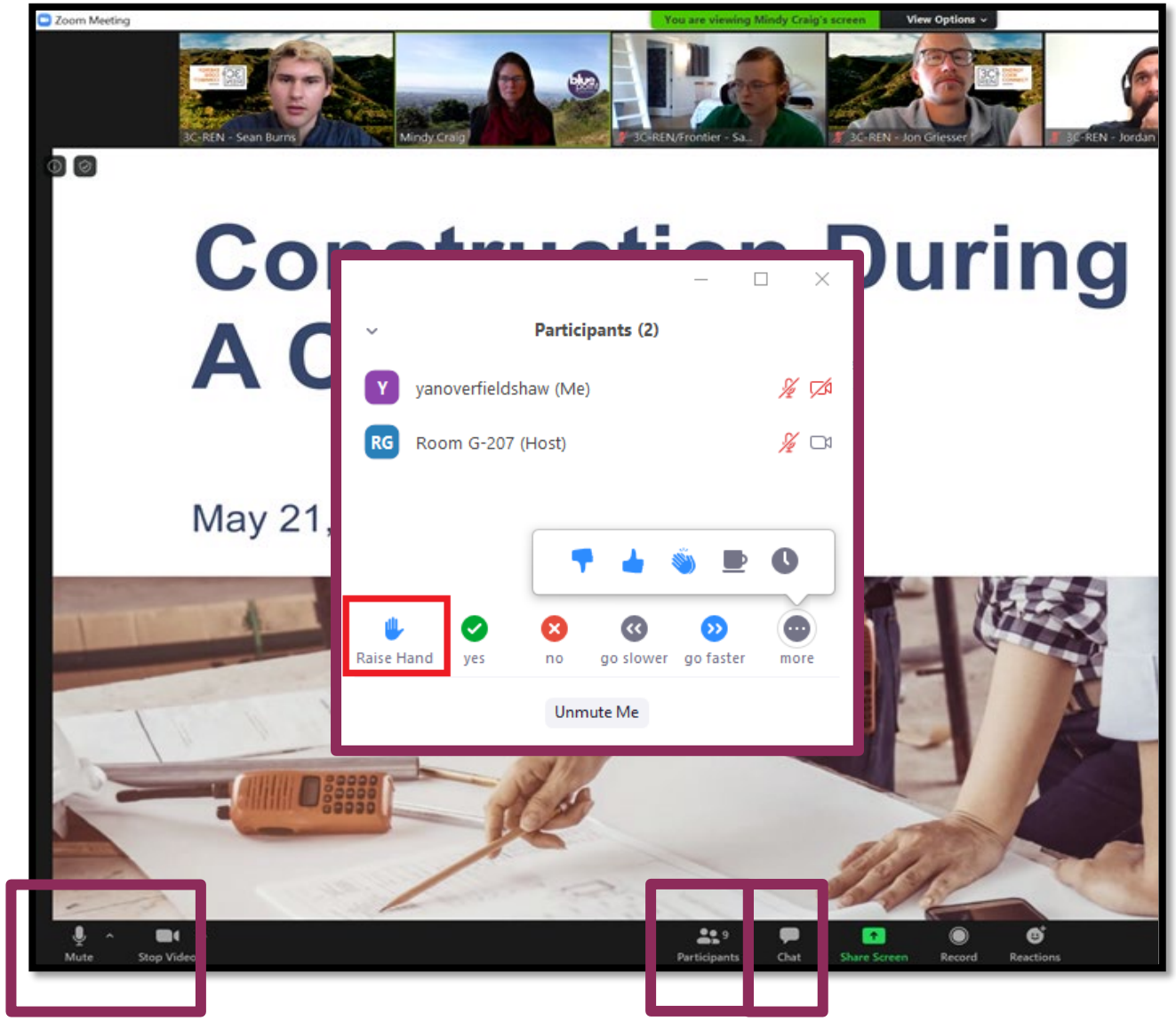
Grant Murphy, CEA – In Balance Green Consulting

June 28, 2023

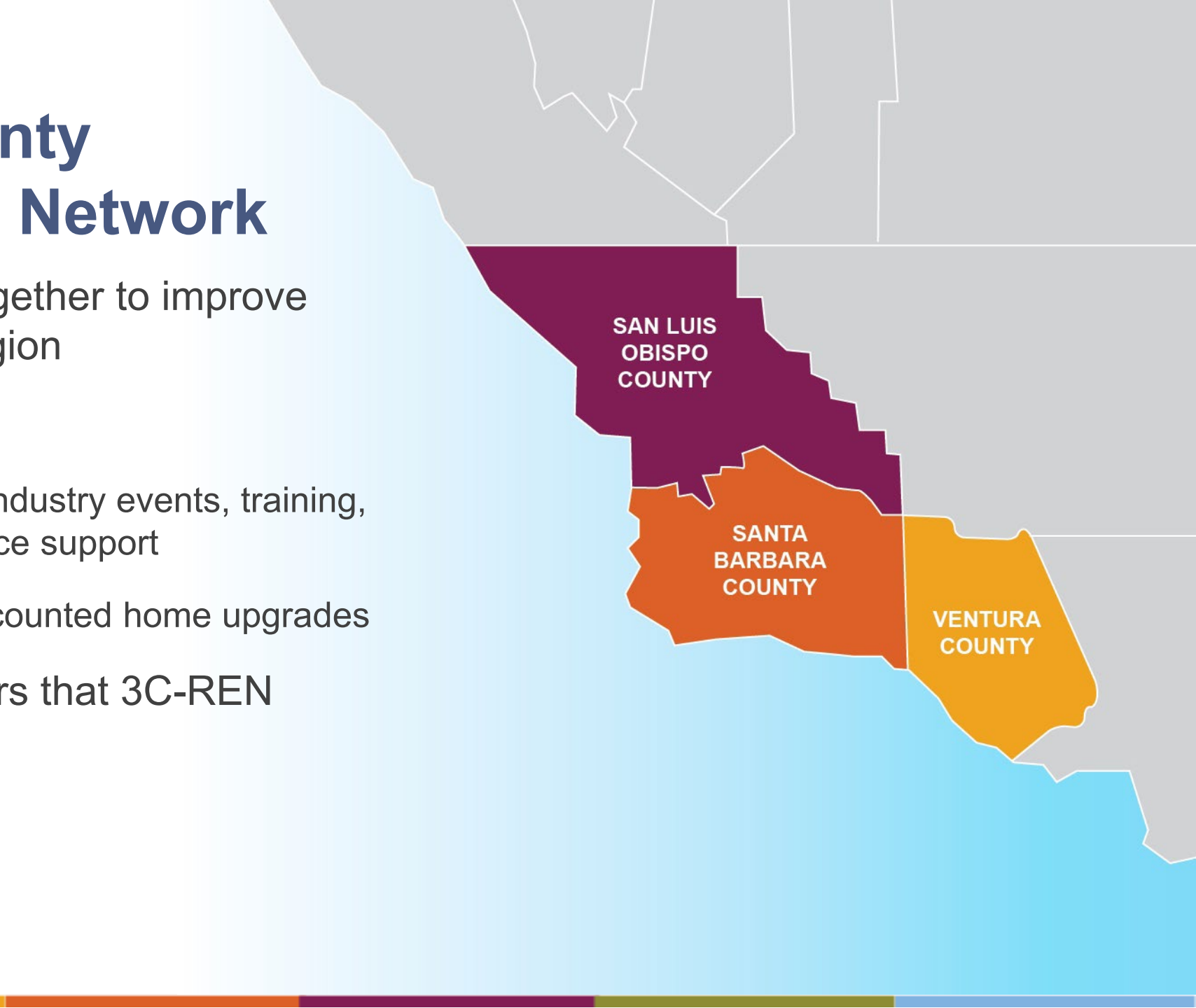
Zoom Orientation

- Please be sure your full name is displayed
- Please mute upon joining
- Use "Chat“ box to share questions or comments
- Under "Participant" select "Raise Hand" to share a question or comment verbally
- The session may be recorded and posted to 3C-REN's on-demand page. Feel free to ask questions via the chat and keep video off if you want to remain anonymous in the recording.



3C-REN: Tri-County Regional Energy Network

- Three counties working together to improve energy efficiency in the region
- Services for –
  - **Building Professionals:** industry events, training, and energy code compliance support
  - **Households:** free and discounted home upgrades
- Funded by ratepayer dollars that 3C-REN returns to the region



3C REN ENERGY CODE CONNECT

- Serves all building professionals
- Three services –
  - **Energy Code Coach**
  - **Training and Support**
  - **Regional Forums**
- Makes the Energy Code easy to follow

Energy Code Coach:
3c-ren.org/codes

3C REN BUILDING PERFORMANCE TRAINING

- Serves current and prospective building professionals
- Expert instruction:
  - **Technical skills**
  - **Soft skills**
- Helps workers to thrive in an evolving industry

Event Registration:
3c-ren.org/events

3C REN HOME ENERGY SAVINGS

Multifamily (5+ units)

- Rebates up to $750/apartment plus additional rebates for specialty measures like heat pumps for property owners.

Single Family (up to 4 units)

- Contractors get paid for the metered energy savings of your customers

Enrollment:
3C-REN.org/contractor-participation

3C-REN
Staff Online

CENTRAL COAST AND VENTURA ICC CHAPTER SERIES

Zoom Meetings
Wednesdays
2:00 pm - 3:00 pm

Partner

inBALANCE Green Consulting

Co-Sponsors

CENTRAL COAST INTERNATIONAL CODE COUNCIL

VENTURA REGION CHAPTER

Course Schedule:

5/10	Introduction to the Energy Code
5/31	2022 Energy Code: Single Family
6/14	2022 Energy Code: Multi Family
6/28	2022 Energy Code: ADUs and Other A + A
7/19	2022 Energy Code: Nonresidential
8/2	CALGreen Overview and 2022 Changes

3C REN

Today's Learning Objectives

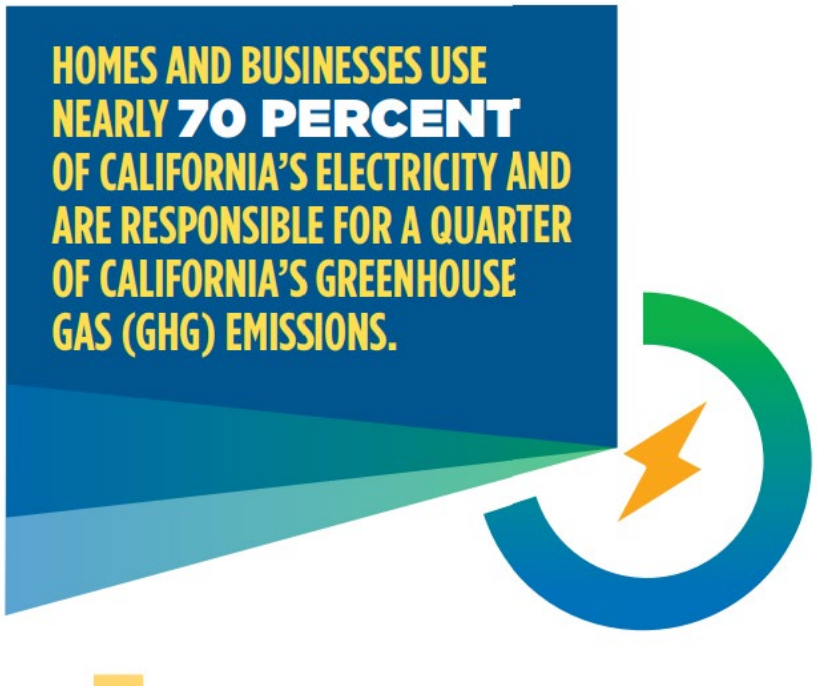
- Understand the organizational changes to the 2022 Energy Code
- Identify Big Pictures Goals of the California Energy Commission and how those goals influence changes
- Recognize key updates including building envelope, lighting, mechanical and DHW systems, renewable energy and storage and field verification
- Be able to access resources for energy code questions

Agenda

1. Energy Code Re-organization and Key Terms
2. ADUs – Benefits and Types
3. 2022 Energy Code for ADUs
4. Q&A and Closing

Energy Code Re-organization and Key Terms

Big Picture Goals for the 2022 Code Updates



- Encourage heat pump technology for space and water heating
- Establish electric-ready requirements for single family and multifamily projects
- Expand PV systems and battery storage standards
- Strengthen ventilation standards

The 2022 Energy Code makes All-Electric construction easier

Heat Pumps for Hot Water – Split Systems and Integrated

Heat Pumps for Space Heating and Cooling –Ductless and Ducted

- Heating and A/C with split system heat pump– ducted or ductless baseline in most climate zones
- Heat pump for DHW allowable in all climate zones
- Electric on-demand DHW with point-of-use distribution for ADUs and Additions (<500sf)
- Induction and electric cooktops can use smaller vent hoods as compared to gas cooktops

An all-electric home can be very cost effective, because the cost of installing gas infrastructure is avoided.

An all electric home reduces the CO_2 footprint by 66% compared to a 2019 Code compliant home with mixed fuel.

Subchapter Reorganization

2019 Code

All Buildings -Sections 100 and 110

High-Rise Residential, Nonresidential, Hotel/Motel -Sections 120, 130, 140, and 141

Low-Rise Residential -Section 150.0-150.2

2022 Code

All Buildings -Sections 100 and 110

Nonresidential, Hotel/Motel -Sections 120, 130, 140, and 141

Single-Family Residential -Section 150.0-150.2 (includes duplexes and townhouses)

New Sections

Multifamily Buildings -Sections 160, 170, 180 (low and high rise)

T24 Part 6 Energy Code – Subchapter Organization

All [*regulated] Occupancies*

(A, B, E, F, H, I M, R, S, or U, except I-3 and I-4)

Subchapter 1 –All Occupancy –Scope, Definition

Subchapter 2 –All Occupancies – Mandatory Requirements

Sec 100.0-100.3 & Sec 110.0-110.12

Not Low-Rise Res

Subchapter 3 –Nonresidential, High-Rise Res, Hotel/Motel, Covered Process –Mandatory Requirements

[*HVAC and Ventilation*]

Sec 120.0-120.9

Subchapter 4 –Nonresidential, High-Rise Res, Hotel/Motel – Mandatory Requirements

[*Lighting and Power*]

Sec 130.0-130.5

Subchapter 5 –Performance and Prescriptive

[*New Construction*]

Sec 140.0-140.9

Subchapter 6 – Additions and Alterations

Sec 141.0-141.1

Low-Rise Res

Subchapter 7 –Low-Rise Residential Mandatory Measures

Sec 150.0

Subchapter 8 – Performance and Prescriptive

[*New Construction*]

Sec 150.1

Subchapter 9 – Additions and Alterations

Sec 150.2

T24 Part 6 Energy Code – Subchapter Organization

All [*regulated*] Occupancies

(A, B, E, F, H, I M, R, S, or U, except I-3 and I-4)

Subchapter 1 –All Occupancy –Scope, Definitions

Subchapter 2 –All Occupancies – Mandatory Requirements

Sec 100.0-100.3 & Sec 110.0-110.12

Not Residential

Subchapter 3 – Nonresidential, Hotel/Motel, Covered Process –Mandatory Requirements [*HVAC and Ventilation*]

Sec 120.0-120.9

Subchapter 4 – Nonresidential, Hotel/Motel –Mandatory Requirements [*Lighting and Power*]

Sec 130.0-130.5

Subchapter 5 –Performance and Prescriptive [*New Construction*]

Sec 140.0-140.9

Subchapter 6 – Additions and Alterations

Sec 141.0-141.1

Single Family Res

Subchapter 7 –Single Family Residential Mandatory Measures

Sec 150.0

Subchapter 8 – Performance and Prescriptive [*New Construction*]

Sec 150.1

Subchapter 9 – Additions and Alterations

Sec 150.2

Multifamily Res

Subchapter 10 – Multifamily Residential Mandatory Measures

Sec 160.0-160.9

Subchapter 11 – Performance and Prescriptive [*New Construction*]

Sec 170.0-170.2

Subchapter 12 – Additions and Alterations

Sec 180.0-180.4

The Energy Code –Three Compliance Terms

Mandatory Requirements

Energy efficiency measures that are applicable to all projects.

Prescriptive Component Package	Performance Method
Mandatory Requirements are applicable	Mandatory Requirements are applicable
Follow all the parts of the prescriptive package	Other components or measures can be traded-off as long as the Proposed Design Building can be shown to be more energy efficiency than a similar sized Standard Design Building (baseline building)
Note: used to determine the Standard Design Building	
Essentially a **checklist** approach	**Energy modeling** approach

Performance Method

- **New Construction.** Compliance is shown with the Energy Design Rating (EDR) metrics. EDR1 was introduced as a proxy for carbon emissions at the source level.
- EDR2 Efficiency and EDR2 Total continue to be used for New Construction
- **Additions and Alterations to Existing Buildings.** The Energy Budget for additions and alterations is expressed in terms of **TDV**. It is referenced as EDR2.
- **Time Dependent Valuation (TDV)** is a metric that considers the *cost* of energy-used.

Note:
The Additions and Alterations Performance Method does **not** use EDR1. EDR1 Source Energy is only for NEW Construction.

Example of Single Family Performance Method Results for New Construction

When all three –Source EDR1, Efficiency EDR2, and Total EDR2 –have a positive compliance margin value, the project complies.

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	33.2	44.2	41.6			
Proposed Design	29.9	40.1	39.8	3.3	4.1	1.8
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: 2.06 kWdc
- PV System resized to 2.06 kWdc (a factor of 2.065) to achieve 'Standard Design PV' PV scaling

Excerpt from Compliance Form: CF1R-PRF-01-E Additions and Alterations

ENERGY USE SUMMARY

Energy Use	Standard Design Source Energy (EDR1) (kBtu/ft^2 -yr)	Standard Design TDV Energy (EDR2) (kTDV/ft^2 -yr)	Proposed Design Source Energy (EDR1) (kBtu/ft^2 -yr)	Proposed Design TDV Energy (EDR2) (kTDV/ft^2 -yr)	Compliance Margin (EDR1)	Compliance Margin (EDR2)
Space Heating	0	79.58	0	80.44	0	-0.86
Space Cooling	0	123.75	0	120.86	0	2.89
IAQ Ventilation	0	0	0	0	0	0
Water Heating	0	24.39	0	24.39	0	0
Self Utilization/Flexibility Credit						
Efficiency Compliance Total	**0**	**227.72**	**0**	**225.69**	**0**	**2.03**
Photovoltaics		0		0		
Battery				0		
Flexibility						
Indoor Lighting	0	7.33	0	7.33		
Appl. & Cooking	0	21.88	0	21.87		
Plug Loads	0	34.14	0	34.14		
Outdoor Lighting	0	1.75	0	1.75		
TOTAL COMPLIANCE	**0**	**292.82**	**0**	**290.78**		

EDR1 Source Energy is '0' i.e. 'not applicable' to Additions and Alterations

EDR2 Efficiency shows a passing Compliance Margin

ADUs –Accessory Dwelling Units

Benefits of Accessory Dwelling Units


Image Courtesy of Julie Clayton, AIA

- Affordable
  - No new land purchase
  - No major infrastructure needed
- Family & Community Connection
  - Extended Family
  - Essential Workers
- Flexible Living
  - Aging in Place
  - Home Healthcare
- Rental Income

ADU– Resources

California Department of **Housing and Community Development**

Grants & Funding | Manufactured & Mobilehomes | Building Standards | Planning & Community Development | Policy & Research | About HCD

Home › Policy & Research › Accessory Dwelling Units

Accessory Dwelling Units

Accessory Dwelling Units (ADUs) and Junior Accessory Dwelling Units (JADUs) are an innovative and effective option for adding much needed housing in California.

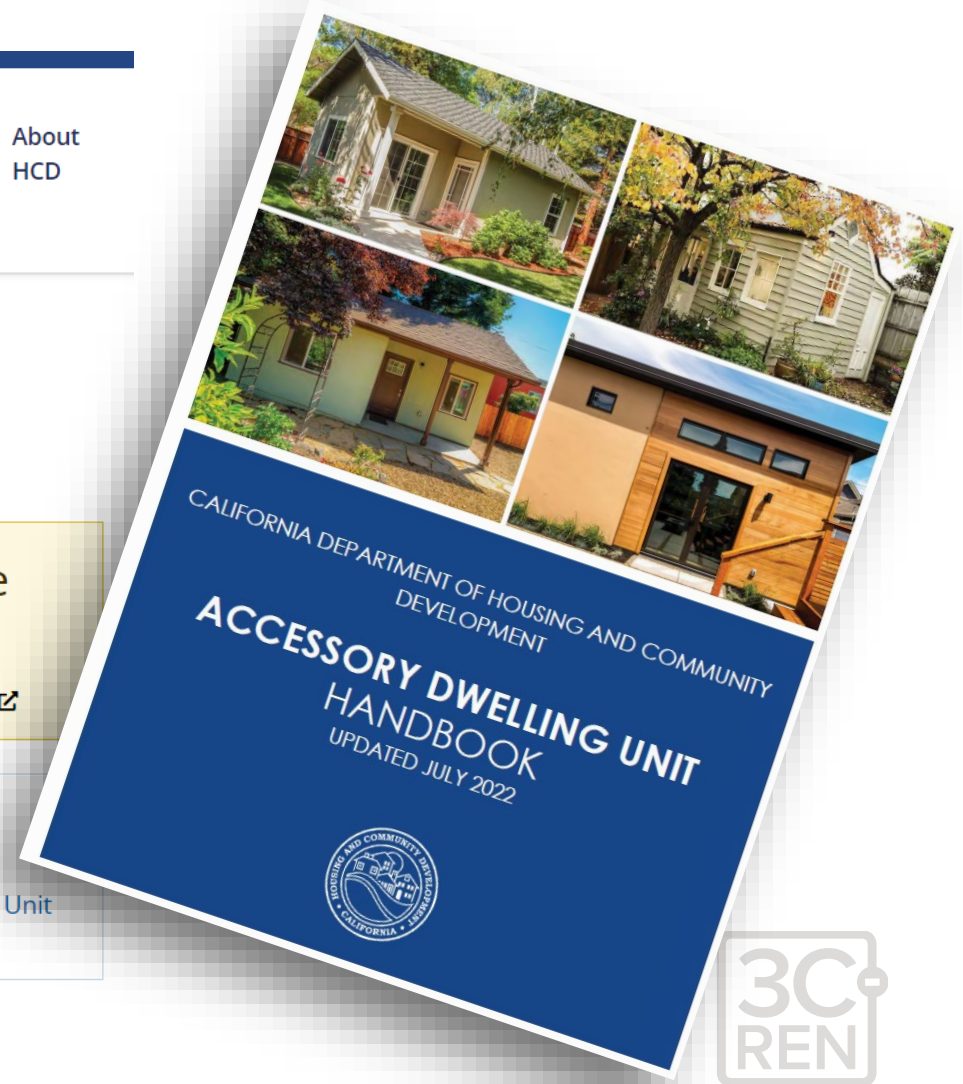
ADUs have been known by many names: granny flats, in-law units, backyard cottages, secondary units and more. HCD is the state's leader on local ADU ordinances, which — while optional — have grown exponentially in number as more cities, counties, and homeowners become interested in ADUs as one solution to increasing the supply of affordable housing.

Contact the ADU Team:

Submit a Question

Resources

Accessory Dwelling Unit Handbook (PDF)



https://www.hcd.ca.gov

ADU– Accessory Dwelling Unit

ADU is an accessory dwelling unit with **complete independent living facilities** for one or more persons with permanent provisions for living, sleeping, eating, cooking and sanitation.

- Can have a “full” or “efficiency” kitchen, i.e. cooking facility with appliances and reasonably sized food prep counter and storage (*definition: www.3c-ren.org/efficiency-kitchen*)
- Has independent bathroom facilities
- Must have a heating and cooling system that does not sharing air with another dwelling.
- Has its own thermostat, i.e. independent controls

Image Courtesy of Julie Clayton, AIA

JADU – Junior Accessory Dwelling Units

Conversion of existing space that is no more than 500 sq. ft. and is **contained entirely within an existing or proposed single-family residence**.

- May include separate or shared sanitation facilities
- May share central HVAC systems
- Has an “efficiency” kitchen, i.e. cooking facility with appliances and reasonably sized food prep counter and storage
- Has a door to the exterior
- May have an interior access door

Photo: ADU Resource Center

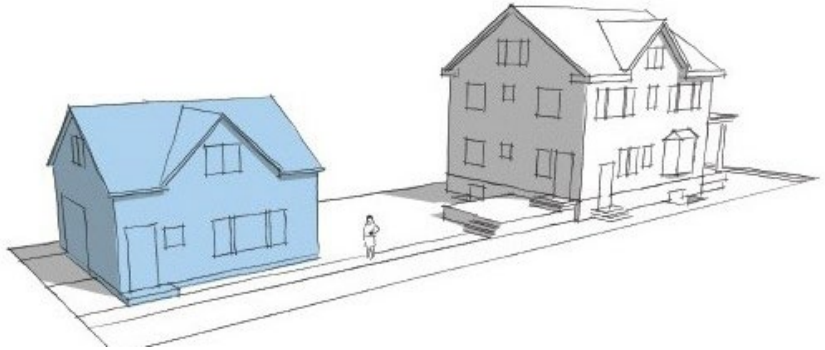
2022 Energy Code for ADUs

ADU's and JADU's (Accessory Dwelling Units)

In *the language* of the Energy Code an **ADU** will only be **noted** as such on the **CF1R** if the is ADU is an **addition and/or alteration**

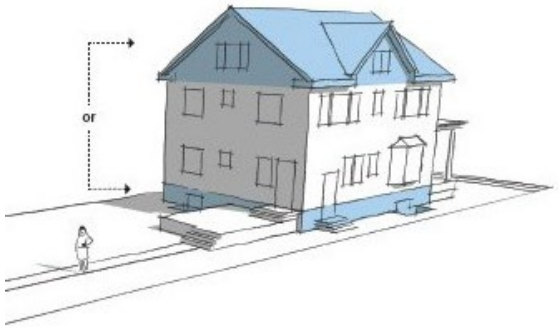
Energy Code: New Construction

Detached [New Construction]



Energy Code: Additions and Alterations

Attached (Internal)



Internal / [Detached] Conversion

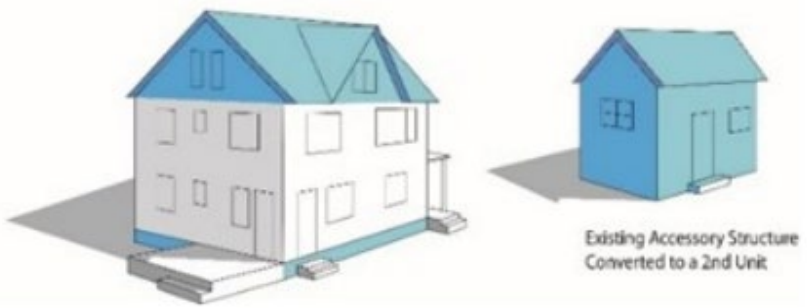
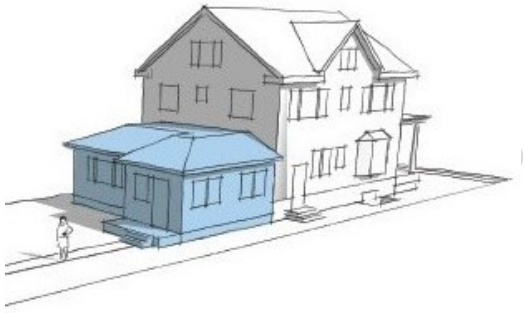


Image: City of Stockton, CA -- ADU Guide

Attached (Addition)



Images: City of Saint Paul, MN

ADU/JADU: New Construction or Addition or Alteration

New Construction –ADUs (new stand-alone detached construction or a new single family home with a JADU)

Additions –ADUs (conversions can be attached or detached construction)
Additions –Junior ADU's as an *attached* conversion less than 500sf

Alterations –ADUs and Junior ADUs (Within the *existing conditioned* residence; JADUs not more than 500 sf)

Section 150.1 New Construction

All subsections apply, including:

- Envelope (Walls, Roof, Floor, and Fenestration)
- Ventilation (IAQ –Indoor Air Quality)
- Mechanical Heating and Cooling
- DHW
- **Electric Ready**
- **Battery Storage Ready**, and
- **PV's (Solar Panels)**

Section 150.2(a) Additions

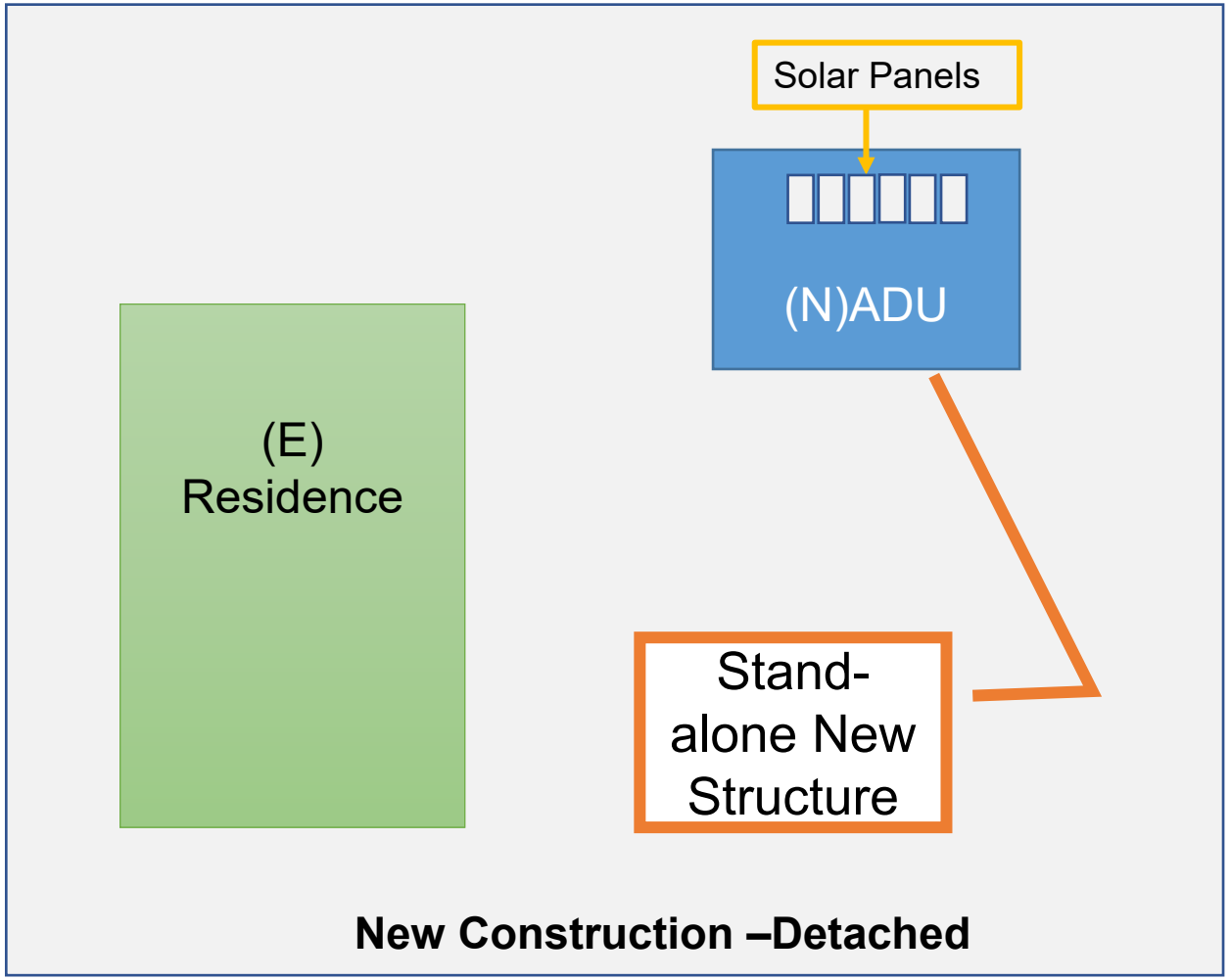
- Envelope
  - Wall Extension/Exemptions and Mandatory Min Insulation might apply
- Ventilation (IAQ –Indoor Air Quality)
  - New dwelling units that are additions to an existing building shall have mechanical ventilation
- Mechanical Heating and Cooling
  - ADU may ***not share return air with the primary dwelling*** through the heating or cooling system.
  - Separate thermostats
- Domestic Hot Water
  - Electric and gas options

Section 150.2 (b) Alterations

- Envelope
  - Wall Exemption to Mandatory Measure (Sec 150.0) Insulation for a 2x4 framed wall might apply
  - Attic Insulation
  - Air-Sealing
  - Recessed Lighting
- Mechanical Heating and Cooling, and Duct Distribution

New Construction

New Detached ADU's are considered "New Construction" under the Energy Code



Section 150.1 –New Construction – Low Rise Residential

All subsections apply, including:

- Envelope (Walls, Roof, Floor, and Fenestration)
- **Ventilation (IAQ –Indoor Air Quality**),
- Mechanical Heating and Cooling
- DHW,
- **Electric Ready**
- **Batter Storage Ready**
- **PV's (Solar Panels)**

Requirements for Ventilation and Indoor Air Quality (IAQ)

ASHRAE 62.2 *continues* to be the ***basis*** for section 150.0(o)

- Quantity of outside air (OA) ventilation,
- Allowable methods of meeting the OA ventilation; and
- Field verification of IAQ system(s)

Updated or Added Language:

- Central Fan Integrated (CFI) Ventilation Systems
- Kitchen and Bathroom Exhaust
- Prescriptive Ventilation Duct Sizing
- Balanced Ventilation with Heat/Energy Recovery
- Required Testing of Ventilation System Air Flow

Note:
This section is also referenced for Additions that are *new dwelling units*, i.e. attached and conversion ADU's.

Kitchen –Range Hood and Other Exhaust Fans

- New Table 150.0-G based on **home size** and **fuel type**
- Capture Efficiency (CE) –new hood performance standard

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 (ft^2)	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

Note:
In this illustration, a hood CE of 65% or 160 cfm would only comply for Electric Ranges/Cooktops, but for any sized dwelling.

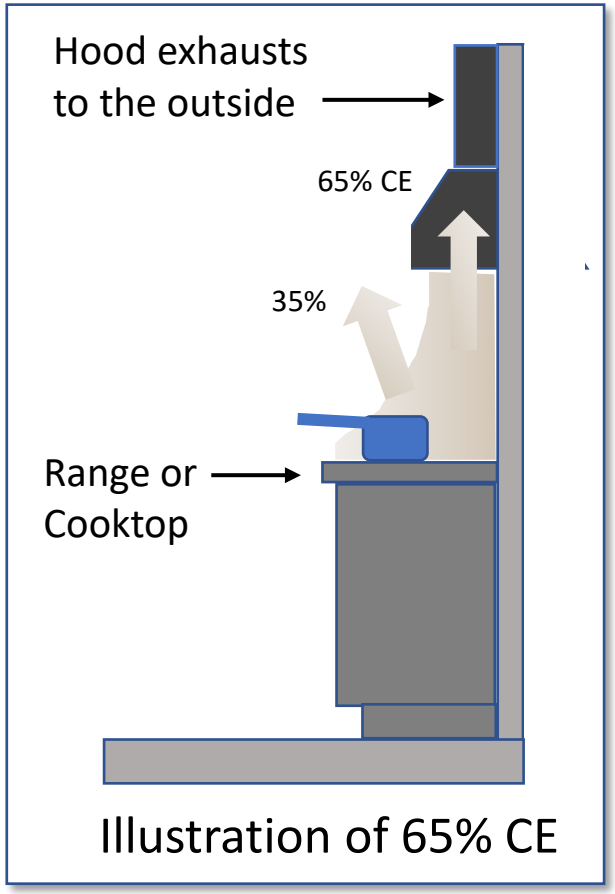


Illustration of 65% CE

CF2R-MCH-32-H
Local Mechanical Exhaust for Kitchen and Bathrooms

LOCAL MECHANICAL EXHAUST

CALIFORNIA ENERGY COMMISSION

CEC-CF2R-MCH-32-H

SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

Title 24, Part 6, Section 150.0(o) **Ventilation for Indoor Air Quality.** All dwelling units shall meet the requirements of ASHRAE Standard 62.2, Ventilation and Acceptable Indoor Air Quality in Residential Buildings, subject to the amendments specified in Section 150.0(o)1.

CERTIFICATE OF INSTALLATION

Note: This table completed by HERS Registry.

Project Name:	Enforcement Agency:
Dwelling Address:	Permit Number:
City and Zip Code:	Permit Application Date:

General Info for calculating kitchen area, volume, type, i.e. enclosed or open, and fuel type, i.e. gas/LP or electric

A. Local Mechanical Exhaust - General Information

01	Dwelling Unit Name	
02	Building Type	
03	Total Kitchen Floor Area	
04	Kitchen Average Ceiling Height	
05	Kitchen Total Conditioned Volume	
06	Kitchen Type	
07	Dwelling Unit Total Floor Area	
08	Kitchen Range (Cooking Stove) Fuel Type	

Clarifies that either flow hood testing or the prescriptive requirements were followed

B. Local Mechanical Exhaust System (*Section 150.0(o)1G*) – Fan Selection and Duct Design Criteria for Compliance

Local mechanical exhaust fans shall be installed in each kitchen and bathroom in accordance with Section 150.0(o)1G. Systems shall be rated for airflow in accordance with ASHRAE 62.2 section 7.1. Delivered local ventilation rates:

- *All local ventilation rates have been measured using a flow hood, flow grid, or other airflow measuring device and meet the requirements of Tables 150.0-E, 150.0-F, or 150.0-G; OR*
- *The airflow rating at a pressure of 0.25 in. w.c. of a certified fan is assumed because the local ventilation system duct sizing meets the prescriptive requirements of Table 150.0-H.*

CF2R-MCH-32-H Local Mechanical Exhaust for Kitchen and Bathrooms –con't

Table 150.0-E
Demand-Controlled Local Ventilation Exhaust Airflow Rates and Capture Efficiency

Application	Airflow
Enclosed Kitchen or Nonenclosed Kitchen	Vented range hood, including appliance-range hood combinations shall meet either the capture efficiency (CE) or the airflow rate specified in Table 150.0-G as applicable.
Enclosed Kitchen	Other kitchen exhaust fans, including downdraft: 300 cfm or a capacity of 5 ACH
Nonenclosed Kitchen	Other kitchen exhaust fans, including downdraft: 300 cfm
Bathroom	50 cfm

Table 150.0-F
Continuous Local Ventilation Exhaust Airflow Rates

Application	Airflow
Enclosed kitchen	5 ach, based on kitchen volume
Bathroom	20 cfm

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 (ft^2)	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

Table 150.0-H
Prescriptive Ventilation System Duct Sizing

Fan Airflow Rating, CFM at minimum static pressure of 0.25 in. water	≤50 (25)	≤80 (40)	≤100 (50)	≤125 (60)	≤150 (70)	≤175 (85)	≤200 (95)	≤250 (120)	≤350 (165)	≤400 (190)	≤450 (210)	≤700 (330)	≤800 (380)
Duct Type	**Minimum Duct Diameter, in. (mm) [a,b]**												
Rigid duct	4[d] (100)	5 (125)	5 (125)	6 (150)	6 (150)	7 (180)	7 (180)	8 (205)	9 (230)	10 (255)	10 (255)	12 (305)	12[d] (305)
Flex duct [c]	4 (100)	5 (125)	6 (150)	6 (150)	7 (150)	7 (180)	8 (205)	8 (205)	9 (230)	10 (255)	NP	NP	NP

a. For noncircular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
b. NP = application of the prescriptive table is not permitted for this scenario.
c. Use of this table for verification of flex duct systems requires flex duct to be fully extended and any flex duct elbows to have a minimum bend radius to duct diameter ratio of 1.0.
d. For this scenario, use of elbows is not permitted.

Includes summary requirements for Mandatory kitchen ventilation, for a kitchen hood and/or continuous ventilation.

Includes additional key requirements, i.e. duct sizing, sound ratings, demand control and shared systems

LOCAL MECHANICAL EXHAUST
CALIFORNIA ENERGY COMMISSION CEC-CF2R-MCH-32-H
SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

e. For this scenario, 4 in. (100 mm) oval duct shall be permitted, provided the minor axis of the oval is greater than or equal to 3 in. (75 mm)
f. When a vented range hood utilizes a capture efficiency rating to demonstrate compliance with 150.0(o)1Giiib, a static pressure greater than or equal to 0.25 in. of water at the rating point shall not be required, and the airflow listed in the approved directory corresponding to the compliant capture efficiency rating point shall be applied to Table 150.0-H for determining compliance.

C. Kitchen Exhaust Systems

01 System Name	02 Manufacturer Name	03 System Type	04 HVI or AHAM Directory Listed Model Number	05 HVI or AHAM Directory Listed Rated Airflow	06 HVI or AHAM Directory Listed Sound Rating	07 Minimum Airflow (defaults to rated airflow)	08 Operation Schedule	09a Method of Compliance	09 Required Minimum Ventilation Rate	10a Exception to Maximum Sound Rating	10 Maximum Sound Rating	11 Compliance Statement for Airflow	12 Compliance Statement for Sound

D. Continuous Kitchen Exhaust

01	Total Continuous Ventilation Airflow	
02	Required Minimum Continuous Ventilation Airflow	
03	Compliance Statement	

D2. Kitchen Range Hood Capture Efficiency Option

01	Manufacturer Name	
02	CEC-Approved Directory Listed Model Number	
03	CEC-Approved Directory Listed Rated Capture Efficiency	
04	Required Minimum Capture Efficiency (*Table 150.0-G*)	
05	Compliance Statement	

E. Other Requirements

The items listed below correspond to the information given in Section150.0(o)1G. Refer also to Chapter 4.6 of the Residential Compliance Manual for information describing these requirements in more detail. The signature of the Responsible Person in the declaration statement below certifies that the building complies with these requirements if applicable.

01	Demand control exhaust systems shall be provided with at least one of the following: 1. A readily accessible occupant-controlled on-off control. 2. An automatic control that does not impede occupant on control.
02	Nonenclosed kitchens shall be provided with a demand-controlled mechanical exhaust system.
03	Each continuous mechanical exhaust system shall be provided with a readily accessible manual on-off control. (Multifamily dwellings are exempt from readily accessible requirement.)
04	Continuous mechanical exhaust systems shall be designed to operate during all occupiable hours.
05	Exhaust fans in separate dwelling units shall not share a common exhaust duct. Exhaust inlets from more than one dwelling unit may be served by a single exhaust fan downstream of all the exhaust inlets if the fan is designated and intended to run continuously or if each inlet is equipped with a back-draft damper to prevent cross-contamination when the fan is not running.

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

Registration Number: Registration Date/Time: HERS Provider:
CA Building Energy Efficiency Standards - 2022 Residential Compliance January 2022

Electric Ready
–update to Water Heater section (n)

Electric ready items require breaker space and labeling in panel
AND
Electrical feed within 3 ft of non-electric appliance location

For all propane/natural gas installed DHW:

- Water heaters: gas or propane water heaters must be installed in or adjacent to a space large enough for a heat pump water heater HPWH. (2.5’ x 2.5’ x 7’) Must install 240v/20amp or 240v/30amp circuit depending on location - **150.0(n)**

Electric Ready
–new subsections (t), (u), and (v)

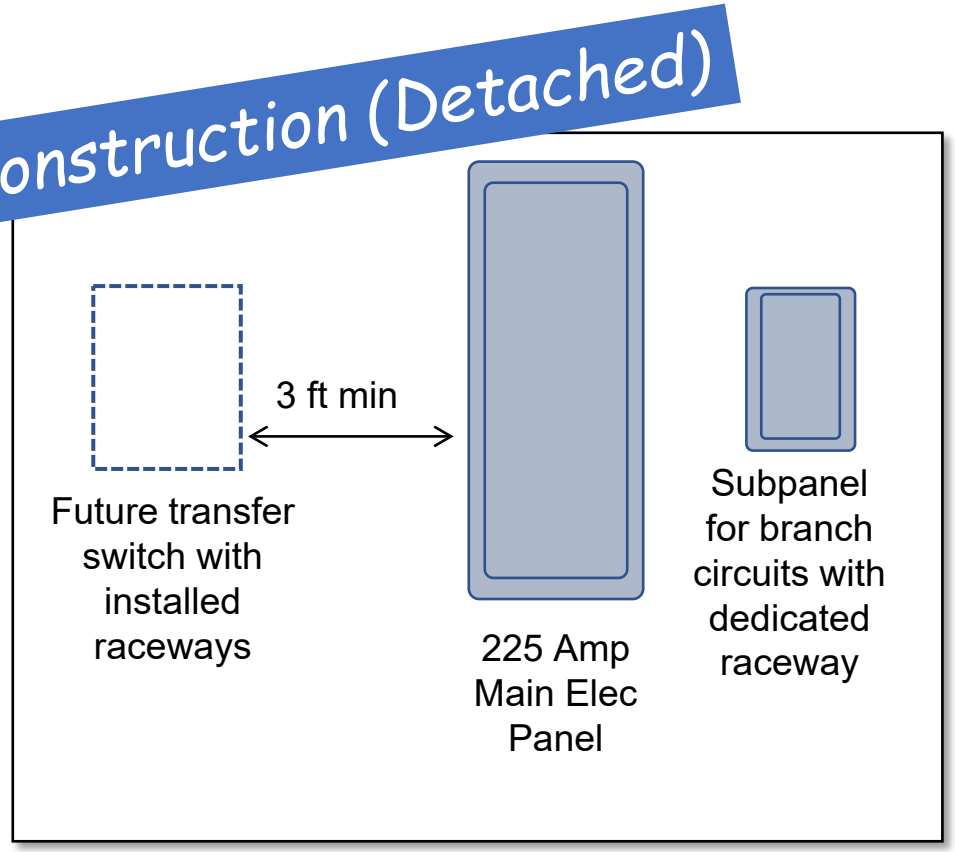
New Construction (Detached)

For all propane/natural gas installed appliances:

- Furnaces: provide conductors rated at 240 volt/ 30 amp to the furnace for future heat pump installation- **150.0(t)**
- Cooktops: provide conductors rated at 240 volt/ 50 amp for future cooktop- **150.0(u)**
- Dryers: provide conductors rated at 240 volt/ 30 amp feed dryer - **150.0(v)**

Energy Storage System (ESS) aka Battery Ready:

- At least one of the following required:
  - Interconnection equipment with minimum backed up capacity of 60 amps
  - Dedicated raceway (min 1”) from the main service to subpanel that supplies the branch circuits
- A minimum of 4 branch circuits shall be identified feeding:
  - Refrigerator
  - One lighting circuit near the primary egress
  - A sleeping room receptacle outlet
- Main panel must have busbar rating of 225 amps minimum
- 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



Solar Photovoltaic (PV) –New Construction

New Construction (Detached)

Prescriptive PV Sizing:

Equation 150.1-C Annual Photovoltaic Electrical Output

System Size kWPV = (CFA x A)/1000 + (N_{dwell} x B)

Where:

kW_{PV} = kW DC size of PV system

CFA = Conditioned Floor Area

A = CFA adjustment factor

N_{dwell} = Number of dwelling units (1 single, 2 duplex)

B = Dwelling adjustment factor

CZ	A	B
4	0.586	1.21
5	0.585	1.06
6	**0.594**	**1.23**
9	0.613	1.36

Example: 1000 sf ADU in CZ 6

kWpv = (1000 sf x 0.594)/1000 + 1(1.23) = 1.82 kW system

1.82 kW / 300 W panel = 6 panels

[each panel approx. 40”x67”]

Exemptions:

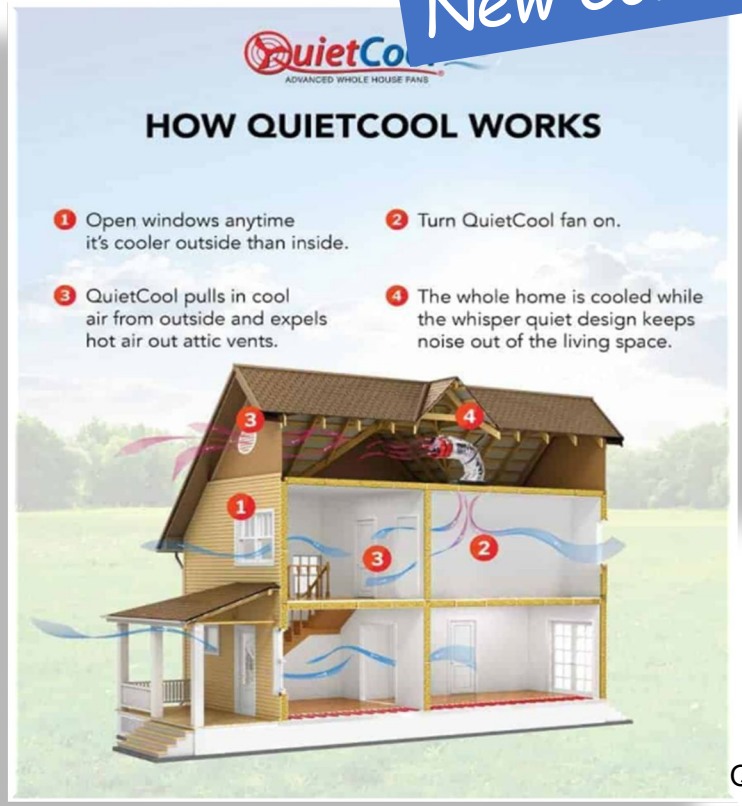
- **PV not required, when kW_{PV} is less than 1.8 kW**
- **PV not required, when SARA is less than 80 sf**
- **PV size may be reduced by 25% if a usable battery capacity of 7.5 kWh is installed**

Ventilation Cooling with a Whole House Fan (WHF)

CZ's 8-14 Prescriptive Requirement (or Performance Baseline)

New Construction (Detached)

Exception to section 150.1(c)12: New dwelling units with a conditioned floor area of **500 square feet or less** shall **not** be required to comply with the WHF requirements.

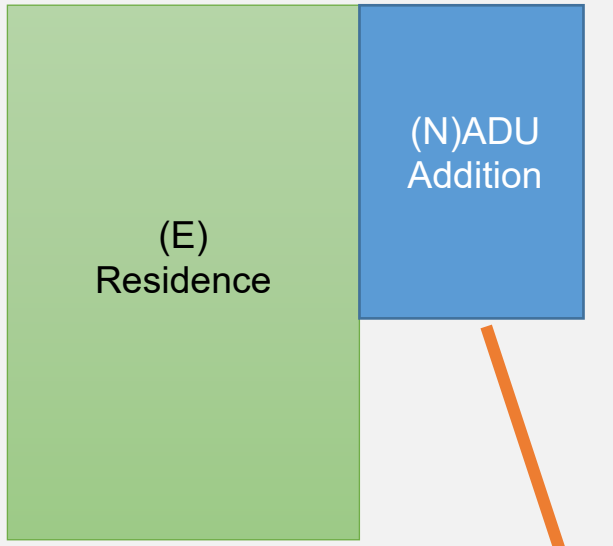


Quiet Cool

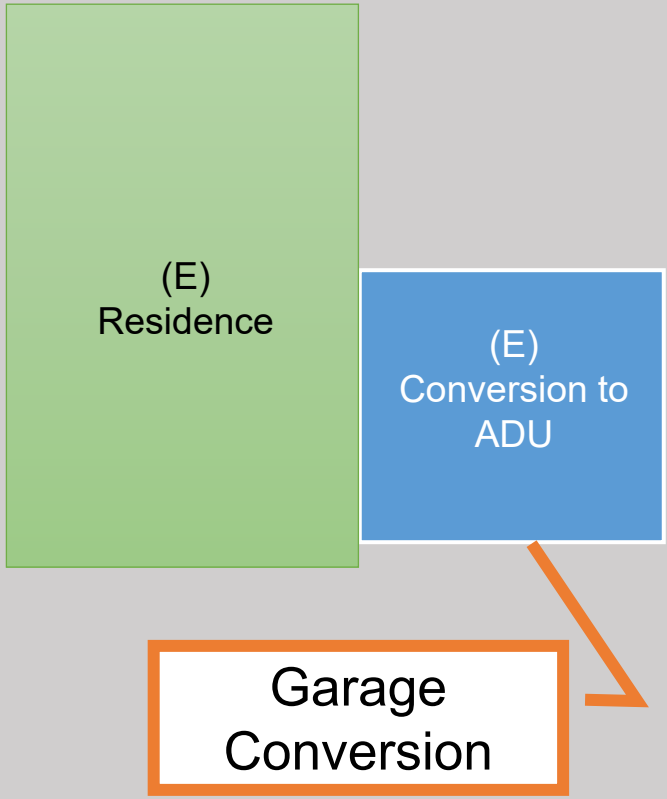
Quiet Air Deluxe

Additions

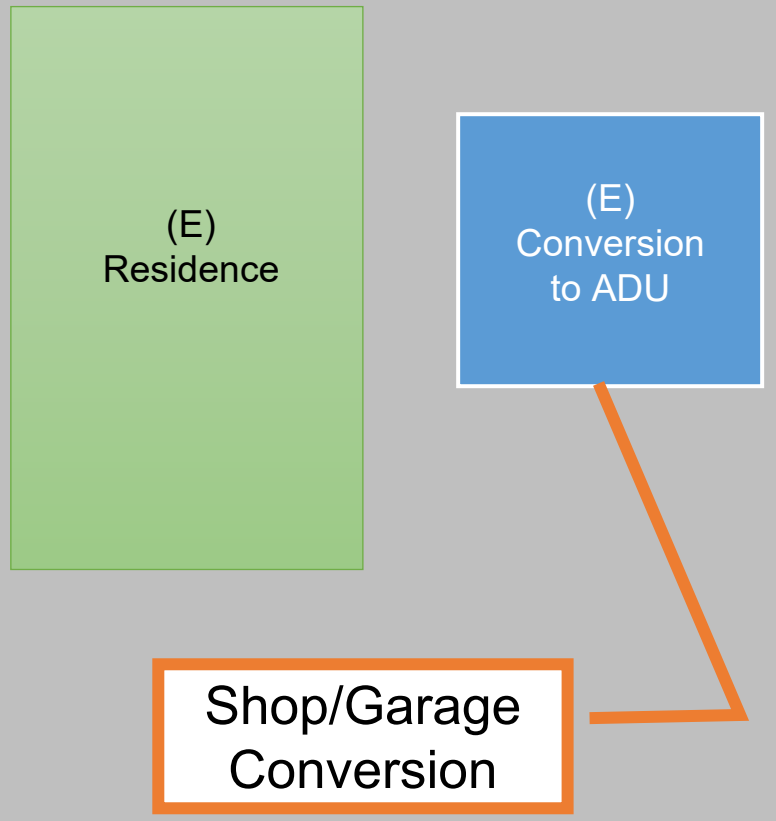
ADU Conversions and Additions are considered "Additions" under the Energy Code



Addition –Attached

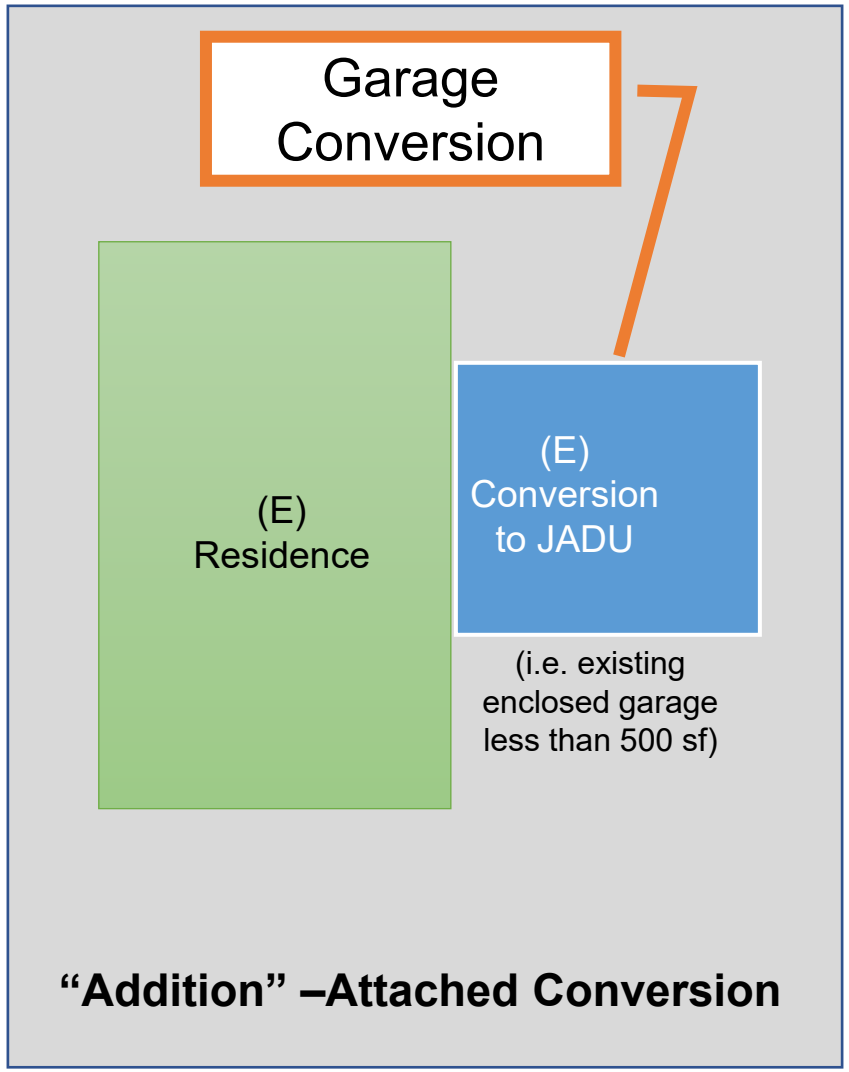


"Addition" –Attached Conversion



"Addition" –Detached Conversion

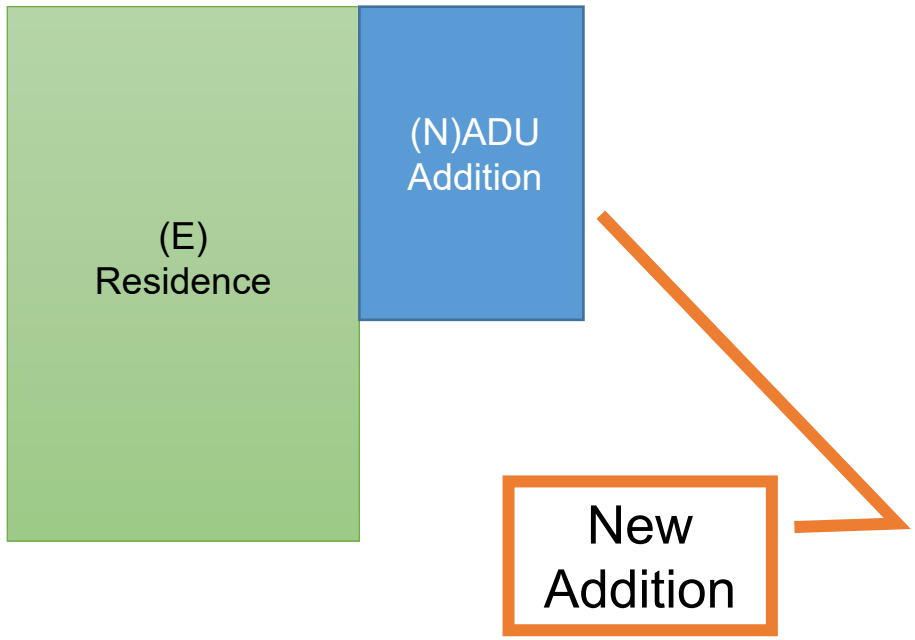
JADU Conversions are considered “Additions” under the Energy Code



Junior ADU (JADU) –Conversion of the unconditioned space of an attached garage or attic or basement, etc.

Reminder: a JADU is built within the residence footprint/envelope/walls, and be no more than 500 sf in

ADU Additions under the Energy Code



New Addition –Attached

150.2(a) Additions

Envelope [150.2(a)1A,B]

- Wall Extension/Exemptions and Mandatory Min Insulation might apply

Ventilation (IAQ –Indoor Air Quality) [150.2(a)1C]

- New dwelling units that are additions to an existing building shall have mechanical ventilation

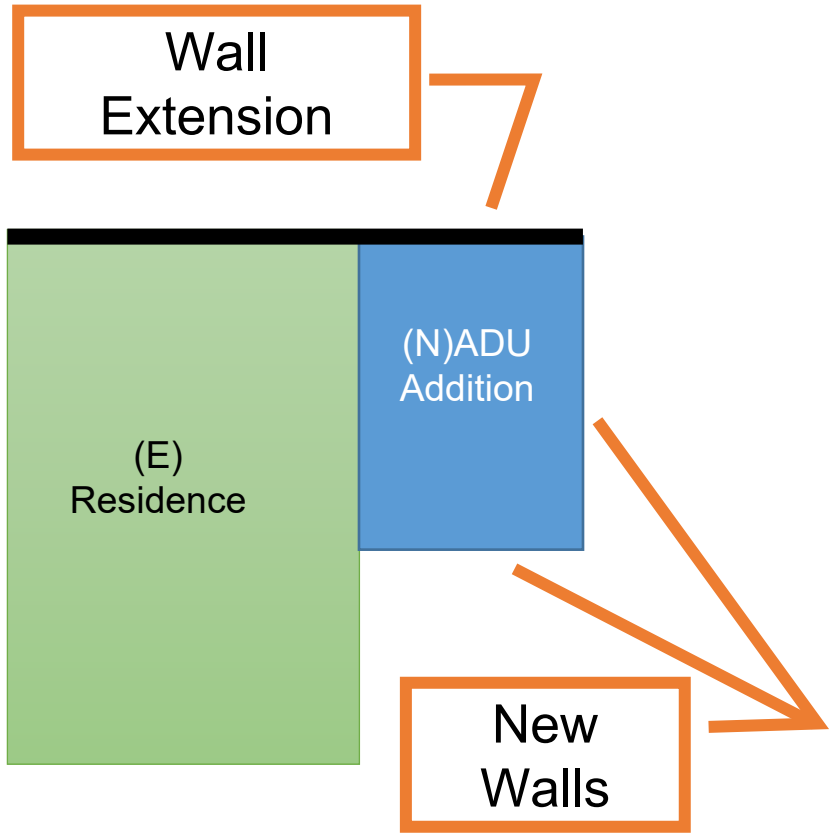
Mechanical Heating and Cooling [New dwelling unit that are additions –see Mandatory Measures]

- ADU may ***not share return air with the primary dwelling*** through the heating or cooling system. [CMC –Calif Mechanical Code]
- Separate thermostats [110.2(c)]

Domestic Hot Water [150.2(a)1D]

- Electric and gas options

Envelope:
ADU Additions –some (N) walls might qualify as a Wall Extension



New Addition Attached

Sec 150.2(a)1 Prescriptive Additions
Must follow Section 150.1(c), with *modifications*:

Under Section 150.2(a)Ai or Biii:
Extensions of existing wood-framed walls may retain the dimensions of the existing walls and shall install cavity insulation of R-15 in a 2x4 framing and R-21 in a 2x6 framing.

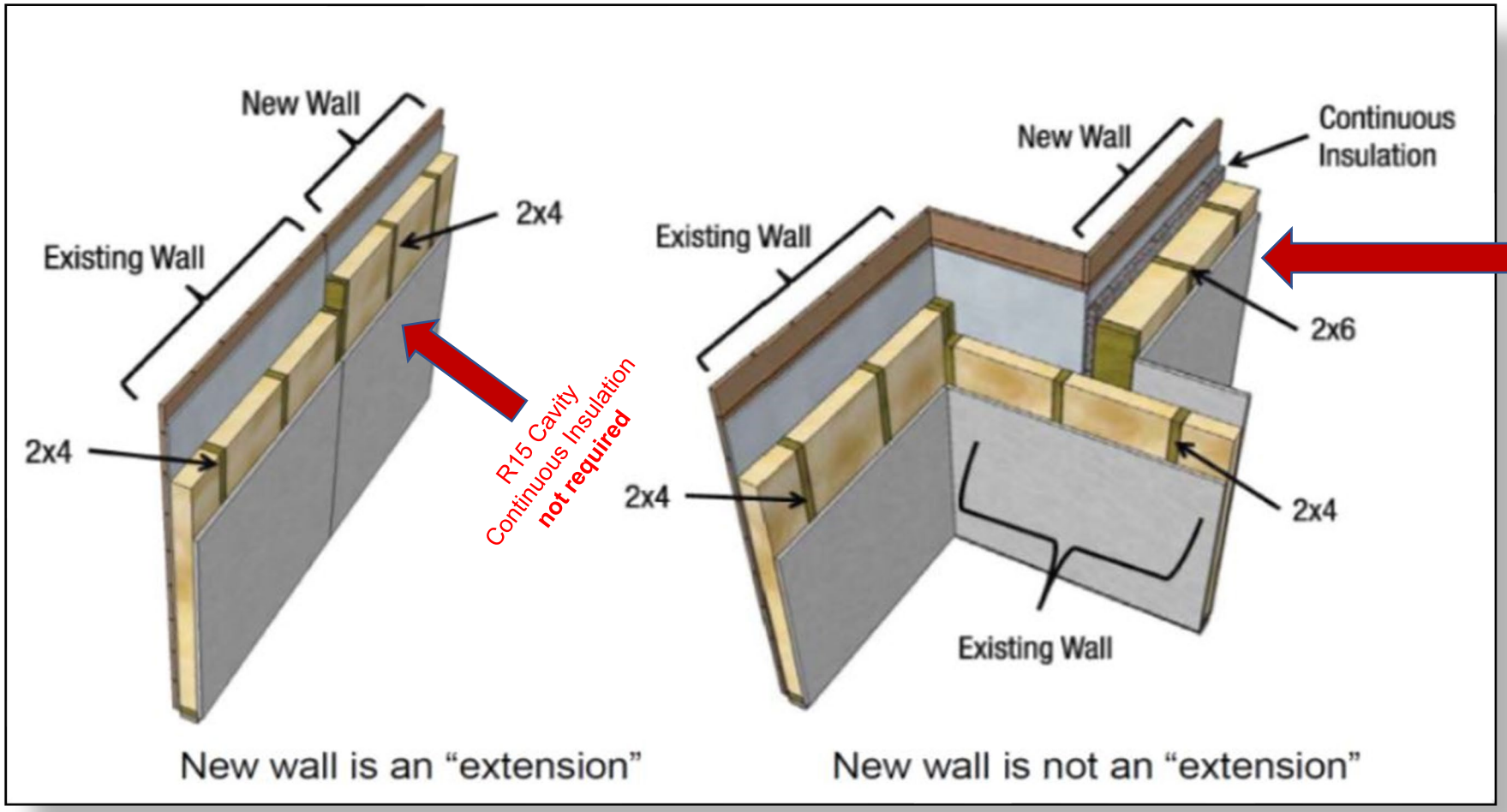
Otherwise...

Sec 150.1(c) Prescriptive Component –Walls:

Framed exterior walls shall be insulated such that the exterior wall has an assembly U-factor equal to or less than that shown in TABLE 150.1-A or B...

See next slide...

Wall Extension –Where a (N) Wall *aligns* with an (E) Wall



Continuous Insulation is required Prescriptively.

This could be a cavity filled R-21 batt with R-5 continuous. (U- 0.048)

Image from CEC's BluePrint

Wall Extension: R-15 for 2x4 walls and R-21 for 2x6 walls

Prescriptive Envelope (Baseline for Performance Method)

TABLE 150.1-A COMPONENT PACKAGE – Single-Family Standard Building Design

Single-Family				Climate Zone														
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Building Envelope Insulation																			
Building Envelope	Roofs/Ceilings	Option B (meets 150.1(c)9A)	Below Roof Deck Insulation1,2 (With Air Space)	NR	NR	NR	R 19	NR	NR	NR	R 19	R 19	R 19	R 19	R 19	R 19	R 19	R 19	R 19
			Ceiling Insulation	R 38	R 38	R 30	R 38	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38	R 38
			Radiant Barrier	NR	REQ	REQ	NR	REQ	REQ	REQ	NR	NR	NR	NR	NR	NR	NR	NR	NR
		Option C (meets 150.1(c)9B)	Ceiling Insulation	R 38	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 30	R 38	R 38	R 38	R 38	R 38	R 38
			Radiant Barrier	NR	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	REQ	NR
	Walls	Above Grade	Framed3	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.065	U 0.065	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048	U 0.048
			Mass Wall Interior4,5	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.059 R 17
			Mass Wall Exterior4,5	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.125 R 8.0	U 0.077 R 13
		Below Grade	Below Grade Interior6	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.077 R 13	U 0.067 R 15
			Below Grade Exterior6	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.200 R 5.0	U 0.100 R 10	U 0.100 R 10	U 0.053 R 19

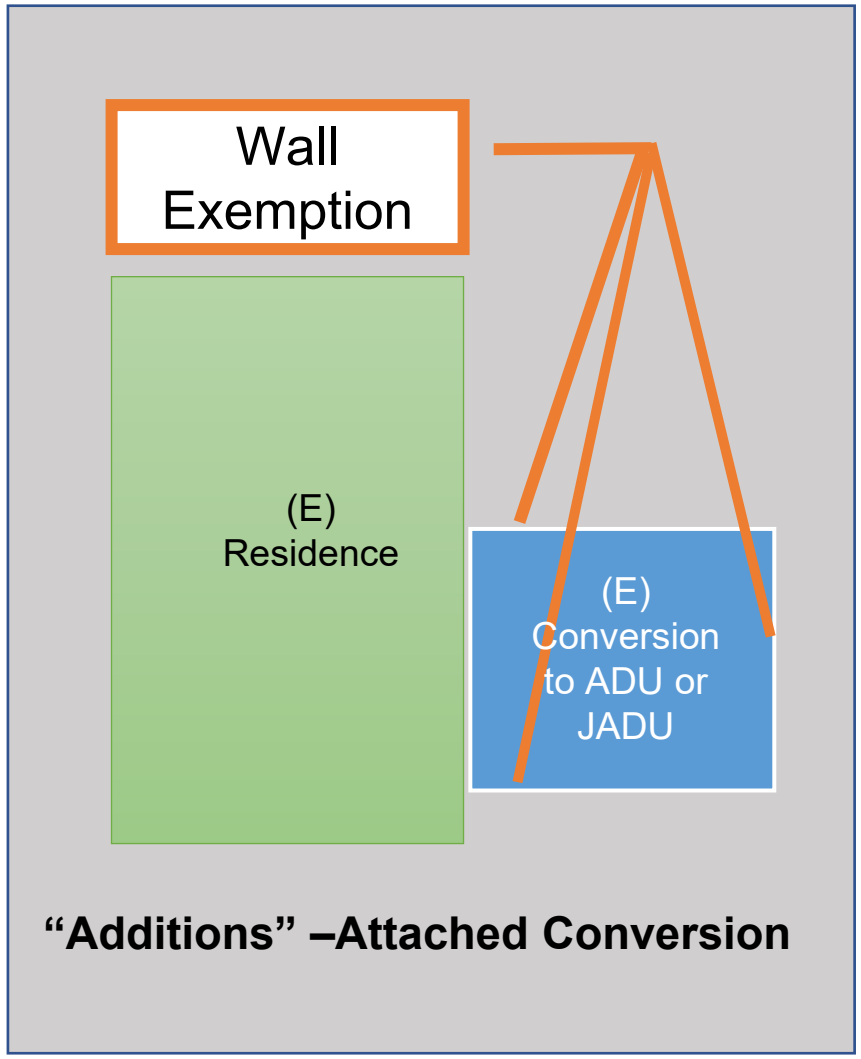
Translation...
Walls Assemblies Meeting Prescriptive U-0.065 and U-0.048

Table 3-10: Examples of Wood-Framed Wall Assemblies and U-Factors, Assuming Gypsum Board Interior

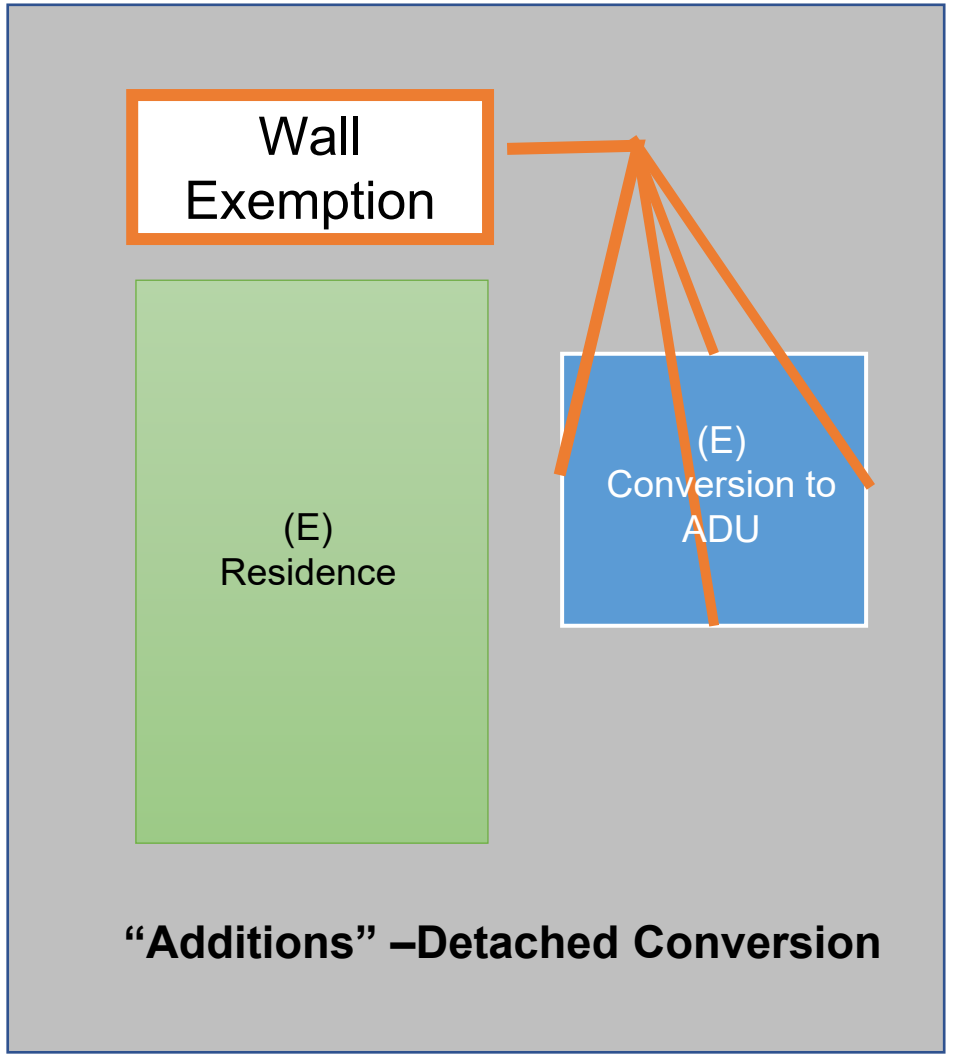
Stud (16" oc)	Cavity Insulation	Cavity Insulation Type	Exterior Insulation	U-Factor	
2x4	R15	High density batt	R4	0.065	CZ 6,7
2x4	R13	Open-cell spray foam (ocSPF)	R5	0.064	
2x4	R15	High density batt	R8	0.050	
2x6	R21	Loose-fill cellulose or high density batt	R4	0.051	
2x6	R19	Low density batt	R5	0.051	
2x6	R31	Closed-cell spray foam (ccSPF)	R2	0.049	
2x6	R23	High density batt or mineral wool	R4	0.049	
2x6	R21	Loose-fill cellulose or high density batt	R5	0.048	CZ 1-5 CZ 8-16
2x6	R19	Low density batt	R6	0.048	
2x6	R23	High density bat or mineral wool	R5	0.047	

Note: Under the Performance Method projects will have to find trade-off credit to remove the CI.

Envelope:
Additions –Conversions (E) walls *may* qualify for an Exemption



“Additions” –Attached Conversion



“Additions” –Detached Conversion

Under Section 150.2(a)Aiii or Bvi:

When **existing siding** of a wood-framed wall is **not being removed** or replaced, cavity insulation of R-15 in a 2x4 framing and R-21 in a 2x6 framing shall be installed and continuous insulation is ***not*** required.

Indoor Air Quality (IAQ) Ventilation

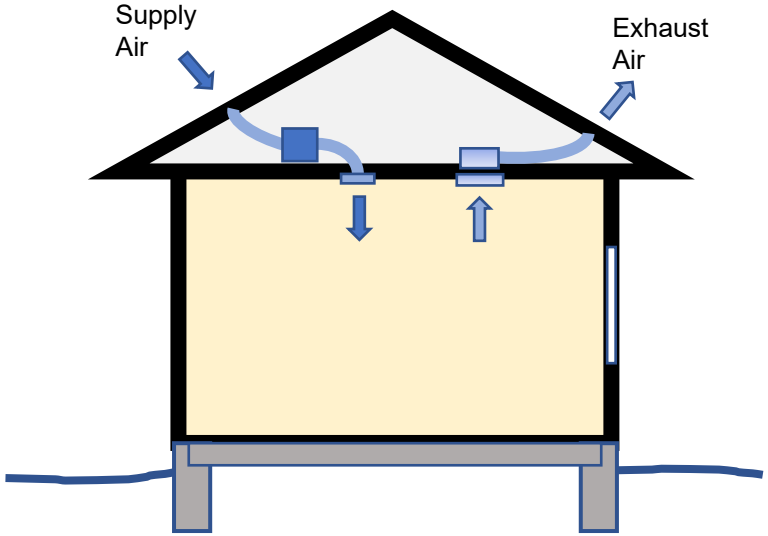
New dwelling units (i.e. ADUs) that are additions to an existing building shall have mechanical ventilation airflow provided in accordance with Section 150.0(o)1C...

Translation...

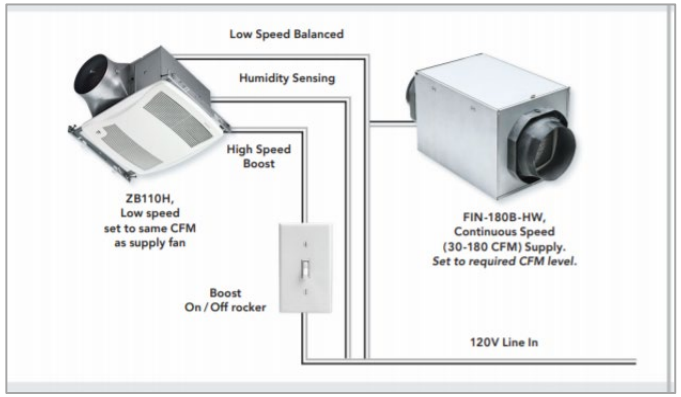
Follow ASHRAE 62.2 –provide fresh outside air

Single Family / ADU use supply, exhaust or balanced ventilation

Multi-Family and Attached use balanced ventilation **OR** comply with dwelling unit air-pressure **boundary sealing and acceptance testing**



Balanced Ventilation



https://www.broan-nutone.com/

Balanced Ventilation with Heat Recovery

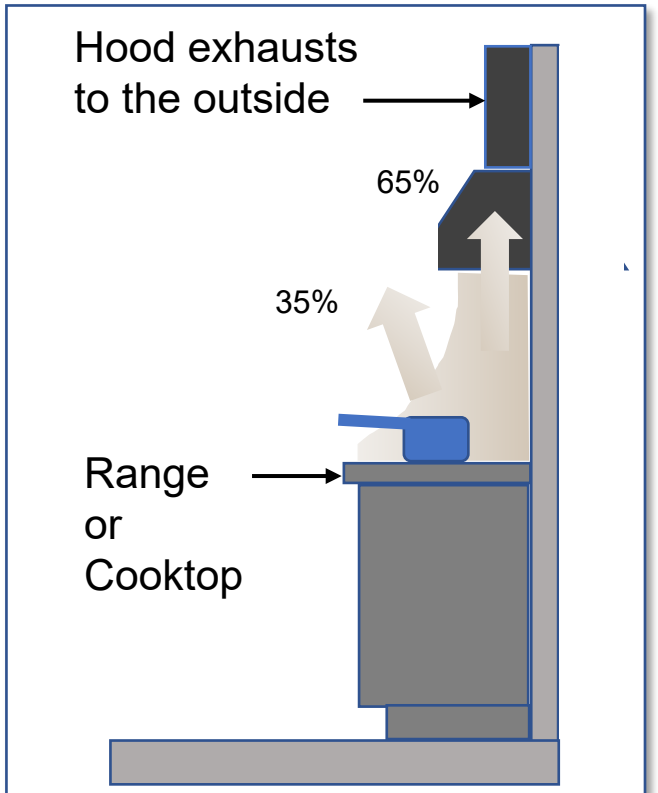
Panasonic ERV

Indoor Air Quality (IAQ) Ventilation –con't

Note: Junior Accessory Dwelling Units (JADU) that are additions to an existing building **not** required to comply with the 150.0(o)1C... whole-dwelling unit ventilation

Local Mechanical Exhaust . Additions to existing buildings shall comply with all applicable requirements specified in 150.0(o)1G and 150.0(o)2, (i.e. mandatory exhaust for kitchen and bathroom, and field testing)

Change from 2019 Code: Clarification that JADU's don't trigger general IAQ ventilation, but cooking appliances/kitchens have new ventilation requirements



160 cfm or 65% hood capture efficiency (CE) for electric ranges required for dwellings less than 750 sf.

Additions – both JADU's and Attached ADU's

150.2(a) EXEMPTION 7:

Space heating system: New or replacement space heating system serving an addition may be a **heat pump** or **gas heating** system.

Indoor Unit Wall Mount

One to one heat pump with programable thermostat

Outdoor Unit / Condenser

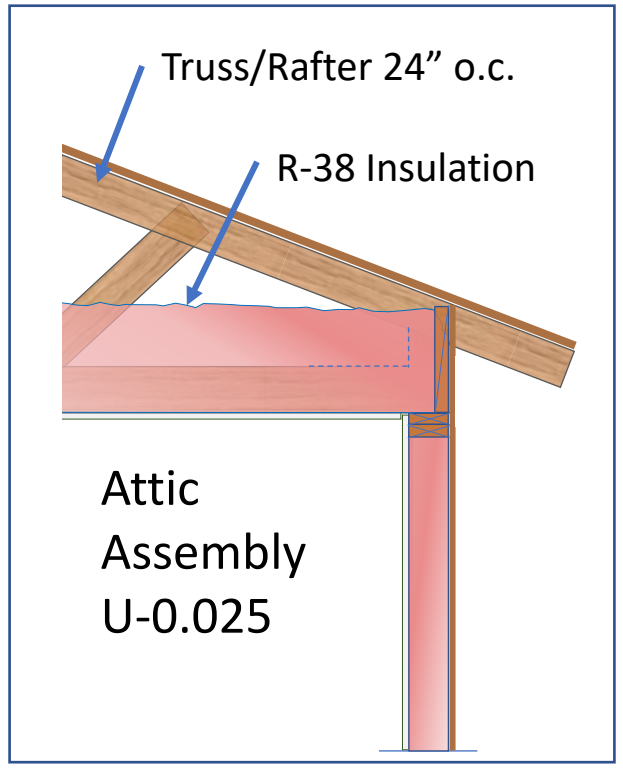
Additions –Roof and Ceiling

Additions that are **700 square feet or less** shall meet the requirements of Section 150.1(c) [i.e. Prescriptive Components], with the following modifications:

Roof and ceiling insulation in a ventilated attic shall meet one of the following requirements:

a. In **Climate Zones 1, 2, 4, and 8 - 16**, achieve an overall assembly U-factor not exceeding 0.025. In wood framed assemblies, **R-38** or greater.

b. In **Climate Zones 3, 5, 6, and 7**, achieve an overall assembly U-factor not exceeding 0.031. In wood framed assemblies, **R-30** or greater.



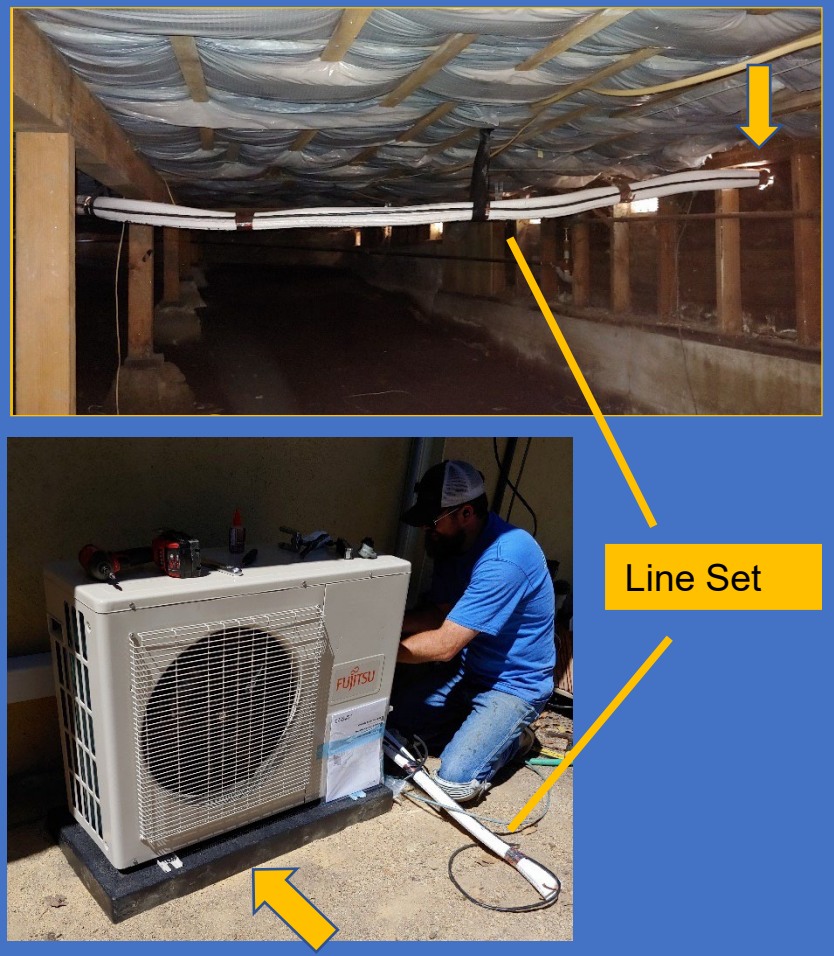
Change from 2019 Code: CZ’s 2, 4, 8, 9 and 10 got “upgraded” to R-38

Important Reminders –Heating and Cooling for ADU's

- ADU's may ***not share return air with the primary dwelling*** through the heating or cooling system.
- **Separate thermostats** are required

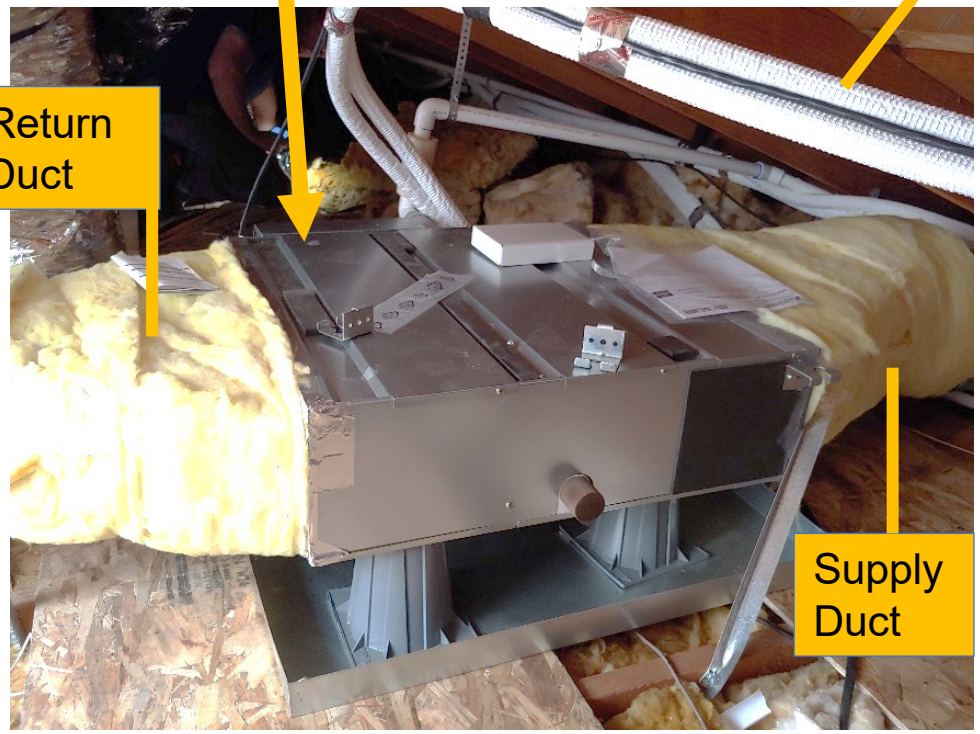
Mini-Split Raised Floor Example

- Mini-Split system heat pumps can offer a straight forward solution
- Condenser can be ground or wall mounted
- One condenser can be shared by the main dwelling and the ADU
- Each dwelling has its own indoor unit and thermostat

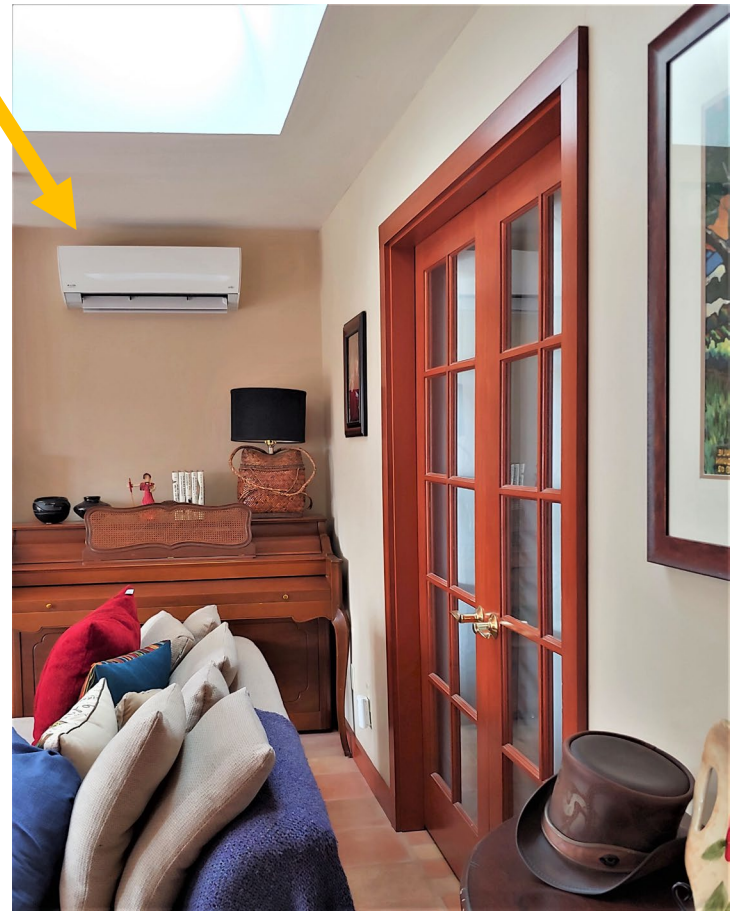


Indoor Options: Each indoor unit has its own thermostat and return/supply air systems

Compact Ducted Fan Coil



Ductless Wall Mount

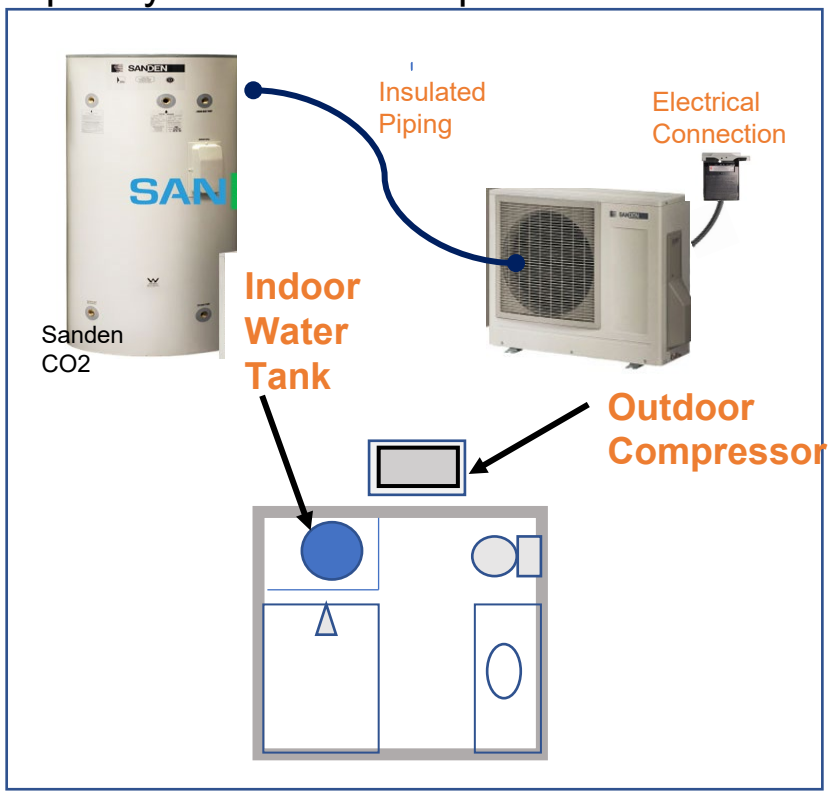


New Construction or Additions with Second Water Heater

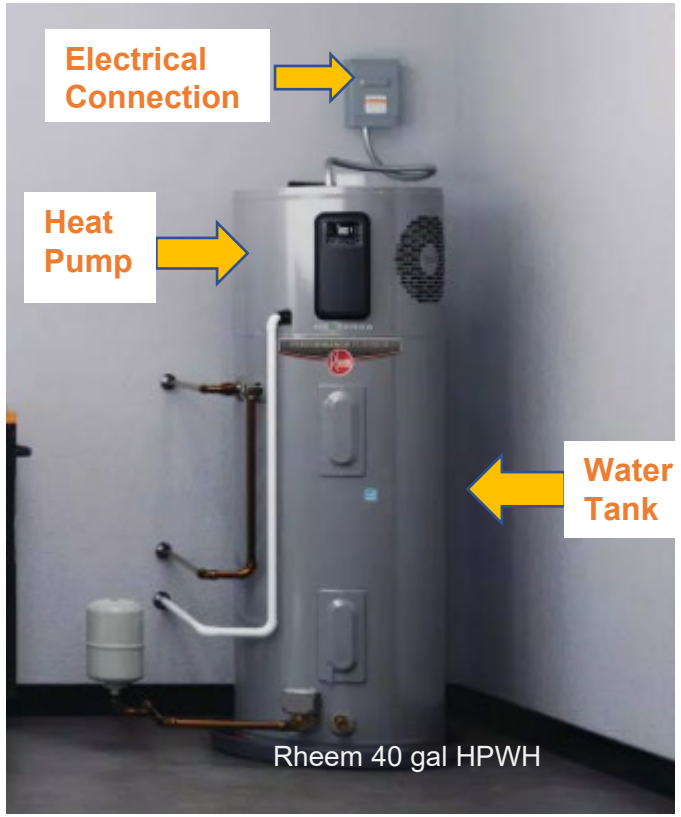
Allowable:

- 240V heat pump water heater HPWH NEEA Tier 3 or higher
- A gas or propane on-demand tankless with input of 200 kBtu/h or smaller

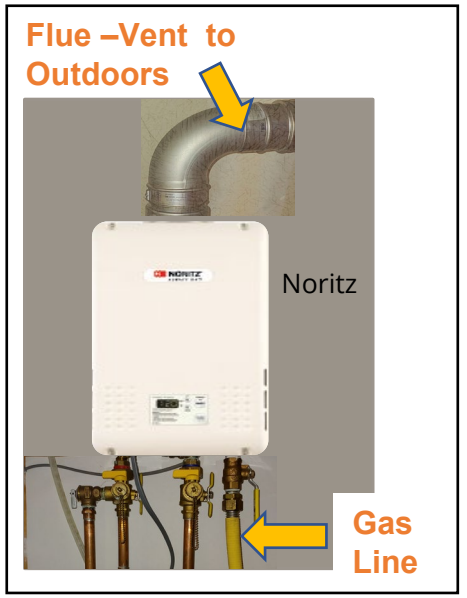
Split-System Heat Pump



Integrated Heat Pump



Gas On-Demand

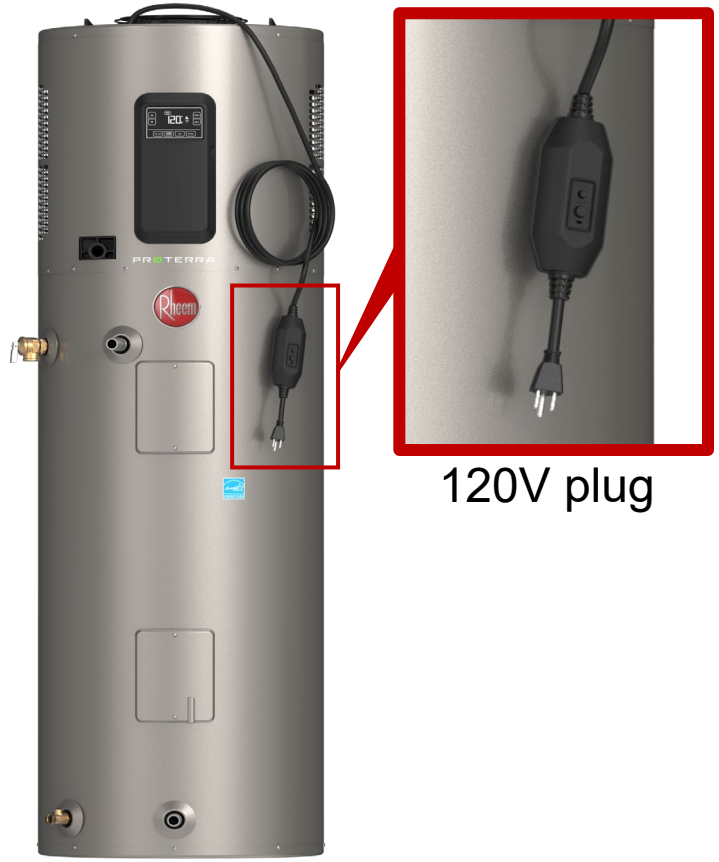


Reminder: Confirm with your jurisdiction –it maybe incentivizing all-electric or limiting new gas infrastructure in new construction.

New Construction or Additions with Second Water Heater

New:

- A **120V HPWH** allowable for **new dwelling units with up to 1 bdrm**



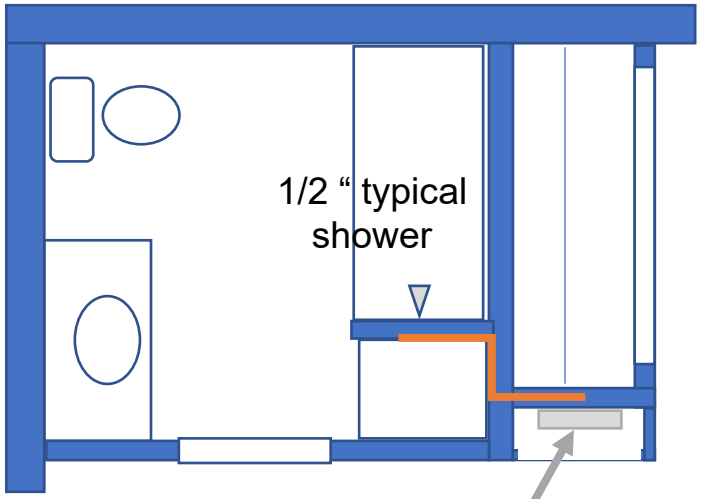
120V plug

New:

- For **additions** and **dwelling units** that are **500 sq ft or less**, an **instantaneous electric water heater** with ***point of use distribution*** as specified in RA4.4.5 is allowable

Major Change from 2019 Code: POU Electric tankless for **500 sf** or less

Point of Use (POU) -Second Water Heater, Addition < 500sf

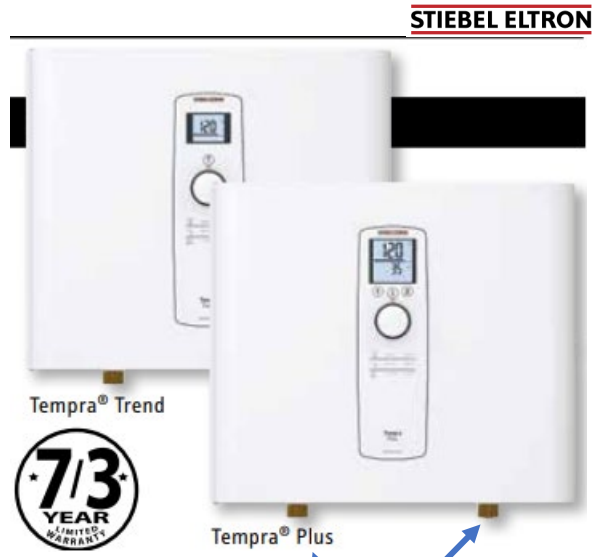


Instantaneous electric water heater with ***point of use distribution***

Table 4.4.5

Size Nominal (Inch)	Length of Pipe (feet)
3/8”	15
1/2”	10
3/4”	5

Line size vs Length for each run



¾” lines connection typical

See Reference Appendice RA4.4.5 POU for more information

CF2R-PLB-22-H
CF2R-PLB-02-E
Single Dwelling Unit - Hot Water Distribution

Includes clarifying language for point of use (POU) when using a combination of different piping size.

I. Point of Use Requirements (POU) (RA4.4.5)

Systems that utilize this distribution type shall comply with these requirements

01	All hot water supply pipe run lengths are equal to or less than the maximum values shown below, based on the pipe diameter. If a combination of piping is used in a single run, then one half the allowed length of each size is the maximum installed length. The maximum allowed length of piping for the longest run terminating in: 3/8 inch - For only one pipe size - max length allowed is 15 feet For combination pipe sizes the max allowed length of 3/8-inch piping is 7.5 feet, of 1/2 inch piping is 5 feet, and 3/4 inch piping is 2.5 feet. 1/2 inch - For only one pipe size – max length allowed is 10 feet For combination pipe sizes the allowed length of 1/2-inch piping is 5 feet, and 3/4 inch piping is 2.5 feet. 3/4 inch - For only one pipe size = 5 feet

The responsible person's signature on this compliance document affirms that all applicable requirements in this table have been met.

CF1R-PRF-01E
Excerpts from a draft Performance E+A (ADU)

Lists **Point of Use** (POU) and electric water heater exception as a **Required Special Feature** that must be installed

REQUIRED SPECIAL FEATURES

The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.

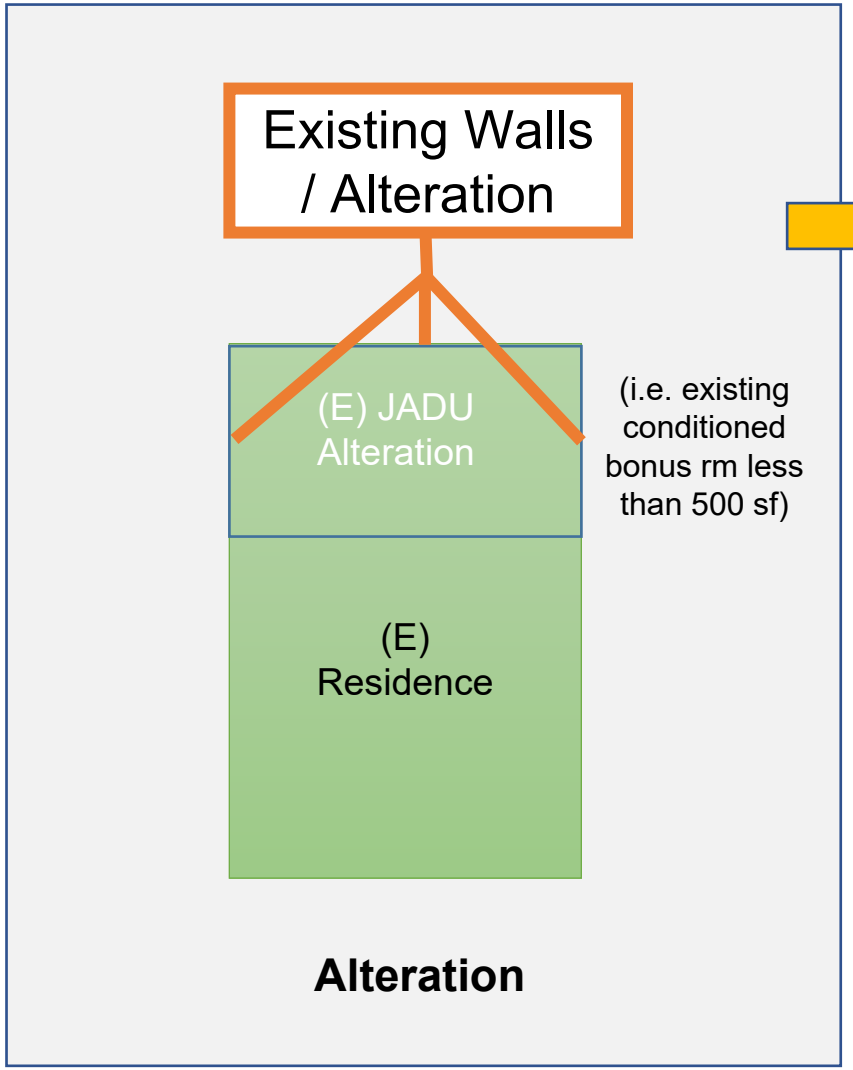
- IAQ Ventilation System: as low as 0.24 W/CFM
- Cool roof
- Ceiling has high level of insulation
- Insulation below roof deck
- Non-standard duct location (any location other than attic)
- Variable capacity heat pump compliance option (verification details from VCHP Staff report, Appendix B, and RA3)
- Electric water heater exception - Exception 2 to Section 150.1(c)8
- Point of use

WATER HEATING SYSTEMS

01	02	03	04	05	06	07	08	09	10	11	12
Name	System Type	Distribution Type	Water Heater Name	Number of Units	Solar Heating System	Compact Distribution	HERS Verification	Water Heater Name (#)	Status	Verified Existing Condition	Existing Water Heating System
DHW Sys 3	Domestic Hot Water (DHW)	Point of Use	DHW Heater 3	1	n/a	None	n/a	DHW Heater 3 (1)	New	NA	

Alterations

Alteration –Junior ADU (JADU) –within the envelope of an Existing Residence



Section 150.2 (b) Alterations

Wall Exemption to Mandatory Measure (Sec 150.0) Insulation for a 2x4 framed wall might apply

- **EXCEPTION to Section 150.0(c)1:** Existing walls already insulated to a U-factor not exceeding U-0.110 or already insulated between framing members with insulation having an installed thermal resistance of R-11 or greater.

Alterations –Ducts

Updates:

- Ducts extended at least **25 ft** trigger this section (previously 40 ft)
- Duct leakage to test at **10%** or less (previously 15%)
- Duct leakage to the **outside** to test at **7%** or less (previously 10%)
- Duct Insulation increased to **R-8 for CZ 1, 2, 4, 8-10, 12, and 13** (previously R-6) Table 150.2-A

TABLE 150.2-A DUCT INSULATION R-VALUE

Climate Zone	3, 5-7	1, 2, 4, 8-16
Duct R-Value	R-6	R-8

HERS testing for Duct Leakage is required. See Reference Residential Appendix Section RA3.1.

R-8 Flex Duct

Duct Alteration "upgrades" have been shown to be cost effective.

Alterations –Ceilings of Vented Attics

New Section

Altered ceilings shall be insulated to R-49 in CZ 1-4, 6, 8-16

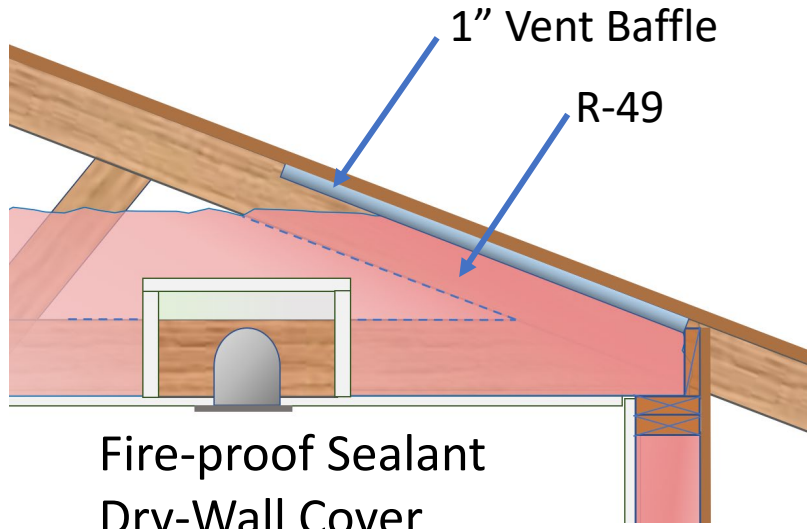
[not CZ 5 and 7]

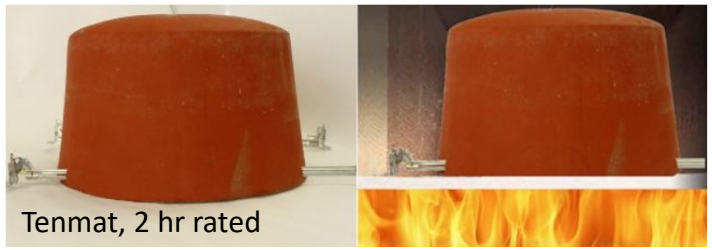
- Except for CZ 1, 3, and 6 with existing R-19 insulation

In CZ 1-4 and 8-16 *[not CZ 5,6,or 7]* **recessed downlights** in the ceiling **shall be covered with insulation** to the same depth as the rest of the ceiling. **Downlights not rated** for insulation contact must be **replaced or retrofitted** with a **fire-proof** cover that allows for insulation to be installed directly over the cover

- Except CZ 1 -4 and 8 -10, existing R-19 insulation *[not CZ 11-16]*

Better air-sealing and higher insulation levels was shown to be cost effective for most of CA climate zones.





Manufactured Cover

Alterations –Ceilings of Vented Attics

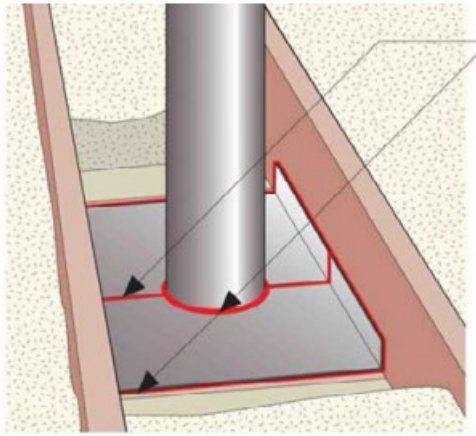
New Section

Altered ceilings must be air sealed in CZ 2, 4, 8-16 *[not CZ 1,3, 5-7]*

- Exception for existing R-19 insulation
- Except where combustion appliances are within the air boundary

Attic ventilation shall comply with the California Building Code requirements. Exception where

- existing R-38 existing insulation, asbestos, and knob and tube wiring
- the accessible spaces in the attic that are not large enough
- the attic space is shared with other dwellings that are not part of the alteration



Drawings and instructions in the guide show contractors the proper way to air seal around typical breaks in the ceiling. Here, sheet metal and fire-rated caulk provide air sealing around a flue pipe.

Better air-sealing and higher insulation levels was shown to be cost effective for most of CA climate zones.

Alterations –Ventilation IAQ Systems

Mechanical Ventilation for Indoor Air Quality (IAQ)- Entirely New or Complete Replacement Ventilation Systems. Considered a complete replacement if 75% of duct and associated materials are replaced. Duct system to comply with the **Mandatory Measures 150.0(o)** Ventilation and Indoor Air Quality.

Mechanical Ventilation for Indoor Air Quality - Altered Ventilation Systems. Altered ventilation system components or newly installed ventilation equipment serving the alteration shall comply with **Mandatory Measures 150.0(o)** Ventilation and Indoor Air Quality with qualifications...

- Fan Replacement
- Fan Alteration
- Air Filters
- Kitchen Exhaust
- Bathroom Exhaust
- Exhaust Fan Replacement

New IAQ Ventilation Sections

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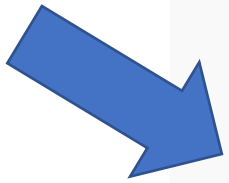

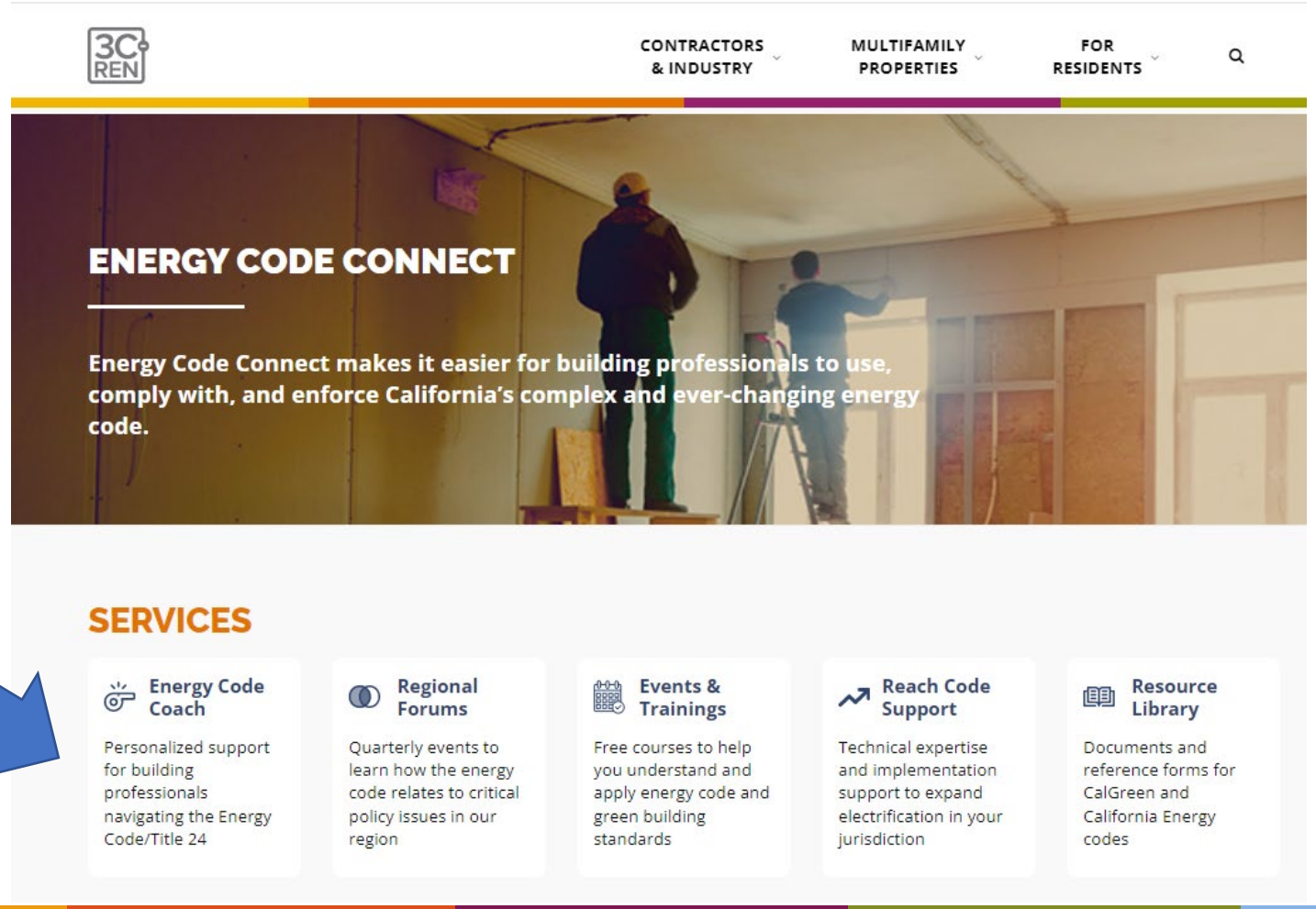

Closing

- Continuing Education Units Available
  - Contact ggautereaux@co.slo.ca.us for AIA and ICC LUs
- Coming to Your Inbox Soon!
  - Slides, Recording, & Survey – Please Take It and Help Us Out!
- Upcoming ICC Chapter Energy Code Courses:
  - July 19 – 2022 Energy Code: Nonresidential
  - August 2 – CALGreen Overview and 2022 Changes
- Other Upcoming Courses:
  - July 12 – Recovery Ventilators: Energy Savings & Compliance Credits in the 2022 Energy Code
  - July 14– The Case for Practical Home Performance Electrification
  - July 18 – Addressing the Energy-Water Nexus: Zero Net Carbon Design Series
- Q3 Event Calendar out NOW : 3C-REN-Events_July-Sept_Summer-2023.pdf

Thank you!

For more info:
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