



We will be starting soon!

Thanks for joining us



2022 Energy Code – Multifamily Central Coast and Ventura ICC Chapter Series



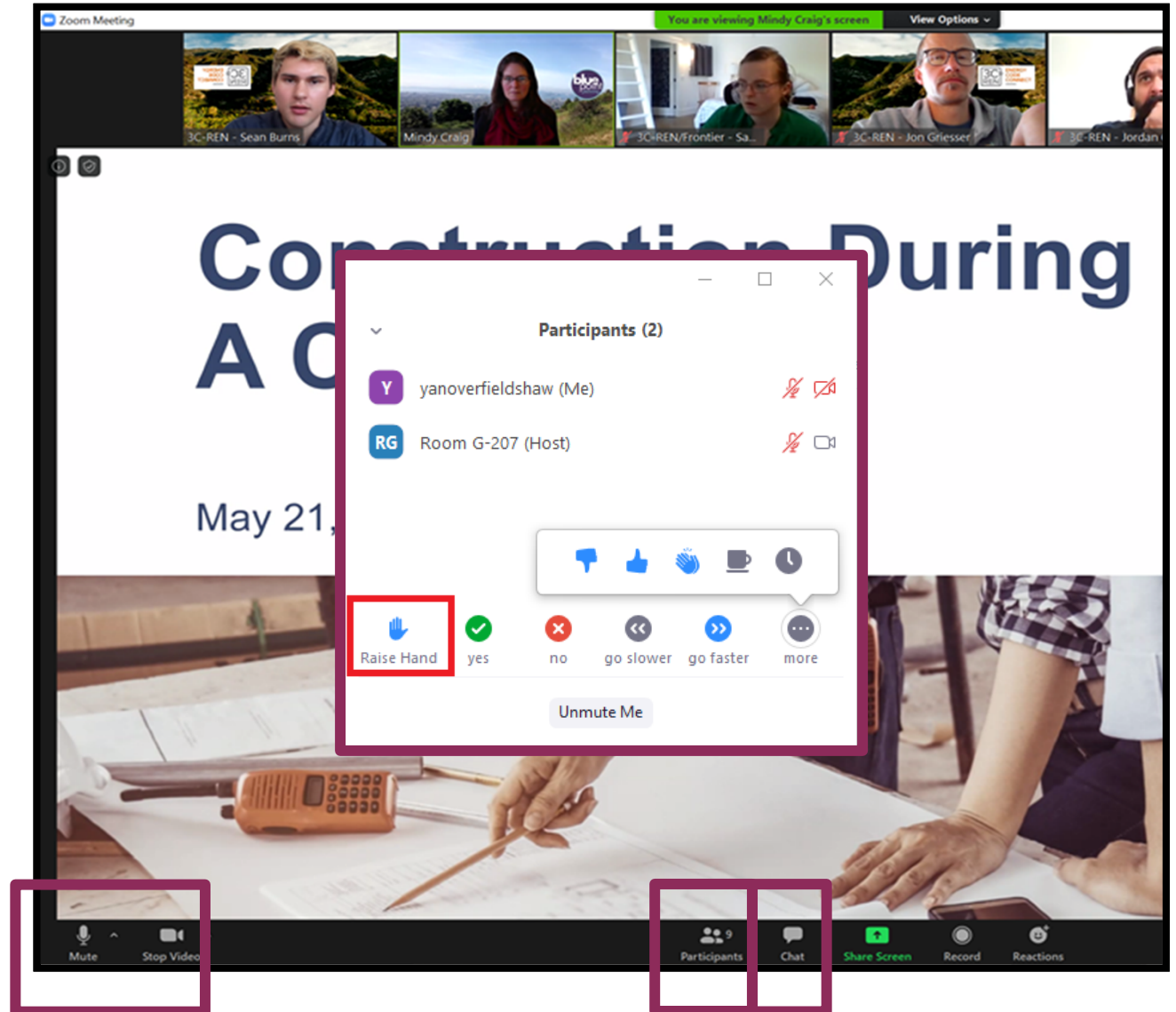
Jennifer Rennick, AIA, CEA – In Balance Green Consulting
Grant Murphy, CEA – In Balance Green Consulting

June 14, 2023



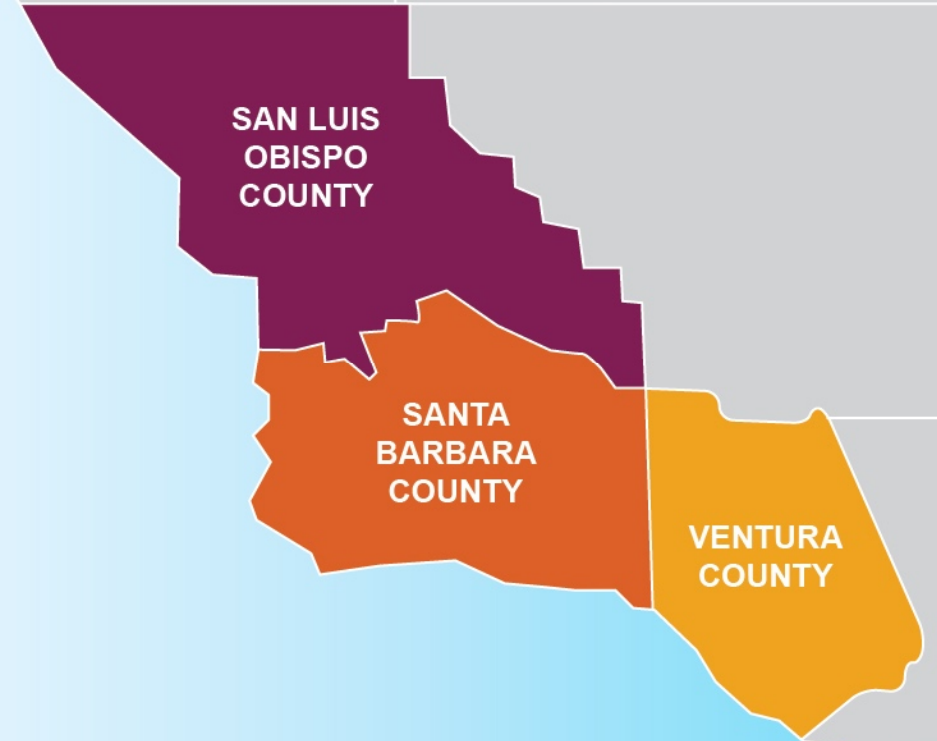
Zoom Orientation

- 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





- 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



- 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



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](https://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



Co-Sponsors



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



Today's Learning Objectives

- Learn how the 2022 Energy Code has been reorganized
- Review high level changes that have been made to the 2022 Energy Code impacting multifamily residences
- Learn some of the specific changes have been made to the 2022 Energy Code for multifamily residences:
 - Mandatory Measures
 - Performance and Prescriptive
 - Additions and Alterations



Agenda

1. Energy Code Re-organization
2. Multifamily Residential –High Level Changes
3. Mandatory Measures Code Changes
4. Performance and Prescriptive Code Changes
5. Additions and Alterations –Highlight Major Code Changes
6. Q&A





Energy Code Re-organization

Big Picture Goals for the 2022 Code Updates

HOMES AND BUSINESSES USE NEARLY **70 PERCENT** OF CALIFORNIA'S ELECTRICITY AND ARE RESPONSIBLE FOR A QUARTER OF CALIFORNIA'S GREENHOUSE GAS (GHG) EMISSIONS.



- 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



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

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 7 –Low-Rise Residential Mandatory Measures
Sec 150.0

Subchapter 5 –Performance and Prescriptive
[New Construction]
Sec 140.0-140.9

Subchapter 6 – Additions and Alterations
Sec 141.0-141.1

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



Multifamily Residence

Multifamily High-Level Changes

- New Compliance Metric – Source Energy
- Heat Pumps are baseline

Major Updates to:

- Dwelling Unit IAQ ventilation
- Electric Ready
- Photovoltaics and Batteries

Minor Updates to:

- Envelope
- Lighting
- Domestic Hot Water

Compliance software has changes to the **Standard Design** which now **varies by climate zone** and includes **heat pump space conditioning** as **Multifamily baseline.**



The Energy Code –Three Compliance Terms

Mandatory Requirements

Energy efficiency measures that are applicable to all projects.

Prescriptive Component Package

Mandatory Requirements are applicable

Follow all the parts of the prescriptive package

Note: used to determine the Standard Design Building

Essentially a **checklist** approach

Performance Method

Mandatory Requirements are applicable

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)

Energy modeling approach

Performance Method (Computer Modeling)

Two Metric Types:

- **Source Energy Budget** is the efficiency of the energy used by the building (site energy) as well the energy used to produce, procure, and distribute it from a particular source. It serves as **proxy for carbon-based metric**.
- **TDV Energy Budget** is the efficiency of the building's source energy and brings in TDV multipliers based on when the energy is being used to reflect the actual cost, supply, and demand. It serves to **encourage better performance during peak hours**.

Key Take-aways for 2022

Source Energy
New proxy for
carbon



SITE ENERGY

Site Energy is the energy consumed in the operation of the building used by the customer.

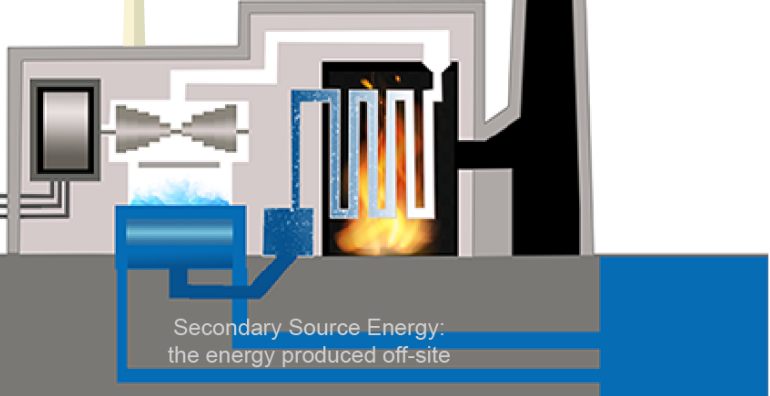


Primary Source Energy: the energy produced on-site

TDV ENERGY

Time Dependent Valuation (TDV) Energy values energy use differently based on WHEN the savings occur to encourage better performance during periods of high energy cost,

TDV continues to be the metric for both 'Efficiency' and 'Total' TDV



Secondary Source Energy: the energy produced off-site

SOURCE ENERGY

Source Energy looks at the energy required to produce, procure, and distribute the energy used by the building to understand its total carbon consumption.

Source Energy is being used as a proxy for Carbon in New Construction



Excerpt from Compliance Report

CERTIFICATE OF COMPLIANCE - LOWRISE MULTIFAMILY MIXED USE PERFORMANCE COMPLIANCE METHOD

Lowrise Multifamily Mixed Use Performance Compliance Method

(Page 3 of 26)

C1. COMPLIANCE SUMMARY

COMPLIES³

| | Time Dependent Valuaton (TDV) | | Source Energy Use |
|--------------------|---|--|--|
| | Efficiency ¹ (kBtu/ft ² - yr) | Total ² (kBtu/ft ² - yr) | Total ² (kBtu/ft ² - yr) |
| Standard Design | 76.36 | 29.66 | 11.58 |
| Proposed Design | 76.08 | 29.35 | 11.51 |
| Compliance Margins | 0.28 | 0.31 | 0.07 |
| | Pass | Pass | Pass |

¹ Efficiency measures include improvements like a better building envelope and more efficient equipment

² Compliance Totals include efficiency, photovoltaics and batteries

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



Mandatory Measures

New Multifamily Section 160.0

- Mandatory Measures –applies to new construction (and is referenced for Additions and Alterations in Sec 180.0)
- Apply to dwelling units and common use areas in multifamily buildings.
- Nonresidential occupancies in a mixed occupancy building shall comply with nonresidential requirements in Sections 120.0 through 141.1.

Section 160.0 Mandatory Requirements:

- 160.0 General Scope**
- 160.1 Building Envelope**
- 160.2 Ventilation and Indoor Air Quality**
- 160.3 Space Conditioning Systems**
- 160.4 Water Heating Systems**
- 160.5 Lighting –Indoor and Outdoor**
- 160.6 Electric Power Distribution Systems**
- 160.7 Covered Process**
- 160.8 Solar Ready Buildings**
- 160.9 Electric Ready Buildings**



Ventilation and Indoor Air Quality (IAQ)

Part (a) General Requirements

- Attached **dwelling** units –See part (b) –follows **Residential** Code
- HERS field verification and diagnostic testing for **three habitable stories or less** –See **Residential** Appendices
- Occupiable spaces **other than** attached dwelling units –See part (c) – follows **Non-Res** Code
- HERS or ATT for buildings with **four or more habitable stories** –See **Non-residential** Appendices NA1, NA2 and NA7.
- **Reminder:** Section 160.2 is **not applicable** to townhouses or dwellings that contain two dwelling units.
- **Reminder:** The outdoor air-ventilation rate and the air-distribution system design shall be **clearly identified on the building design plans**

Big Picture Change:
The Multifamily Section addresses **both** the Residential and Non-Residential occupancies



Mixed Occupancies- Section 100.0(f)

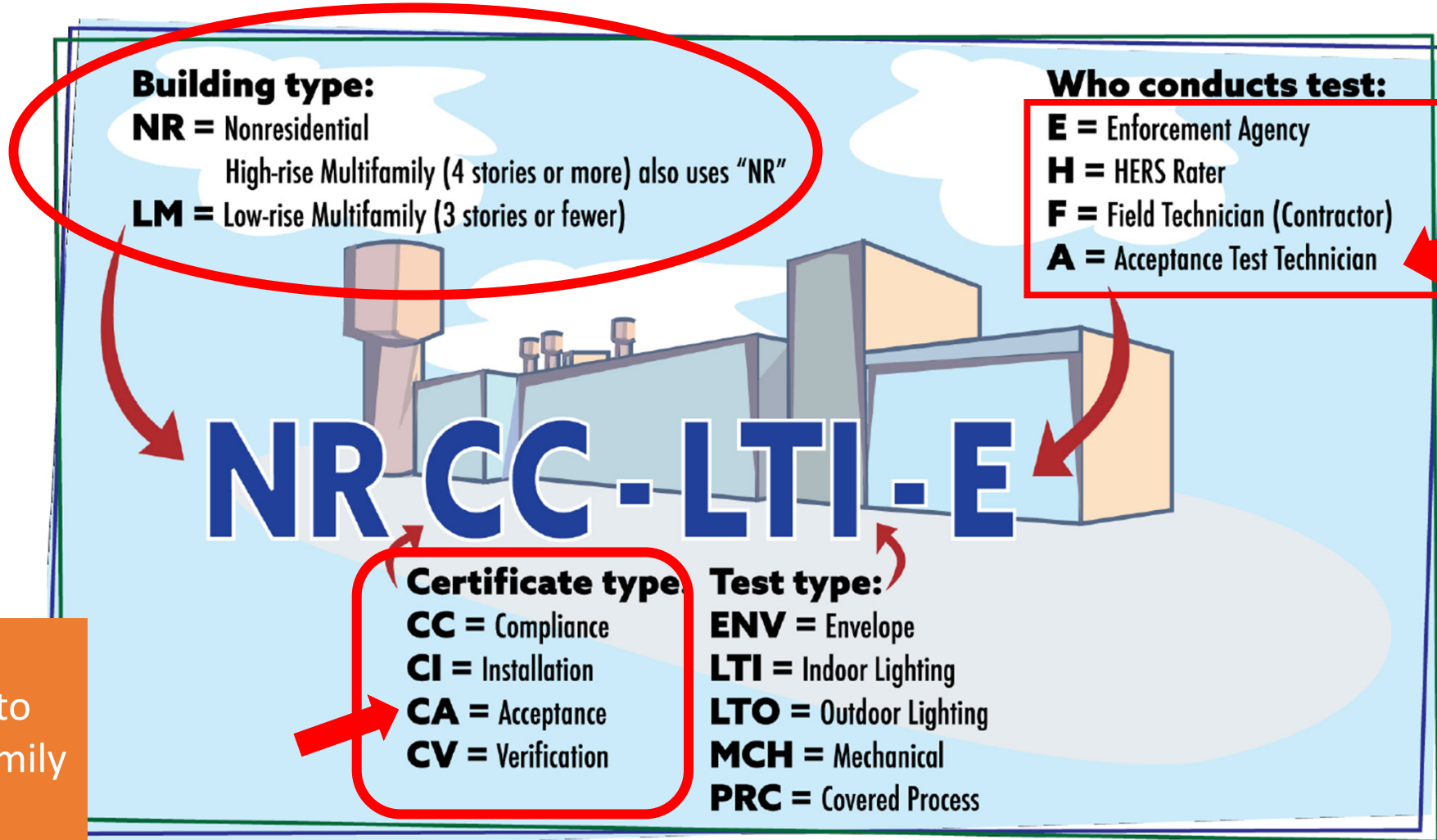
When a building is designed and constructed for **more than one type of occupancy (residential and nonresidential)**, the space for **each occupancy** shall meet the provisions of Part 6 **applicable** to that occupancy.

Exception 1: If one occupancy constitutes at least **80 percent** of the conditioned floor area of the building, the entire building envelope, HVAC, and water heating may be designed to comply with the provisions of Part 6 applicable to that occupancy, provided that the **applicable lighting requirements** in Sections 140.6 through 140.8, or 150.0(k), or 160.5 and 170.2(e) are met for **each occupancy** and space, and **mandatory measures** in Sections 110.0 through 130.5, and 150.0, and 160.0 through 160.9 are met for **each occupancy** and space.

Exception 2: If one occupancy constitutes at least **90 percent** of the combined conditioned plus unconditioned floor area of the building, the entire building **indoor lighting** may be designed to comply **with only** the lighting provisions of Part 6 applicable to **that occupancy**.

NRCC vs LMCC Series of Forms

Ask: Is it High-rise or Low-rise?



High-Rise
and
Non-Res

Reminder: CF1R
Series continues to
refer to Single Family
project types

Resource: Energy Code Ace



Requirements for Ventilation and Indoor Air Quality (IAQ)

- Part (b) –ASHRAE 62.2 continues to be the basis for dwelling unit (residential) occupancies
- Part (c) –ASHRAE 62.1 continues to be the basis for common space (non-residential) occupancies

2022 Change is under dwelling unit IAQ with 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

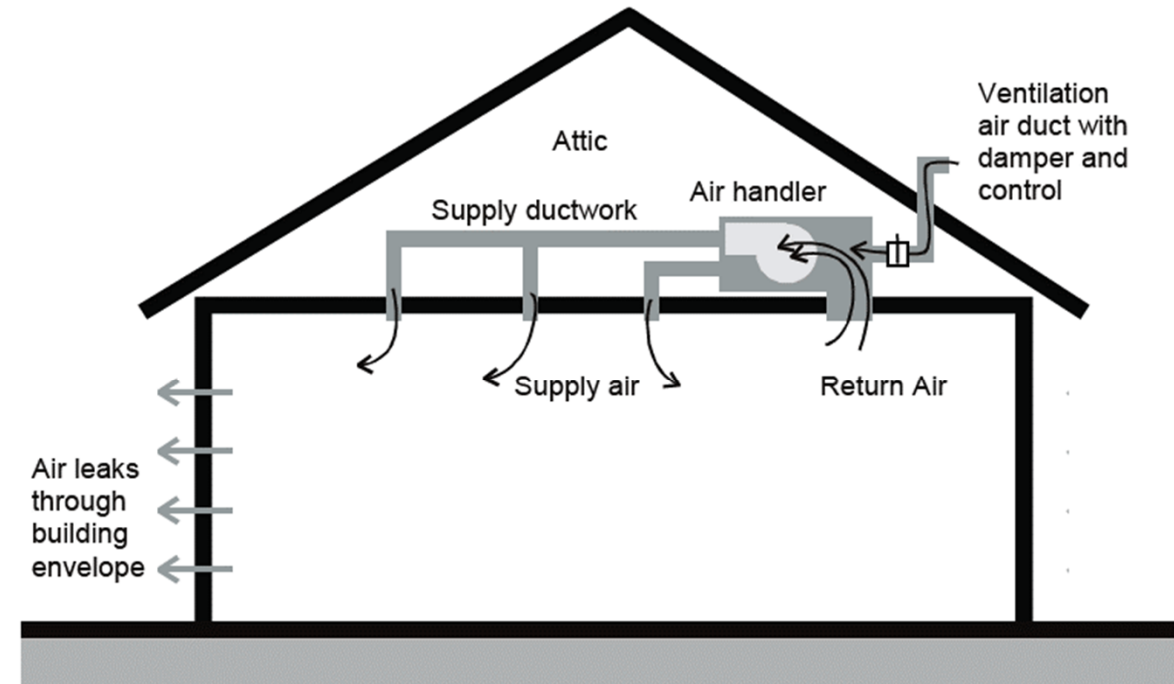


Central Fan Integrated (CFI) Ventilation Systems

New language to clarify when and how CFI systems can be used and operated:

- Outdoor Air Dampers Required
- Damper Controls – Clarified Operation
- Variable Ventilation – Clarified Controls and Operation

Main premise did not change: *Continuous* fan operation not permissible way of meeting indoor air quality ventilation.



Source: California Energy Commission

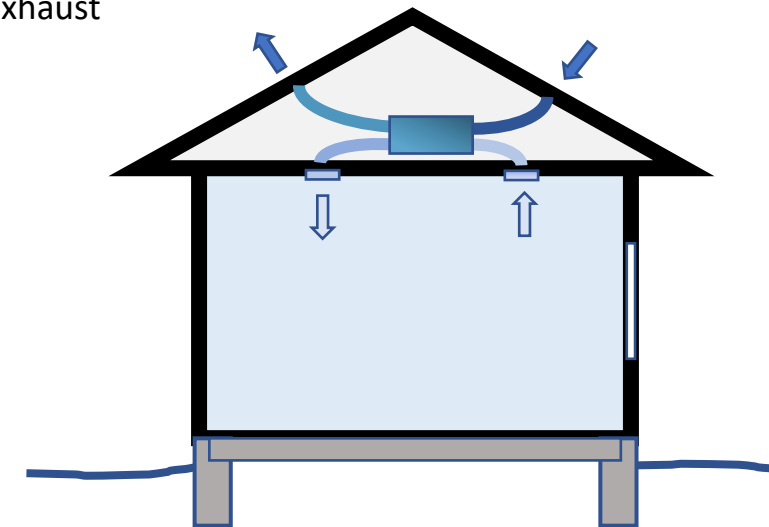
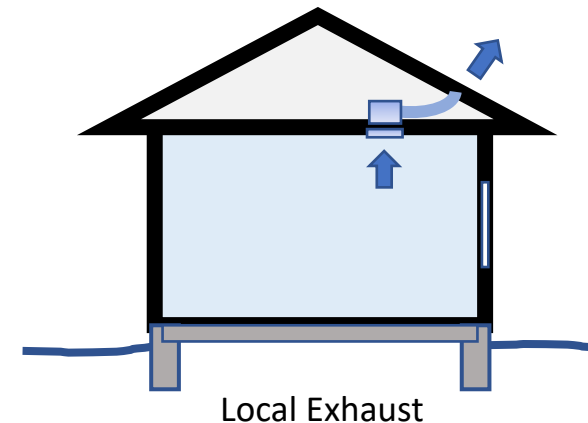


Mechanical Exhaust –Kitchens and Bathrooms

Local Mechanical Exhaust shall be installed in each kitchen and bathroom. Systems shall be rated for airflow in accordance with ASHRAE 62.2 section 7.1.

- **Open (Non-enclosed) Kitchens:** demand controls and meet min ventilation
- **Enclosed Kitchens and Bathrooms:** can use continuous ventilation systems that are part of ERV/HRV systems

All systems must have occupant **accessible ON-OFF** switches –and if part of IAQ ventilation system be label , "This switch controls the indoor air quality ventilation for the home. Leave it switch in the "on" position at all times unless the **outdoor air quality is very poor.**"



ERV/HRV Balanced Ventilation with fan efficacy of ≤ 1.0 W/cfm

Kitchen –Range Hood and Other Exhaust Fans

New Tables 160.2-E, F and G

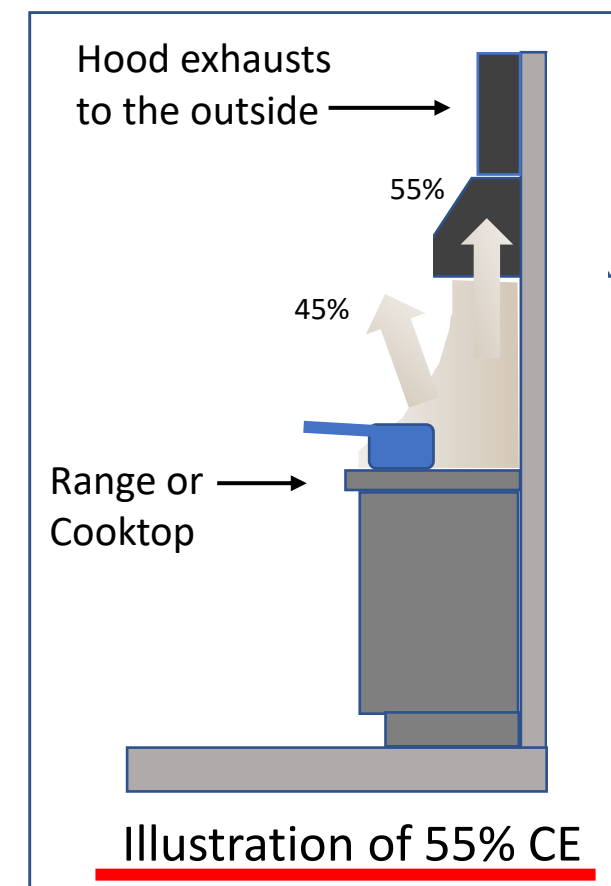
- Table 160.2-G based on home size and fuel type
- Capture Efficiency (CE) performance standard or rated air flow rate

*Table 160.2-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*

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

- Other exhaust fans, such as downflow, 300 cfm or 5 ACH for enclosed kitchens

No change: Noise shall be 3 sones or less for 100 cfm ventilation rate



Mechanical Exhaust –Kitchen and Bathrooms Con't

- **Installer to field test** with air flow hood/grid, or
- Follow **Table 160.2-H** Prescriptive Ventilation System Duct Sizing (ASHRAE 62.2 Table 5-3)
 - Reference cfm of the ventilation exhaust system
 - Minimum duct diameter for both rigid and flex duct
 - Where Duct System:
 - Total duct length is $\leq 25\text{ft}$
 - Duct system has no more than 3 elbows
 - Duct system has exterior termination fitting with a hydraulic diameter \geq to the minimum duct diameter and $>$ than the hydraulic diameter of the fan outlet.



Air Flow
Testing
Equipment



Low-Rise Example

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



CALIFORNIA ENERGY COMMISSION

LOCAL MECHANICAL EXHAUST

CEC-LMCI-MCH-32-H

SAMPLE FORM – NOT VALID FOR SUBMISSION TO BUILDING DEPARTMENTS

Title 24, Part 6, Section 160.2(b)2 **Ventilation and Indoor Air Quality for Attached Dwelling Units**. 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 160.2(b)2A.

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 160.2(b)2Avi) – Fan Selection and Duct Design Criteria for Compliance

Local mechanical exhaust fans shall be installed in each kitchen and bathroom in accordance with Section 160.2(b)2Avi. 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 160.2-E, 160.2-F, or 160.2-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 160.2-H.

High-Rise Example

NRCV-MCH-32 Local Mechanical Exhaust for Kitchens (HERS)

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

Clarifies that the flow is continuous or demand controlled, and if flow rate or capture efficiency metric is used, etc



CERTIFICATE OF VERIFICATION

Note: This table completed by HERS Registry.

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

Title 24, Part 6, Section 160.2(b)2 **Ventilation and Indoor Air Quality for Attached Dwelling Units.** All dwelling units shall meet the requirements of ANSI/ASHRAE Standard 62.2. Ventilation and Acceptable Indoor Air Quality in Residential Buildings, subject to the amendments specified in Section 160.2(b)2A. **Equation and table numbering on this form corresponds to the numbering for that information in the published ANSI/ASHRAE Standard 62.2-2019.**

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 | |

B. Kitchen Exhaust Systems

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

C. Continuous Kitchen Exhaust

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

C2. 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 160.2-G) | |
| 05 | Compliance Statement | |



Lighting

(a) Dwelling Unit Lighting:

Table 160.5-A CLASSIFICATION OF HIGH LUMINOUS EFFICACY LIGHT SOURCES

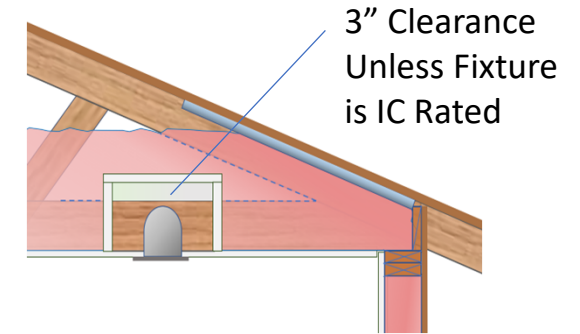
–Removed some of the **LED light sources** that did not need to meet JA8

Minor Updates:

- **Joint Appendix JA8** which provides the qualification requirements for high luminous efficacy light sources
- **Recessed Luminaires** must meet the clearance and installation requirements of **California Electrical Code Section 410.116**

(b) Common Services Areas Lighting:

- **All non-dwelling/common-living spaces, parking garage areas, outdoor lighting, and associated controls** follow nearly the same mandatory requirements as under the non-res (section 130) lighting standards.
- Minor changes from 2019 to 2022 Standards, and
- **Secondary daylit zones** have been included in the **daylighting controls** requirements under the 2022 standards.



LMCC-LTI-01-E Indoor Lighting and Controls –Low Rise

New 'Everything' Form

Note: Not Registered -- Form can be used until **Dec 31, 2023**.

Download **form fillable pdf** from CEC (energy.ca.gov)

Compliance for **Low-Rise Multifamily, non-dwelling common areas, commercial areas, parking garage, etc.** for the Prescriptive and Mandatory requirements – New Construction and Alterations



CALIFORNIA ENERGY COMMISSION

INDOOR LIGHTING

CEC-LMCC-LTI-01-E

NOT REGISTERED - CAN BE USED FOR SUBMISSION TO BUILDING DEPARTMENTS PRIOR TO DECEMBER 31, 2023

CERTIFICATE OF COMPLIANCE

This document is used to demonstrate compliance with requirements in §110.9, §110.12(c), §130.0, §130.1, §140.6, and §141.0(b)2 for indoor lighting scopes using the prescriptive path for nonresidential and hotel/motel occupancies in low-rise multifamily mixed-use buildings. It is also used to document compliance with requirements in §160.5, §170.2(e) and §180.2(b)4 for indoor lighting scopes using the prescriptive path for multifamily occupancies. Multifamily includes dormitory and senior living facilities.

Project Details

| Field Name | Data Entry | Field Name | Data Entry |
|--------------------|------------|---------------------|------------|
| Project Name: | | Enforcement Agency: | |
| Dwelling Address: | | Permit Number: | |
| City and Zip Code: | | Date Permit Issued: | |

A. GENERAL INFORMATION

| Field | Field Name | Data Entry |
|-------|---|--|
| 01 | Project Location (city) | |
| 02 | Climate Zone | |
| 03 | Occupancy Types Within Project (select all that apply): | <input type="checkbox"/> Office <input type="checkbox"/> Retail <input type="checkbox"/> Warehouse <input type="checkbox"/> Low-Rise Residential, Multifamily/ MF Mixed-use < 4 stories (ir <input type="checkbox"/> Healthcare Facilities <input type="checkbox"/> Relocatable <input type="checkbox"/> Auditorium <input type="checkbox"/> Commercial/ Industrial |

Grocery Store
 Classroom
 Library
 Gymnasium
 Hotel/ Motel
 Parking Garage
 School
 Support Areas
 Theater
 Sports Arena
 Religious Facility
 Data Center
 Convention Center
 Restaurant/ Commercial Kitchen
 Financial Institution
 Medical Clinic
 All Others

Registration Number:

Registration Date/Time:

HERS Provider:

Electric Power Distribution Systems

Clarify:

Multifamily buildings shall comply with the applicable requirements of Sections 160.6(a) through 160.6(e).

(a) Service Electrical Metering

(b) Separation of Electrical Circuits for Electrical Energy Monitoring

EXCEPTION 2 to Section 160.6(b): Sub-metered electrical power distribution systems that provide power to **dwelling units**

(c) Voltage Drop

(d) Circuit Controls for 120-Volt Receptacles and Controlled Receptacles

EXCEPTION 2 to Section 160.6(d): Receptacles in **common use areas** **providing** shared provisions for living, eating, cooking, or sanitation **to dwelling units** that would otherwise lack these provisions.

Key Take Away:

- Minimal change.
- Code clarifies that the non-dwelling unit portions of multifamily buildings must comply and dwelling units are exempt.

Depending if the project is mixed use low-rise or high-rise will determine which form to use, i.e. LMCC or NRCC series



Mandatory Change

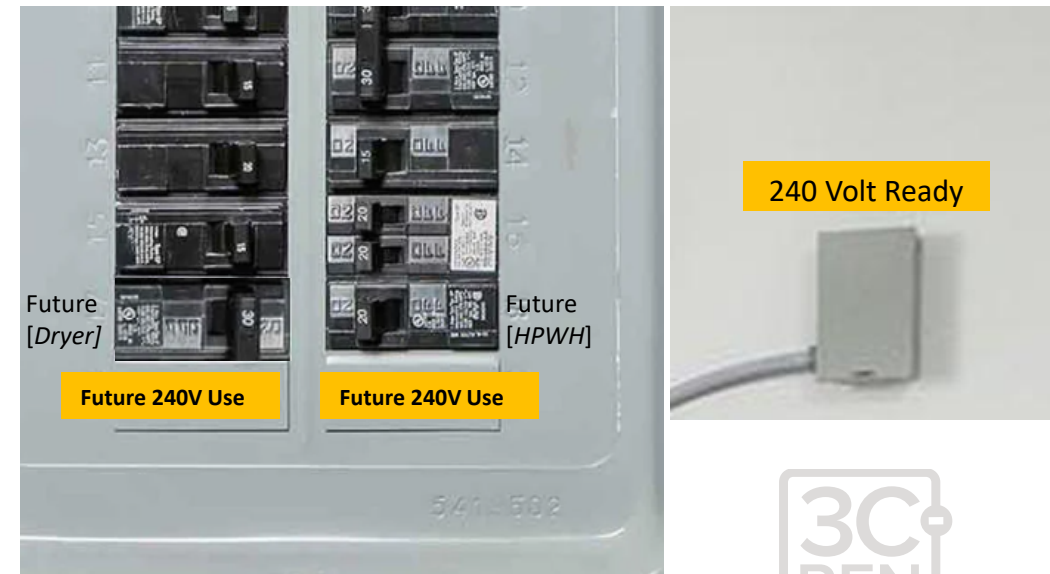
Water Heater 160.4 and Electric Ready Buildings 160.9

- update to Water Heater 160.4(a)
- new Sections 160.9(a), (b), and (c)1,2

For all propane/natural gas installed appliances:

- Water heaters: serving individual dwellings must install 125v/20amp outlet with spare conductor to allow for a 240v circuit - **160.4(a)**
- Furnaces: serving individual dwellings provide conductors rated at 240 volt/ 30 amp to the furnace for future heat pump installation- **160.9(a)**
- Cooktops: provide conductors rated at 240 volt/ 50 amp for future cooktop- **160.9(b)**
- Dryers –dwelling units: provide conductors rated at 240 volt/ 30 amp feed dryer - **160.9(c)1**
- Dryers –common space: provide conductors rated at 240 volt/ 24 amp feed per dryer or 2.6 kVA for each 10 kBtu/h gas dryer capacity- **160.9(c)2**

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



Example situation for a dwelling subpanel



LMCI-PLB-02-E Multifamily Dwelling Unit Hot Water Distribution --Excerpt

Includes the
“Electric Ready”
requirements
when installing
a NG or LP
water heater.

F. Mandatory Measures for all Domestic Hot Water Distribution Systems

| | |
|----|---|
| 01 | Equipment shall meet the applicable requirements of the Appliance Efficiency Regulations (Section 110.3(b)1). |
| 02 | Unfired storage tanks are insulated with an external R-3.5 or combination of R-16 internal and external Insulation. (Section 110.3(c)4). |
| 03 | <ul style="list-style-type: none"> All domestic hot water piping shall be insulated as specified in Section 609.11 of the California Plumbing Code. Insulation buried below grade must be installed in a waterproof and non-crushable casing or sleeve. Piping that penetrates framing members shall not be required to have pipe insulation for the distance of the framing penetration. Piping that penetrates metal framing shall use grommets, plugs, wrapping or other insulating material to assure that no contact is made with the metal framing. Insulation shall butt securely against all framing members. Piping installed in interior or exterior walls that is surrounded on all sides by at least 1 inch (2.5 cm) of insulation. Piping installed in crawlspace with a minimum of 1 inches (2.5 cm) of crawlspace insulation above and below. Piping installed in attics with a minimum of 4 inches (10 cm) of attic insulation on top. Pipe insulation shall fit tightly and all elbows and tees shall be fully insulated. |
| 04 | <p>For Gas or Propane Water Heaters: Ensure either a or bare installed (Section 150.0(n))</p> <p>a) A designated space at least 2.5 feet by 2.5 feet and 7 feet tall within 3 feet from the water heater</p> <ul style="list-style-type: none"> A dedicated 125V, 20A electrical receptacle connected to the electric panel with a 120/240V 3 conductor, 10 AWG copper branch circuit, within 3 feet from the water heater and is accessible with no obstructions. The conductor shall be labeled with the word “Spare” on both ends; and A reserved single pole circuit breaker space next to the circuit breaker next to the branch circuit labeled “Future” 240V shall be provided. A condensate drain no more than 2 inches higher than the base on water heater for natural draining. <p>b) A designated space at least 2.5 feet by 2.5 feet and 7 feet tall more than 3 feet from the water heater</p> <ul style="list-style-type: none"> <u>A dedicated 240 volt branch circuit shall be installed within 3 feet from the designated space. The branch circuit shall be rated at 30 amps minimum. The blank cover shall be identified as “240V ready”; and</u> <u>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”; and</u> <u>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; and</u> <u>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; and</u> <u>The hot and cold water piping at the designated HPWH location shall be exposed and readily accessible for future installation of a HPWH; and</u> <u>A condensate drain no more than 2 inches higher than the base of the installed water heater, and allows natural draining without pump assistance.</u> |

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

LMCI-ELC-01-E Electric Ready –Excerpt

D. Electric Clothes Dryer Ready – Systems Serving Individual Dwelling Units

| | |
|----|---|
| 01 | A dedicated 240 volt branch circuit wiring shall be installed within 3 feet from the clothes dryer location and accessible to the clothes dryer location with no obstructions. |
| 02 | The branch circuit conductors shall be rated at 30 amps minimum. |
| 03 | The blank cover shall be identified as “240V ready”. |
| 04 | All electrical components shall be installed in accordance with the <i>California Electrical Code</i> . |
| 05 | 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”. |

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

E. Electric Clothes Dryer Ready – Systems in Common Areas

| | |
|----|---|
| 01 | Conductors or raceway shall be installed with termination points at the main electrical panel, via subpanels panels if applicable, to a location no more than 3 feet from each gas outlet or a designated location of future electric replacement equipment. |
| 02 | Both ends of the conductors or raceway shall be labelled “Future 240V Use.” |
| 03 | The conductors or raceway and any intervening subpanels, panelboards, switchboards, and busbars shall be sized to meet the future electric power requirements, at the service voltage to the point at which the conductors serving the building connect to the utility distribution system. Capacity shall be one of the following: <ul style="list-style-type: none">i. 24 amps at 208/240 volts per clothes dryer;ii. 6 kVA for each 10,000 Btu per hour of rated gas input or gas pipe capacity; oriii. The electrical power required to provide equivalent functionality of the gas-powered equipment as calculated and documented by the responsible person associated with the project. |
| 04 | The capacity requirements may be adjusted for demand factors in accordance with the California Electric Code. Gas flow rates shall be determined in accordance with the California Plumbing Code. |

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

Includes the “Electric Ready” requirements when installing a NG or LP clothes dryer in dwelling units (D) or in the common areas (E).





New Construction Prescriptive and Performance

New Multifamily Section 170.0

- Section 170. –General
- Section 170.1 –Performance Approach
- Section 170.2 –Prescriptive Approach
- Apply to dwelling units and common use areas in multifamily buildings.
- Nonresidential occupancies in a mixed occupancy building shall comply with nonresidential requirements in Sections 120.0 through 141.1.

Section 170.2 Prescriptive Approach:

- (a) Building Envelope
- (b) Daylighting –Large Enclosed Spaces
- (c) Space Conditioning Systems
- (d) Water Heating Systems
- (e) Lighting –Indoor, Outdoor, Signs
- (f) Photovoltaic (PV/Solar) -3 Stories or less
- (g) Photovoltaic (PV/Solar) -4 Stories or more
- (h) Battery Storage Systems



Roof and Ceiling Insulation



- New **Table 170.2-A** outlines prescriptive multifamily requirements by climate zone and Roof Type
- Option B: Attic –Ducts in attic
- Option C: Attic –Ducts in conditioned space
- Option D: Non-Attic Roof

Few changes between 2019 and 2022

Note: Option B and C roof types are described with R-values, but Option D is described with U-factors.



Roof and Ceiling Insulation – ‘Cathedral Ceiling’

Option D for Non-Attic Roof (expressed as U-Factor)

- Metal Building
- Wood Framed or Other

- New Table 170.2-A,
- New roof types
- Expanded Cool Roof climate zones

iv. Option D: A minimum U-factor for roof assemblies above conditioned space without attic space

| Multifamily | | Climate Zone | | | | | | | | | | | | | | | | | |
|--------------------------------------|---------------------------------------|--------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | | <u>1</u> | <u>2</u> | <u>3</u> | <u>4</u> | <u>5</u> | <u>6</u> | <u>7</u> | <u>8</u> | <u>9</u> | <u>10</u> | <u>11</u> | <u>12</u> | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> | | |
| Option D (Non Attic Roof) | Metal Building U-factor | | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | <u>0.041</u> | |
| | Wood Framed and Other U-factor | | <u>0.028</u> | <u>0.028</u> | <u>0.034</u> | <u>0.028</u> | <u>0.034</u> | <u>0.034</u> | <u>0.039</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> | <u>0.028</u> |
| | Low-sloped | Aged Solar Reflectance | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>0.63</u> | <u>0.63</u> | <u>0.63</u> | <u>NR</u> | <u>0.63</u> | <u>0.63</u> | <u>0.63</u> | <u>NR</u> | |
| | | Thermal Emittance | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>NR</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>NR</u> | |
| | | Solar Reflectance Index (SRI) | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>NR</u> | <u>75</u> | <u>75</u> | <u>75</u> | <u>NR</u> | <u>75</u> | <u>75</u> | <u>75</u> | <u>NR</u> | |
| | Steep-sloped | Aged Solar Reflectance | <u>NR</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>NR</u> | |
| | | Thermal Emittance | <u>NR</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>0.75</u> | <u>NR</u> | |
| | | Solar Reflectance Index (SRI) | <u>NR</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>16</u> | <u>NR</u> | |



Wall Insulation

- Varies by wall type, and fire rating
- Note: Wall insulation expressed as U-Factor
- New Types: Metal Building, Framed >1 hr Fire Rated, and Heavy Mass

- New Table 170.2-A,
- New wall types

| Climate Zone | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
|--------------|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--------------|
| <u>Walls</u> | <u>Metal-Building, any fire rating</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.061</u> | <u>0.057</u> | <u>0.057</u> | <u>0.057</u> | <u>0.057</u> | <u>0.057</u> | <u>0.057</u> | |
| | <u>Framed, (wood, metal, and others) >1hr fire rating</u> | <u>0.059</u> | <u>0.059</u> | <u>0.059</u> | <u>0.059</u> | <u>0.059</u> | <u>0.065</u> | <u>0.065</u> | <u>0.059</u> | <u>0.059</u> | <u>0.059</u> | <u>0.051</u> | <u>0.059</u> | <u>0.059</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | |
| | <u>Framed (wood, metal and others), ≤1hr fire rating²</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.065</u> | <u>0.065</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> | <u>0.051</u> |
| | <u>Mass Light^{4,5}</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 13</u> | <u>U</u> <u>0.077</u> <u>R 17</u> | |
| | <u>Mass Heavy</u> | <u>0.253</u> | <u>0.650</u> | <u>0.650</u> | <u>0.650</u> | <u>0.650</u> | <u>0.690</u> | <u>0.690</u> | <u>0.690</u> | <u>0.690</u> | <u>0.650</u> | <u>0.184</u> | <u>0.253</u> | <u>0.211</u> | <u>0.184</u> | <u>0.184</u> | <u>0.160</u> | |

} New

} No change

} New



Quality Insulation Installation – Low Rise



Required for new construction projects with 3 habitable stories or less in CZ 1-6 and 8-16
CZ 7 is exempt

No change from 2019. Still does not apply to multifamily building 4 stories or more



Fenestration

Fenestration performance requirements based on product type and # of floors

Fenestration area allowance based on window and floor area.

| | | Climate Zone | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
|-----------------------------|---|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Fenestration | Curtain Wall/ Storefront | Maximum U-factor | 0.38 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 | 0.38 | |
| | | Maximum RSHGC, three or fewer habitable stories | NR | 0.26 | NR | 0.26 | NR | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.25 | 0.26 | NR | |
| | | Maximum RSHGC, four or more habitable stories | 0.35 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.25 | 0.26 | 0.25 |
| | | Minimum VT, four or more habitable stories | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |
| | NAFS 2017 Performance Class AW ⁶ | Maximum U-factor | 0.38 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.40 | 0.38 |
| | | Maximum RSHGC, three or less habitable stories | NR | 0.24 | NR | 0.24 | NR | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | NR |
| | | Maximum RSHGC, four or more habitable stories | 0.35 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| | | Minimum VT, four or more habitable stories | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 | 0.37 |
| | All Other Fenestration | Maximum U-factor | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.34 | 0.34 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 | 0.30 |
| | | Maximum RSHGC, three or less habitable stories | NR | 0.23 | NR | 0.23 | NR | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | NR |
| | | Maximum RSHGC, four or more habitable stories | 0.35 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| | Maximum Window to Floor Ratio | | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% | 20% |
| | Maximum Window to Wall Ratio | | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% | 40% |
| Maximum Skylight Roof Ratio | | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | 5% | |

Note: All climate zones for Multifamily, the West facing widow allowance is dropped. But a Win-Floor area of 20% or Win-Wall area of 40%, whichever is less, has been added as the new window allowance.

Exterior Doors



Table 170.2-A

- Max U-factor based on type of door

Dwelling Unit or Common Use Area

| | | Climate Zone | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
|-----------------------------------|-------------------------|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Exterior Doors⁶ | Maximum U-factor | <u>Dwelling Unit Entry</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | <u>0.20</u> | |
| | | <u>Common Use Area Entry Non-Swinging</u> | <u>0.50</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>1.45</u> | <u>0.50</u> |
| | | <u>Common Use Area Entry Swinging</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> | <u>0.70</u> |

Differentiating common area doors versus dwelling unit doors.



Space Conditioning – Dwelling Units Only

- **3 Stories or less**

- CZ 1-15: space conditioning shall be a heat pump
- CZ 16: space conditioning shall be a furnace with air conditioner

- **4+ Stories**

- CZ 2-15: space conditioning shall be a heat pump
- CZ 1 and 16: space conditioning shall be a dual-fuel heat pump

Note: No space conditioning equipment requirement for the common areas

Performance Baseline is heat pump for space conditioning

- Required to comply with Energy Budget for Source and TDV



ERV & HRV –see Table 170.2-K Mech Component Package

3 stories or less in CZ 4-10:

- **If heat pump** space conditioning system is installed to meet requirements, a balanced ventilation system without an ERV or HRV shall have a **fan efficacy ≤ 0.4 W/cfm**

4+ stories in CZ 1-2, 11-16:

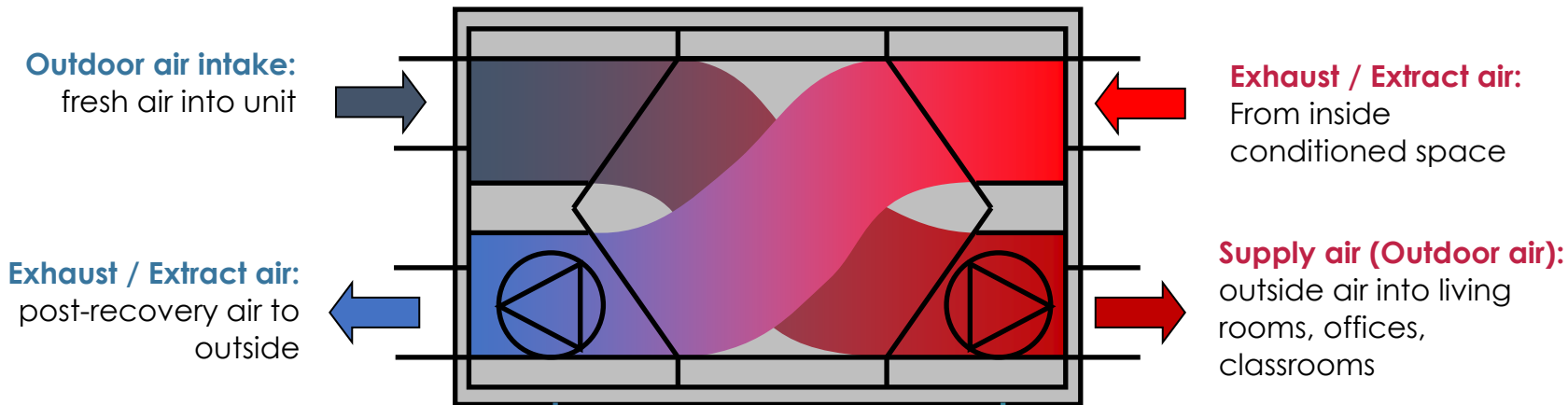
- Balanced ventilation systems using ERV or HRV for **individual dwelling** units shall have a min sensible **recover efficiency $\geq 67\%$** **rated at 32°F and fan efficacy ≤ 0.6 W/cfm**
- Balanced ventilation systems using ERV or HRV **serving multiple units** shall have a min sensible **recover efficiency $\geq 67\%$** rated at 32°F; **Fan efficacy per 170.2(c)4a** (common area fans); and Recover bypass or control to directly **economize** with ventilation air based on outdoor air temperature limits per **Table 170.2-G**



HRV –Heat Recovery Ventilator
ERV –Energy Recovery Ventilator



Example: Energy / Heat Recovery Ventilation (ERV / HRV)



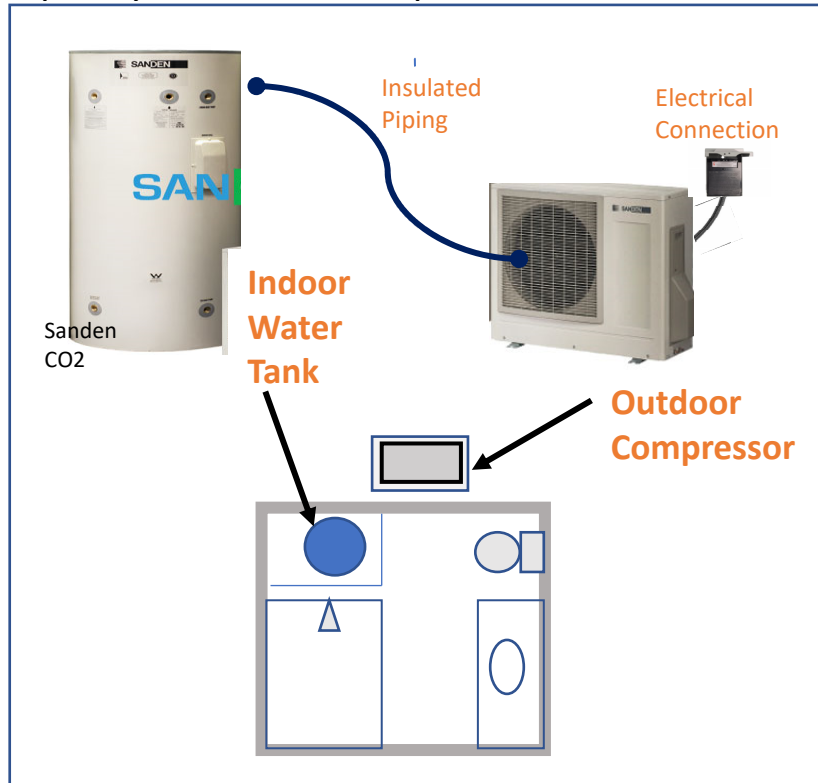
HRV –Heat Recovery Ventilator
ERV –Energy Recovery Ventilator

- Thin membrane, multi-channel pathway for the Outdoor/Supply air going in and the Exhaust/Extracted air going out
- The air pathways do not mix



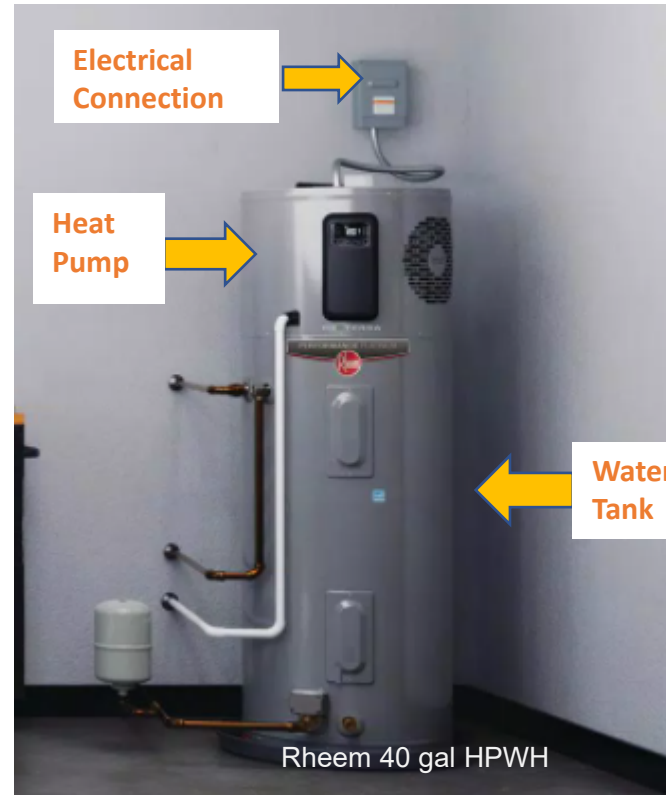
Domestic Hot Water - Individual Dwelling Units

Split-System Heat Pump



- 240-volt HPWH (plus drain pipe heat recovery for CZ 16; or compact plumbing for CZ 1 and 16)
- NEEA-rated Tier 3 HPWH (plus drain pipe heat recovery for CZ 16)

Integrated Heat Pump



Gas On-Demand



- Gas or propane instantaneous water heater 200 kBtu/hr or less input

Central Domestic Hot Water (>8 units)

Heat pump system with the following:

- Hot water return from recirculation loop shall connect to a recirculation loop tank
- Fuel source for the recirculation loop tank shall be electricity if auxiliary heating is needed
- For systems with single pass primary heat pump water heater, the primary thermal storage tanks shall be plumbed in series if multiple tanks are used
- Primary storage tank temp setpoint $\geq 135^{\circ}\text{F}$
- Recirculation loop tank temp setpoint should be at least 10°F lower than primary thermal storage tank
- Minimum HPWH compressor cut-off temp $\leq 40^{\circ}\text{F}$



Requirements for clustered HPWH have been clarified.

Central Domestic Hot Water (>8 units)

Gas or propane system is allowed with the following:

- A recirculation system (does not have to be dual loop)
- Total input rating $\geq 1,000,000$ Btu/hr with a minimum thermal efficiency of 90% for CZ 1-9
- Solar water heating system with a minimum solar savings fraction of:
 - 20% for CZ 1-9
 - 35% for CZ 10-16
 - Solar can be reduced by 5% with a drain water heat recovery system

Eliminated the requirement for 2 or more recirculation loops



Indoor Lighting and Controls

- Dwelling unit requirements match single-family changes
- Common area requirements mostly match nonresidential changes
- New Table 170.2-M –Area Category Lighting Power Density (LPD)
- Reduced LPD values compared to the 2019 Code
- Reduced values based on common use and availability of LEDs



Outdoor Lighting

- Residential outdoor lighting controls apply to luminaires controlled from the dwelling unit
- Outdoor lighting zone applications have changed in Section 10-114
- Urban (moderately high); Urban Clusters (Moderate) per 2010 US Census
- New Table 170.2-R Hardscape Lighting Allowance. New values and minor change in calculation method – results in less energy.



| | | |
|-----|-----------------|---|
| LZ2 | Moderate | Rural areas <u>Urban clusters, as defined by the 2010 U.S. Census. The following building types may occur here: multifamily housing, mixed use residential neighborhoods, religious facilities, schools, and light commercial business districts or industrial zoning districts.</u> |
| LZ3 | Moderately High | Urban areas, as defined by the 2010 U.S. Census. <u>The following building types may occur here: high intensity commercial corridors, entertainment centers, and heavy industrial or manufacturing zone districts.</u> |



Solar Photovoltaic (PV)

PV System Size (kW dc)

Prescriptive sizing equation is determined by the number of stories, i.e. low-rise (3 stories or less) or high-rise (4 stories or more)

SARA –Solar Access Roof Area

Area of a buildings' roof space capable of supporting PV system

- Including covered parking areas, and carports and other newly constructed structures onsite that are compatible with supporting a PV system per CBC 1511.2
- Exceptions: Any roof area that has <70% annual solar access



Change from 2019: Slight modifications to definitions, and new formula for high-rise residential



PV System for ≤3 stories

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

EQUATION 170.2-C

CFA: Conditioned Floor Area

N_{DU}: Number of Dwelling Units

A: Climate Zone Factor

B: Dwelling Adjustment Factor

No PV required if:

- PV size < 1.8 kWdc;
- SARA < 80 sq ft contiguous
- Snow loading parameters

Bonus: Size reduction of 25% if installed with battery



Pismo Terrace Apartments, Pismo Beach, CA

CFA = 16,032 SF

Climate Zone 5

N_{DU} = 27

$kW_{PV} = [(16,032 \times 0.585)/1000] + (27 \times 1.06)$

$kW_{PV} = 9.378 + 28.62$

$kW_{PV} = 37.99 = 38 \text{ kW system}$



The new exceptions were based on CEC cost effectiveness studies

Table for Adjustment Factors

| Table 170.2-T: CFA (A) & Dwelling Unit (B) Adjustment Factors | | | | | |
|---|-------|------|------|-------|------|
| Zone | A | B | Zone | A | B |
| 1 | 0.793 | 1.27 | 9 | 0.613 | 1.36 |
| 2 | 0.621 | 1.22 | 10 | 0.627 | 1.41 |
| 3 | 0.628 | 1.12 | 11 | 0.836 | 1.44 |
| 4 | 0.586 | 1.21 | 12 | 0.613 | 1.40 |
| 5 | 0.585 | 1.06 | 13 | 0.894 | 1.51 |
| 6 | 0.594 | 1.23 | 14 | 0.741 | 1.26 |
| 7 | 0.572 | 1.15 | 15 | 1.56 | 1.47 |
| 8 | 0.586 | 1.37 | 16 | 0.59 | 1.22 |



PV System for >4 stories

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

EQUATION 170.2-D

CFA: Conditioned Floor Area

A: Climate Zone Factor

No PV required if:

- PV size < 4 kWdc;
- SARA < 80 sq ft contiguous or < 3% of the CFA
- Snow loading parameters

OR the PV size = 14 W/sq ft x SARA



VTA Housing Ohlone Station, San Jose, CA

HIGHRISE (12 Stories, 190 units)

CFA = 174,483 SF

Climate Zone 4

$kW_{PV} = 174,483 \times 2.21/1000$

$kW_{PV} = 385,607.43/1000$

$kW_{PV} = 385.61 = 386 \text{ kWdc}$



The new exceptions were based on CEC cost effectiveness studies

Table for Adjustment Factors: It's A Different Table!

| Table 170.2-U: PV CAPACITY FACTORS | | | |
|--|-------------------|------------------|---------|
| Building Use | Zones 1, 3, 5, 16 | Zones 2, 4, 6-14 | Zone 15 |
| Grocery | 2.62 | 2.91 | 3.53 |
| High-Rise Residential | 1.82 | 2.21 | 2.77 |
| Office | 2.59 | 3.13 | 3.80 |
| Retail | 2.62 | 2.91 | 3.53 |
| School | 1.27 | 1.63 | 2.46 |
| Warehouse | 0.39 | 0.44 | 0.58 |
| Auditorium, Hotel, Library, Restaurant, Theatre | 0.39 | 0.44 | 0.58 |



Battery Storage for 4+ Stories

Applies to **high-rise (4 stories or more)** when PV systems are required

Two metrics: energy capacity (kWh) and power capacity (kW)

- $\text{kWh}_{\text{batt}} = \text{kW}_{\text{PVdc}} \times B/D^{0.5}$
- $\text{kW}_{\text{batt}} = \text{kW}_{\text{PVdc}} \times C$



No battery storage system required:

- If installed PV system size is less than 15% of the size determined by Equation 170.2-D
- If less than 10 kWh rated energy capacity
- Single tenant buildings <5,000 sq.ft CFA

Change from 2019: New Requirement





Additions and Alterations

Additions and Alterations

- Additions and Alterations can be shown to comply with the Energy Code via Performance (computer modeling) or Prescriptively (checklist).
- Additions –Requirements match single-family requirements
- Alterations –Requirements are a mix from single-family and nonresidential

- 180.0 General
- 180.1 Additions
 - (b) Prescriptive
 - (c) Performance
- 180.2 Alterations
 - (a) Mandatory
 - (b) Prescriptive
 - (c) Performance
- 180.3 Repairs
- 180.4 Whole Building

The Challenge of Existing Buildings

In addition to new buildings, the standards apply to substantial upgrades to existing homes and businesses.



At least 50 percent of single-family homes and nearly 60 percent of California's apartment complexes (about 14 million total residences) were built before the state's first energy standards.

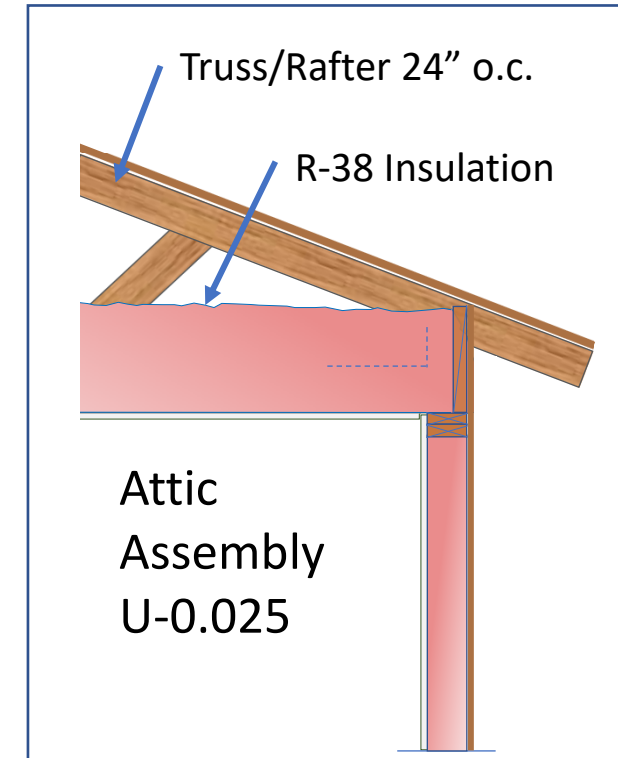
Updating older buildings is critical to achieving the state's climate and clean energy goals.

Additions –Roof and Ceiling

Additions that are **700 square feet or less** shall meet the requirements of Section 170.2(a) [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



Alterations –Ceilings of Vented Attics

New
Section

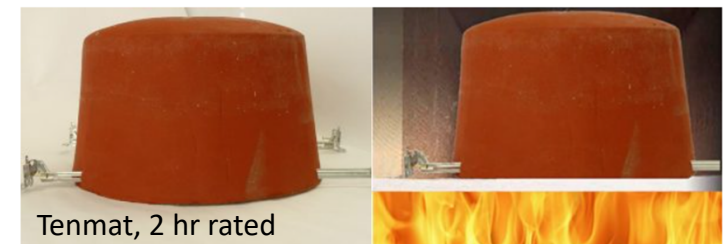
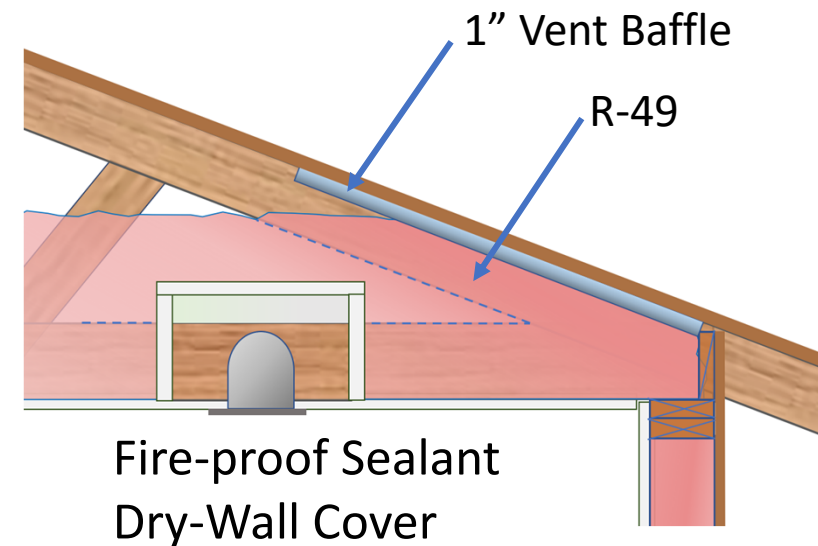
Altered ceilings shall be insulated to R-49 in CZ 1-4, 6, 8-16

[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]*



Manufactured Cover

Alterations – Ceilings of Vented Attics

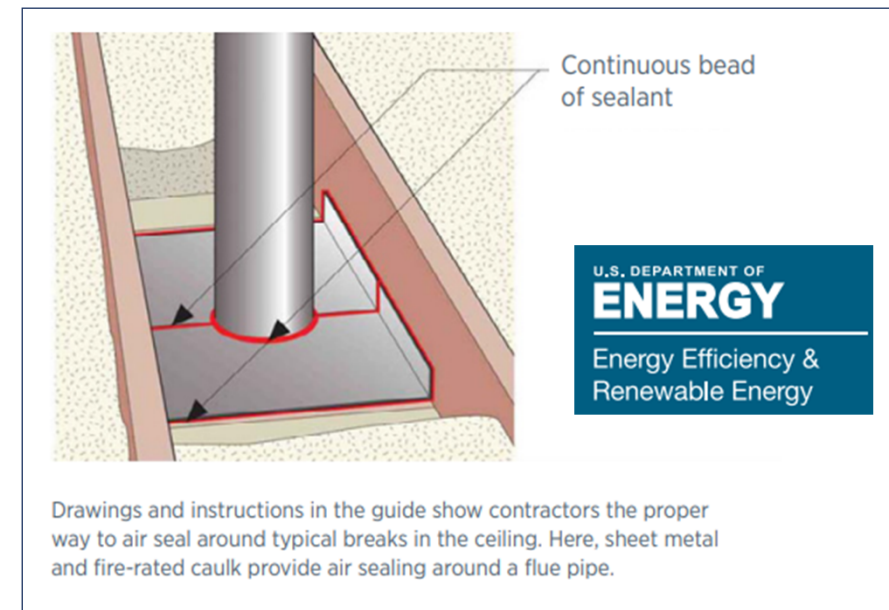
New
Section

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



Alterations –Ducts

Updates if Entirely New or Complete Replacement:

- Ducts extended at least **25 ft** trigger this section (previously 40 ft)
- Duct leakage to test at **12%** or less (previously 15%)
- Duct leakage to the outside to test at **6%** or less (previously 10%)
- Duct Insulation increased to **R-8 for CZ 1, 2, 4, 8-10, 12, and 13** (previously R-6) Table 180.2-C



R-8 Flex Duct

TABLE 180.2-C DUCT INSULATION R-VALUE

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

Duct Alteration “upgrades” have been shown to be cost effective.

Additions – Ventilation for Indoor Air Quality (IAQ)

The following shall **not be required** to comply with the **mechanical IAQ ventilation** airflow specified in **Sections 160.2(b)2Aiv** (whole-dwelling unit IAQ ventilation) or **160.2(b)2Av** (multifamily central IAQ ventilation)

1. Additions to an existing dwelling unit that increase the conditioned floor area of the existing dwelling unit by less than or equal to **1000 square feet**.
2. **Junior Accessory Dwelling Units (JADU)** that are additions to an existing building.

Local Mechanical Exhaust . Additions to existing buildings shall comply with all applicable requirements specified in **160.2(b)2Avi** and **160.2(b)2B**, **i.e. mandatory measures for kitchen and bathroom exhaust**

Change from 2019 Code: Clarification that JADU's don't trigger IAQ whole-dwelling unit nor multifamily central ventilation calculations

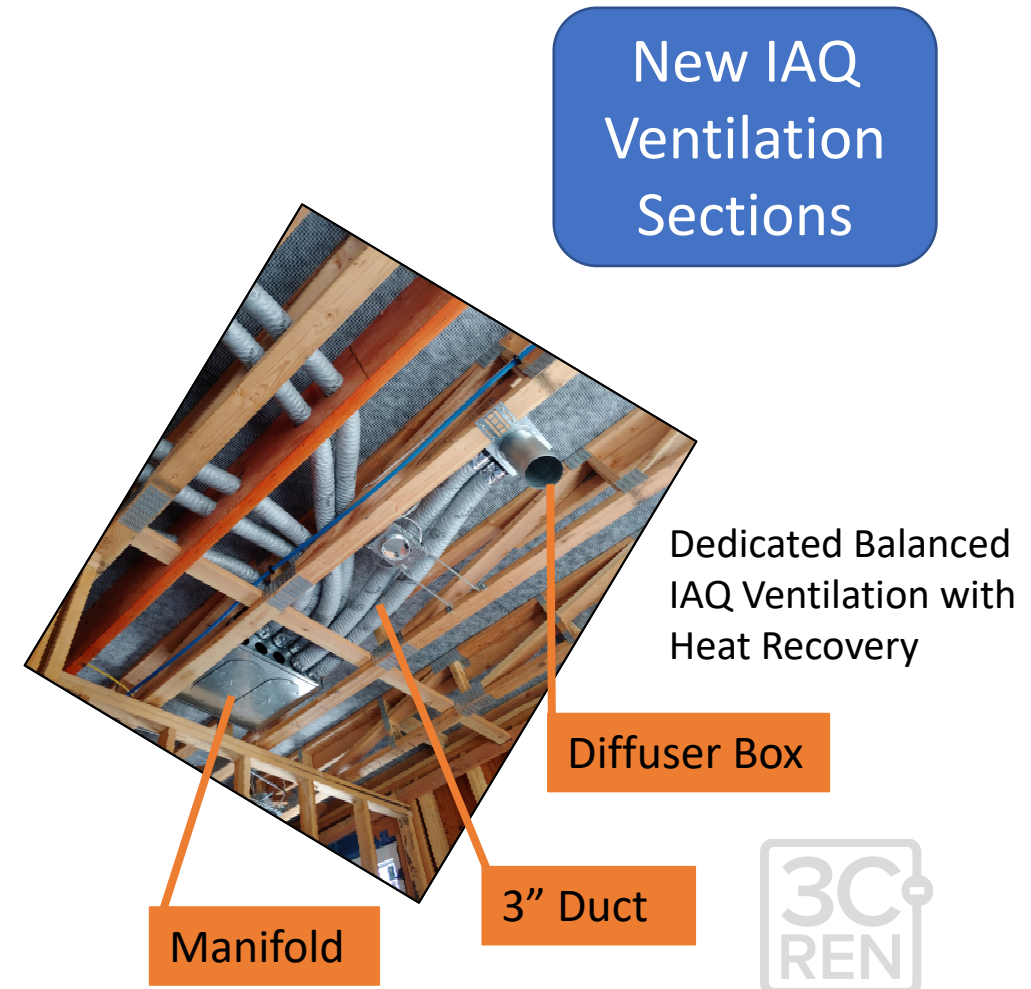


Alterations –Ventilation IAQ for Dwelling Units

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 160.2(b)2** 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 160.2(b)2Aiv** or **160.2(b)2Av** Ventilation and Indoor Air Quality with qualifications... And **HERS or ATT per Reference Appendices**

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



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 - June 28 – [2022 Energy Code: ADUs](#)
 - July 19 – [2022 Energy Code: Nonresidential](#)
 - August 2 – [CALGreen Overview and 2022 Changes](#)
- Other Upcoming Courses:
 - June 20 - [Energy Performance for ZNC Operations – Class 2: Zero Net Carbon Design Series](#)
 - June 22 – [All-Electric Options for Tiny Homes & ADUS](#) *In-Person @ SLO Guild Hall*
 - June 26 – [Passive House Designer/Consultant Certification](#)
- Q3 Event Calendar out NOW : [3C-REN-Events July-Sept Summer-2023.pdf](#)





Thank you!

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