2025 CODE BREAKER

Multifamily Ventilation

Solving the Energy Code Puzzle One Piece at a Time

Participant Handout

February 2026

Energy Code Ace™

SDGE™

Southern California Edison®
Energy for What's Ahead®

Pacific Gas and Electric Company®

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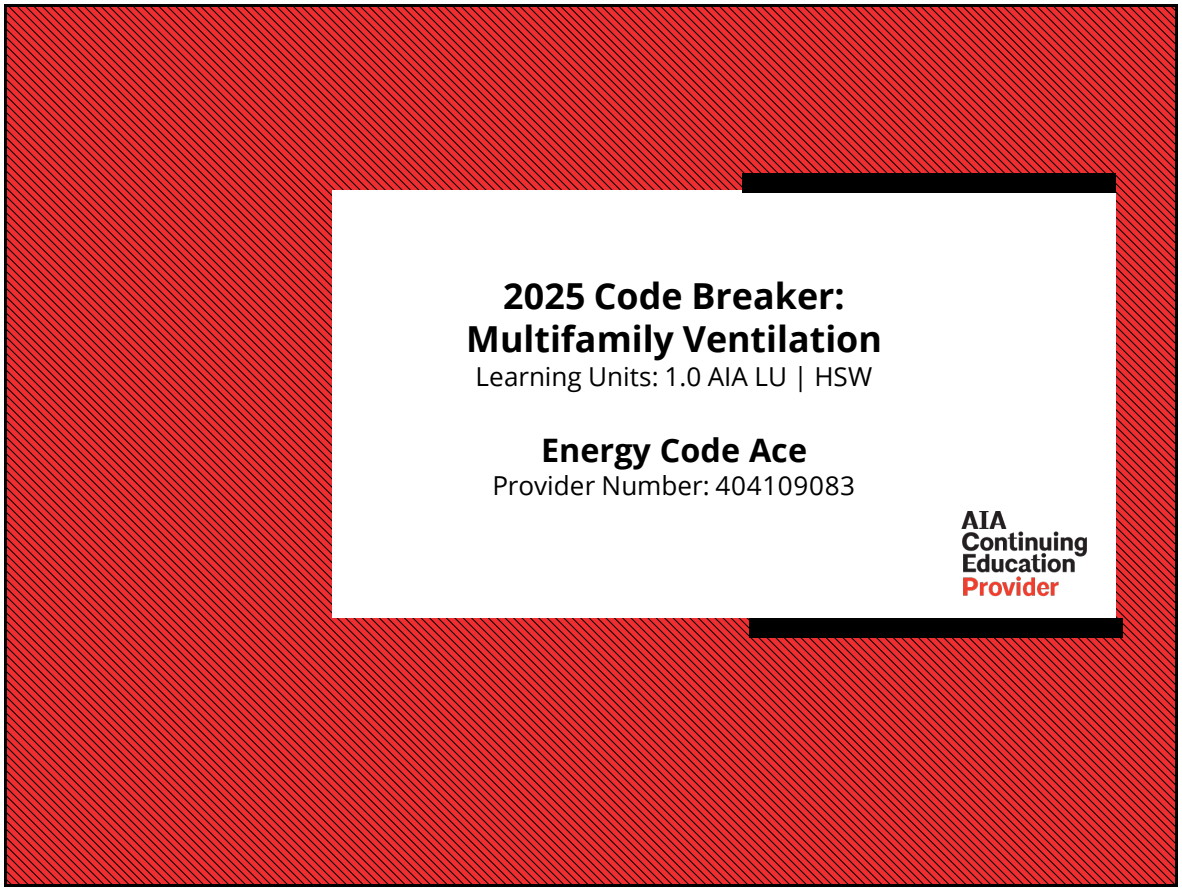
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The Statewide Codes and Standards Program (C&S Program) is jointly managed by the Pacific Gas and Electric Company, Southern California Edison, and San Diego Gas and Electric Company. The C&S Program saves energy on behalf of ratepayers by directly influencing standards and code-setting bodies to strengthen energy efficiency regulations, by improving compliance with existing codes and standards, and working with local governments to develop ordinances that exceed statewide minimum requirements.

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

AIA Information



Course Description

The 2025 energy code addresses the unique considerations in Indoor Air Quality (IAQ) in multifamily buildings by requiring as mandatory measures balanced or supply ventilation in dwelling units plus envelope leakage verification. Kitchen range hoods are also mandatory in multifamily units and are required to be verified by an ECC rater. New prescriptive standards require heat recovery ventilations to perform IAQ functions in some climate zones.

Course Objectives

- Understand why Indoor Air Quality (IAQ) is a key piece of the Energy Code
- Learn what is required by the 2025 Energy Code for IAQ and how code-required ventilation systems help ensure the health and safety of occupants of multifamily buildings
- Grasp how to specify and identify kitchen range hoods and proper filtration in the design drawings
- Lean how Energy Recovery Ventilators (ERV) and Heat Recovery Ventilators (HRV) save energy while meeting code requirements for IAQ and when they are Prescriptive standard in the 2025 code

AIA Continuing Education Provider

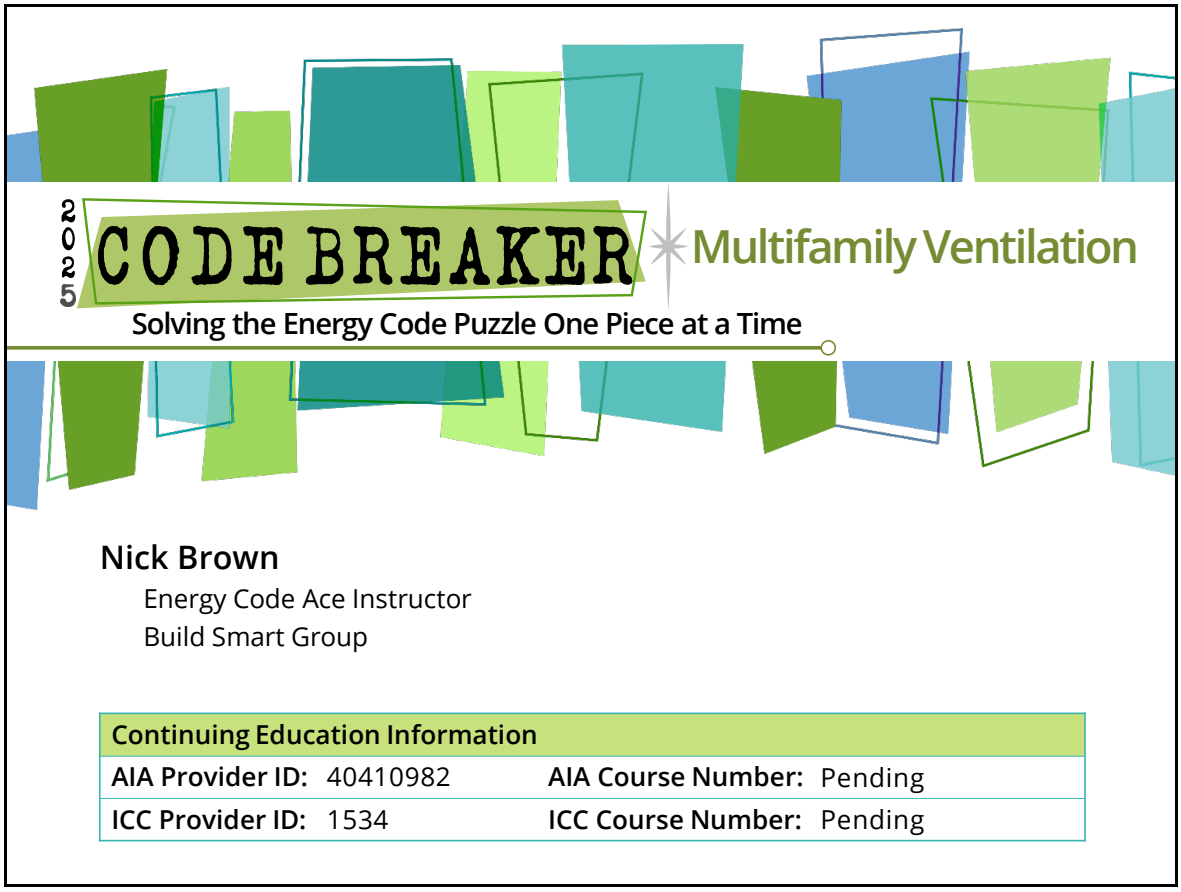
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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

AIA Continuing Education Provider

Welcome



Nick Brown
Energy Code Ace Instructor
Build Smart Group

Continuing Education Information			
AIA Provider ID:	40410982	**AIA Course Number:**	Pending
ICC Provider ID:	1534	**ICC Course Number:**	Pending

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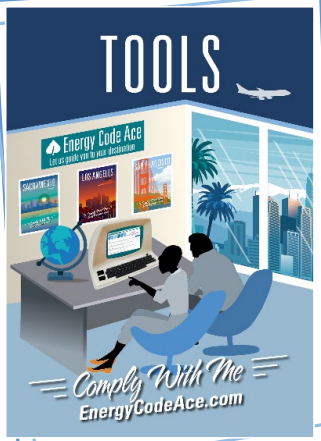
Ace Training™

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

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- Q&Ace
- Reference Ace
- Timeline Ace
- Virtual Compliance Assistant

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- In-person instructor-led
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- Online self-study
- Recorded webinars
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An array of downloadable materials providing practical and concise guidance on how and when to comply with California's building and appliance energy efficiency standards

Our Resources include:

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

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Join us at

www.EnergyCodeAce.com

Course Conventions

Mandatory



- Always required regardless of compliance approach used

Prescriptive



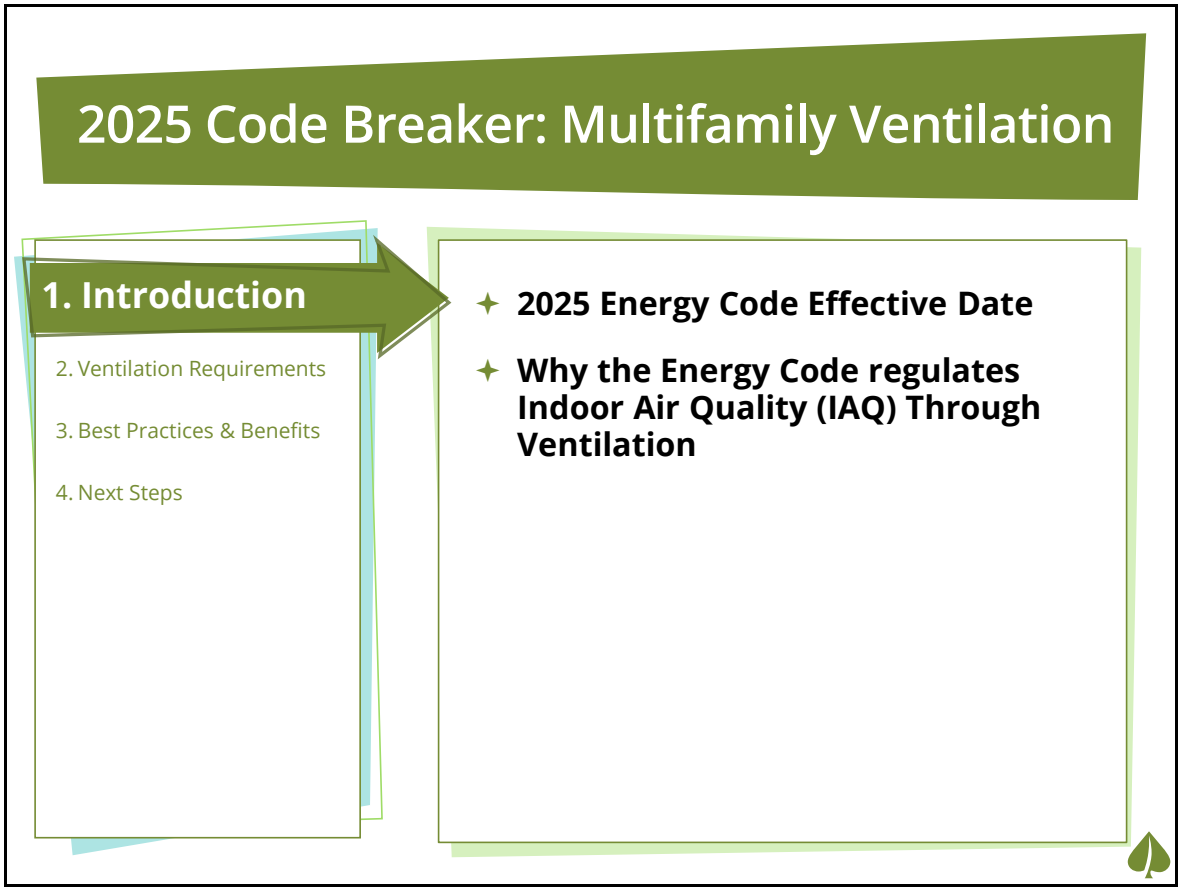
- Required when using the Prescriptive compliance approach

Performance

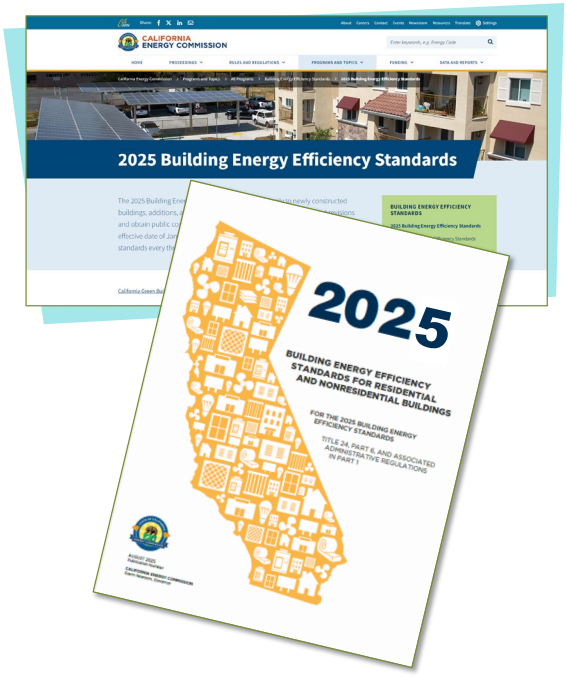


- Optional feature accounted for when doing Performance-based computer modeling

Introduction



2025 Energy Code



- **Implementation Date**
  - **January 1, 2026**
  - Any projects that apply for a permit on or after this date will be subject to the 2025 Energy Code requirements
- Information and documents available on the CA Energy Commission website at:
  - https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2025-building-energy-efficiency

Why Regulate IAQ?

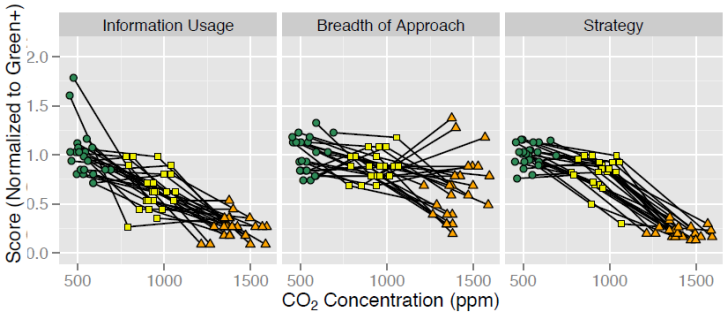


- Homes are built tighter than before
- We spend 90% of our time indoors
- Without proper ventilation, toxins can build up inside and cause health problems
- 1 in 7 Californians have asthma[1]
- Healthy indoor air is critical to maintaining respiratory function in sensitive populations

[1] California Health Interview Survey, UCLA

Why IAQ Matters

- As Indoor Air Quality declines, people's work on challenging tasks declines



Allen, MacNaughton, et al, "Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, ..." Environmental Health Perspectives, October 2015

Ventilation Matters!

"Increasing ventilation rates will reduce respiratory illness and associated sick leave, reduce sick building symptoms, and increase productivity"

~ California Energy Commission

"Reduced ventilation brought down people's ability to think and perform higher order analysis by 60%"

~ Harvard study

What Did We Learn from COVID?

SCIENTIFIC REPORTS
nature research

Sci Rep. 2019; 9: 2185.
Published online 2019 Feb 18. doi: 10.1038/s41598-019-38825-y
PMCID: PMC6379436
PMID: 30778136

Assessing the Dynamics and Control of Droplet- and Aerosol-Transmitted Influenza Using an Indoor Positioning System

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Link in *Nature*

Setting ventilation to code requirement = Vaccinating 50-60% against flu

- Air flow rates often set higher than code minimum
- Filtering return air more important
- Air cleaners, UV lights gained traction

Quick Overview of IAQ System Types

Supply

- Outdoor air into the unit using a dedicated supply fan.
- Indoor air escapes through leaks in the building envelope (exfiltration).

Balanced

- An exhaust fan and a supply fan to move approximately the same volume of air into and out of the dwelling.

Exhaust

- Outdoor air is drawn from the dwelling unit and exhausted to the outdoors.
- Outdoor air enters the unit through infiltration.

Not allowed for newly constructed multifamily buildings in the 2025 Energy Code

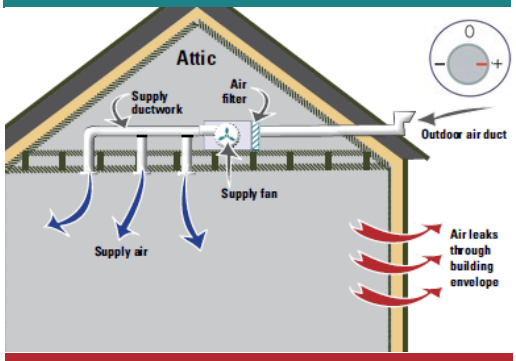
Individual Versus Central

Any of the ventilation components can be supported as:

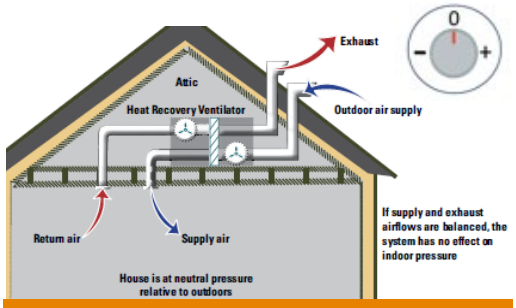
- Individual fans serving each dwelling unit (supply, exhaust, balanced) **OR**
- Central supply, exhaust components of the ventilation system serving multiple dwelling units

Quick Overview of IAQ System Types

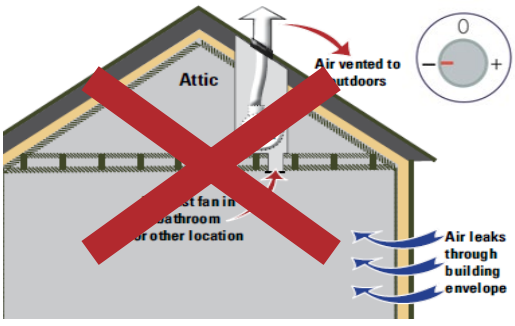
Supply



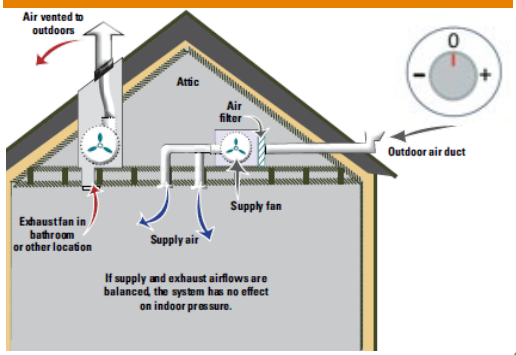
Balanced



Exhaust



Individual Versus Central



Why Does the Energy Code Support Balanced Ventilation & Compartmentalization Testing?



- "The primary goal of this requirement is to reduce pollutant transfer with adjacent units which is reported to be a common complaint by tenants." [1]
- "…the requirement for mechanically-driven supply air (i.e., supply-only or balanced) will ensure that ventilation air comes from the outdoors, rather than neighboring units"[1]
- "Compartmentalization reduces pollutant transfer between adjacent units, thereby improving IAQ and reducing odor and noise transfer." [1]

[1] *CASE Report: Residential Indoor Air Quality, 2019*

Check Your Understanding #1

What do you think?

What options are permissible under the 2025 energy code for ventilation for new multifamily dwelling units? (Select all that apply)

a) Exhaust

b) Supply

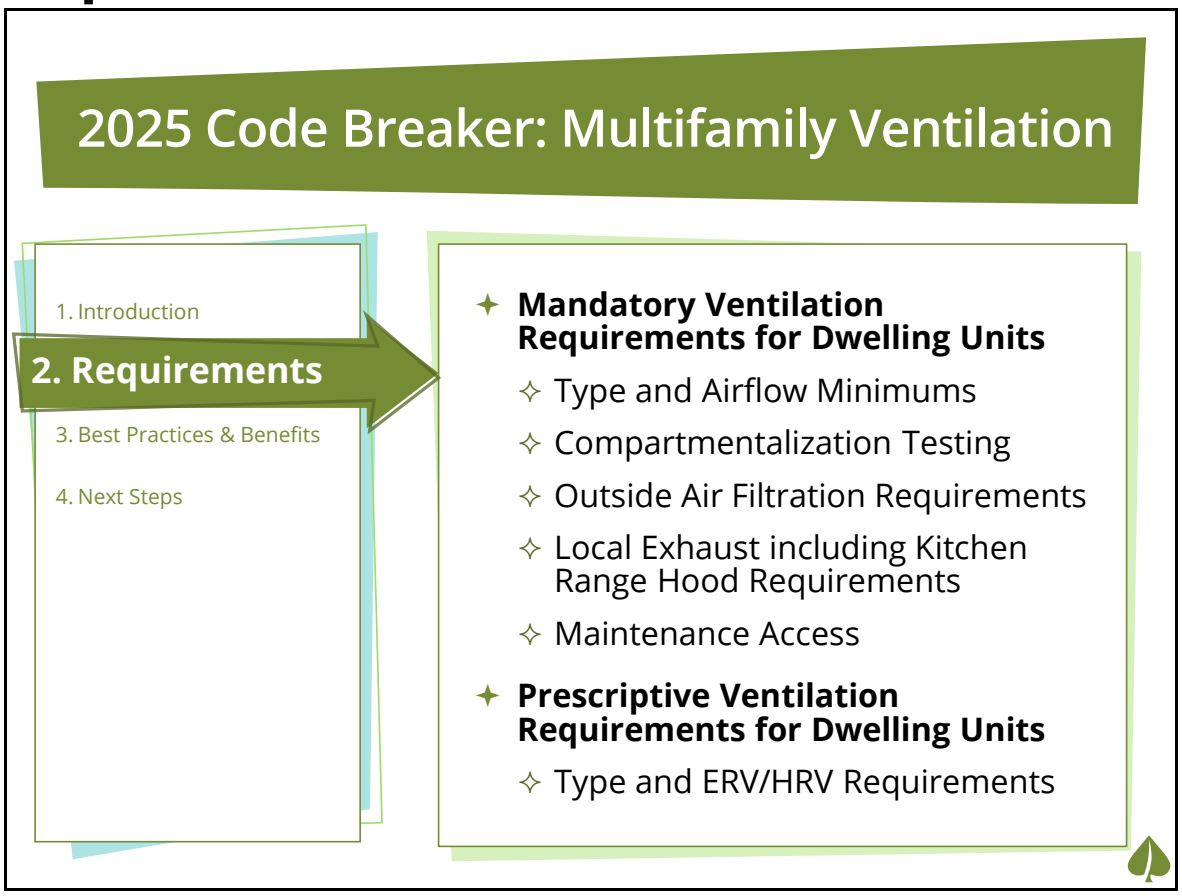
c) Natural

d) Balanced



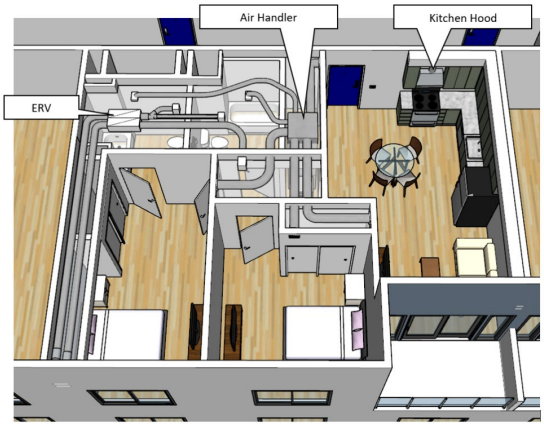
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Requirements



Mandatory Ventilation: Dwelling Units

§160.2(b)



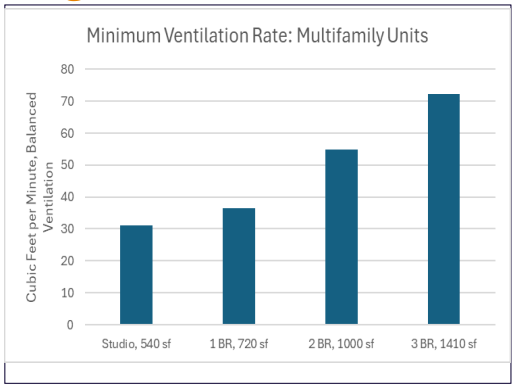
- All new multifamily dwelling units must have continuously operating mechanical ventilation for IAQ
  - Or an equivalent intermittently controlled ventilation system meeting specific control requirements
- Two methods are possible under the 2025 Energy Code for Newly Constructed dwelling units:
  - Supply
  - Balanced
- The "exhaust" method can only be used for existing dwelling units under the 2025 Energy Code

Common use areas of the multifamily occupancy, and any nonresidential occupancies, will need to meet the Mandatory nonresidential ventilation requirements.

Mandatory Ventilation: Minimum Rate

§160.2(b)2

Aligned with ASHRAE 62.2



Total Required Ventilation Rate per **Equation 160.2-B**

$$Q_{tot} = 0.03 \times A_{floor} + 7.5 \times (N_{br} + 1)$$

- Q_{tot} = Total required ventilation rate, cfm
- A_{floor} = Dwelling-unit floor area, ft^2
- N_{br} = Number of bedrooms (not to be less than 1)

Note that the Fan airflow is determined using Q_{tot} and several equations to represent air infiltration.

Sound rating to be **1 sone or less**

Applies to multifamily units AND when a new dwelling unit is added to an existing building (i.e., ADU)

Mandatory Ventilation: Compartmentalization Testing

§160.2(b)2



Tested air leakage rate may not exceed 0.3 cfm per ft² of dwelling unit envelope surface area

- Test conducted by ECC rater under RA3.8 or NA2.3 as applicable

Example: 1 bedroom unit with 744 ft² with a total surface area of the dwelling unit (walls, floor and ceiling) of 2,400 ft² envelope: *Must test < 720 cfm leakage @ 50 pascal pressure*

Also known as "blower door testing", this test is required by the IECC nationwide for residential buildings



Mandatory Ventilation: Filtration

§160.2(b)1

MERV-13 Filtration Required For All Outside Air Sources

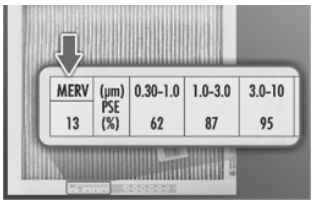
- Mechanical ventilation systems providing outside air to the dwelling unit, including both supply or balanced systems
- Space conditioning systems that have ductwork greater than 10 feet
  - Systems must be designed to allow for pressure drop of the filter
  - 2" deep filters must be used, or 1" filters may be used if sized to Equation 160.2-A

Equation 160.2-A

- $A_{face} = Q_{filter} / V_{face}$
  - A_{face} = air filter face area, the product of air filter nominal length x nominal width, ft²
  - Q_{filter} = design airflow rate for the air filter, ft³/min
  - V_{face} = air filter face velocity ≤ 150 ft/min

Why MERV-13?

MERV-13 filters remove small respirable particulates known as PM2.5 from the air, along with bacteria and viruses. Diesel engines are the most notable producer of PM2.5 pollution.



Mandatory Ventilation: Local Exhaust

§160.2(b)2Avi



- Each kitchen and bathroom must have exhaust system
  - **Bathrooms:**
    - 50 or more cfm with on-demand controls or
    - 20 or more cfm with continuous controls meeting the Energy Code requirements
  - **Kitchens:** See Table 160.2-G
    - Sound rating: 3.0 sones or less

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

Mandatory Ventilation: Maintenance

§160.2(b)2Axi



New for 2025

For Balanced and Supply Only Ventilation

- **IAQ filter and HRV/ERV Access for Maintenance**
  - System air filters and HRV/ERV heat/energy recovery cores shall be located to be **accessible for service** from occupiable spaces, basements, garages, balconies, and mechanical closets
  - If behind access panels, access doors, or grilles, to be located **no more than 10 ft. above a walking surface**
- **To comply with CA Mechanical Code**
  - Must meet "Service Accessibility" and "Outdoor Intake Design including Location and Accessibility" requirements (FID meeting **JA17** exempts location and accessibility requirements)

Fault Indicator Displays for Balanced and Supply Ventilation Systems

WARNING!

Exception to Maintenance Access Requirement:

§160.2(b)2Axi

- Systems that require servicing from **inside the attic** shall have:
  - A **Fault Indicator Display (FID)** meeting requirements of Reference Appendix **JA17**
  - Attic **access door** located in a wall, or if access provided in a ceiling, an **attic access hatch with integrated ladder**
  - A **walkway** from the attic access door to the HRV/ERV

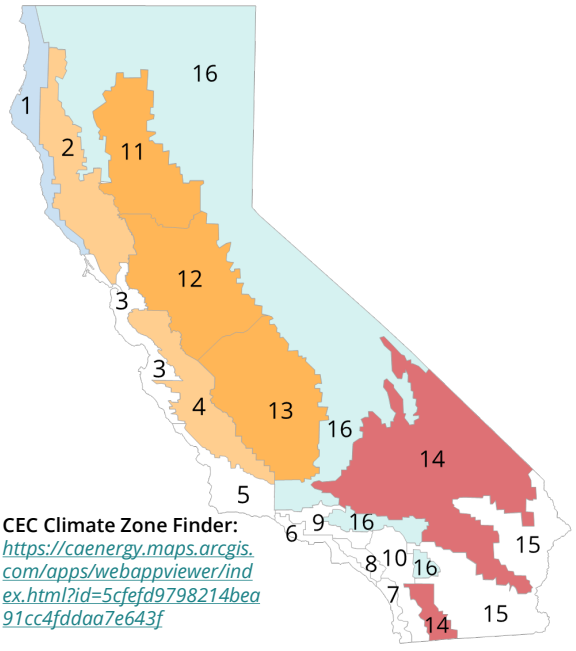
§170.2(c)3Bv

- All **HRV/ERV** systems serving **individual** **dwelling units** shall have:
  - A **Fault Indicator Display (FID)** that is **manufacturer certified** per requirements in Joint Appendix **JA17.4**
  - **FID certification** shall be **verified** by an **ECC-Rater**

Prescriptive Ventilation: Balanced Ventilation Systems

§170.2(c)3Biv

Prescriptive Approach requires a balanced ventilation system to meet the Mandatory Measures for whole-dwelling unit ventilation in §160.2(b)2Aivb1, as well as the following:



CEC Climate Zone Finder: https://caenergy.maps.arcgis.com/apps/webappviewer/index.html?id=5cfefd9798214bea91cc4fddaa7e643f

Supply only can only be done via Performance Approach

Shall, when serving dwelling units in any Multifamily building in CZ 1, 2, 4, 11-14, & 16:

- Be an **ERV** (energy recovery ventilator) **or HRV** (heat recovery ventilator)
- Have a sensible recovery **efficiency ≥ 67%**, rated at 32°F
- Meet **fan efficacy** requirements
- Be confirmed by **field verification**
- *Additional requirements may apply*

Check Your Understanding #2

What do you think?

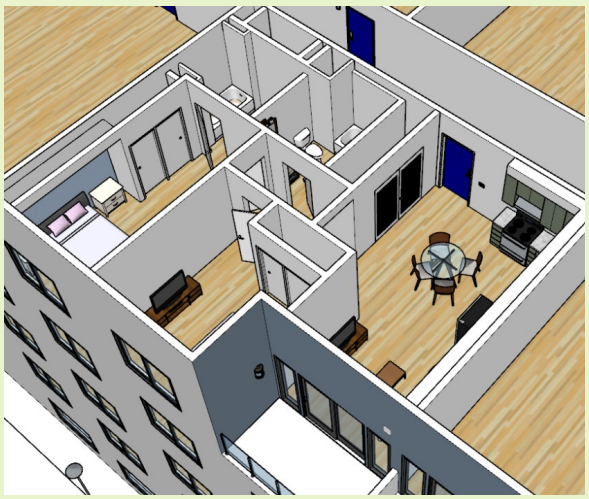
Which rooms in a multifamily dwelling unit are required to have local exhaust? (Select all that apply)

a) Living room

b) Bathroom

c) Bedroom

d) Kitchen



Check Your Understanding #3

What do you think?

In what climate zones are Recovery Ventilators Prescriptively required? (Select all that apply)

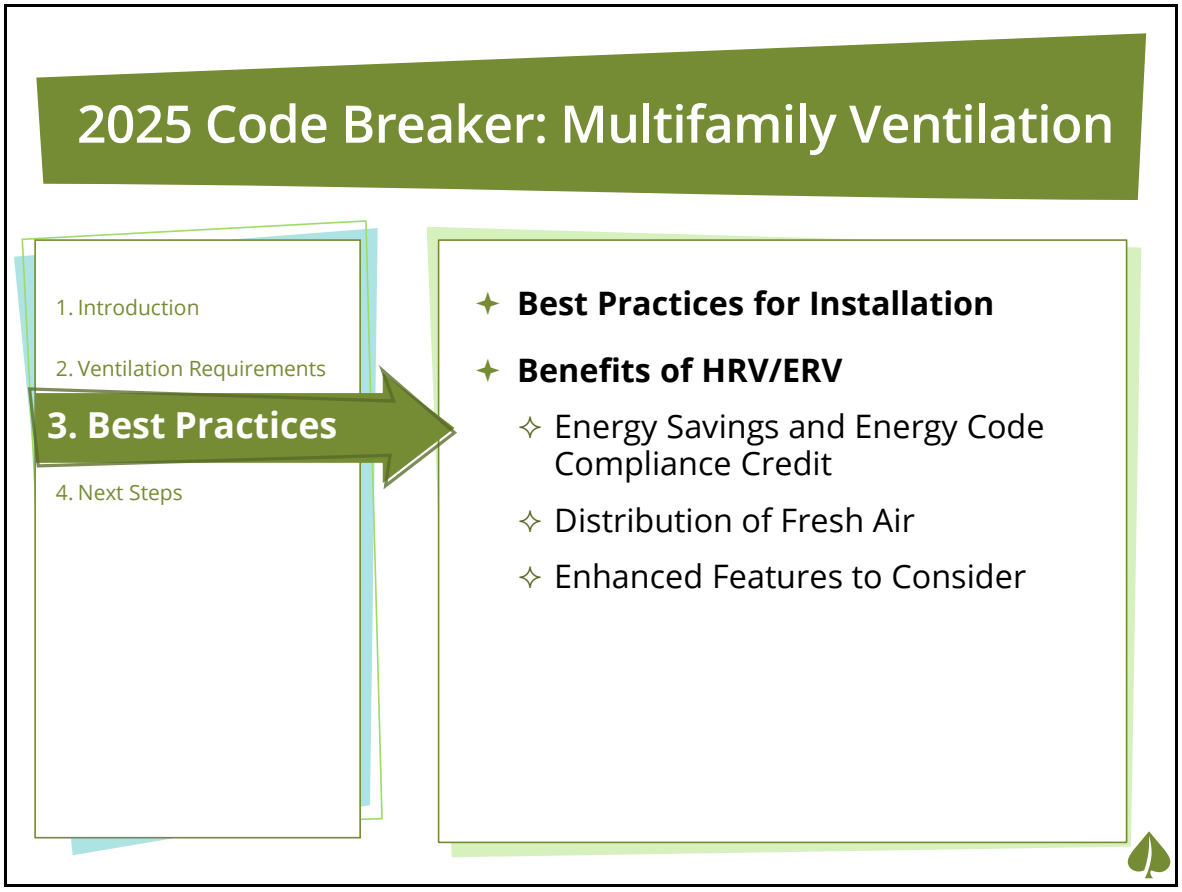
a) Heating dominated CZs (1, 2, 4, 11-14, 16)

b) All CZs except mild coastal (5-7)

c) Cooling dominated CZs (8-10, 15)



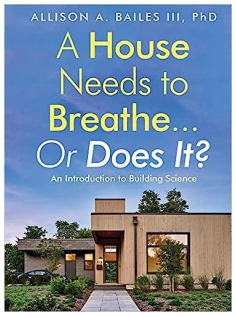
Best Practices



Benefits of ERV versus HRV

The Energy Code doesn't dictate type of recovery system ("Energy" versus "Heat")

Energy Recovery Ventilator (ERV)	Heat Recovery Ventilator (HRV)
✦ ERVs have membranes that temper the incoming air using the humidity of the exhaust air	✦ HRVs temper the incoming air with the outgoing heat, but do not swap moisture
✦ Hot or cold climates: ERVs better	✦ Mild climates: HRVs better



"The choice between an ERV and an HRV should land on ERV most of the time."

"It's only in mild climates where it doesn't get too cold, humid, or dry where HRVs make sense..."

How do Recovery Ventilators Work?

- **Fresh air** brought in via a designed pathway and filtered before introducing the air to the dwelling unit. This is typically supplied using ducting to bedrooms and living areas.
- **Stale air** removed from areas with moisture. This is typically the kitchen and bathrooms.

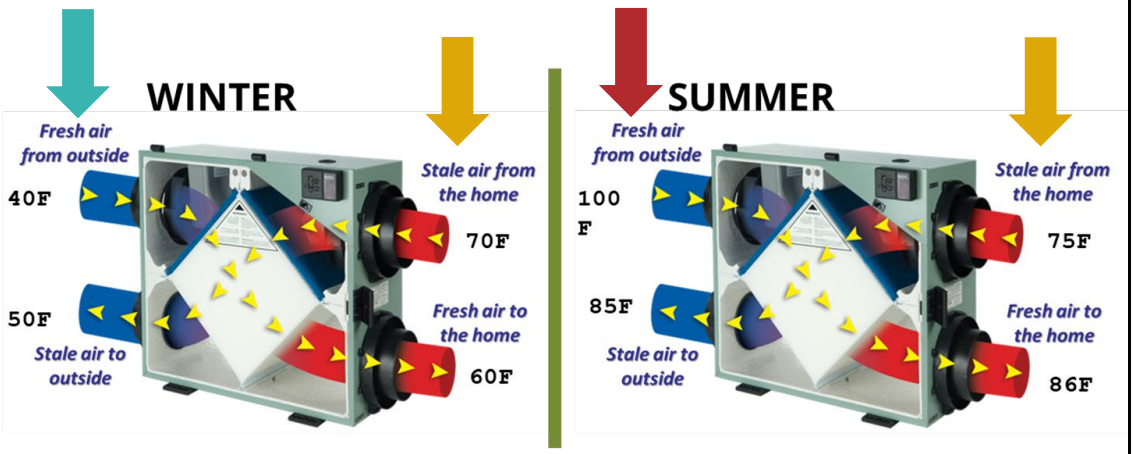
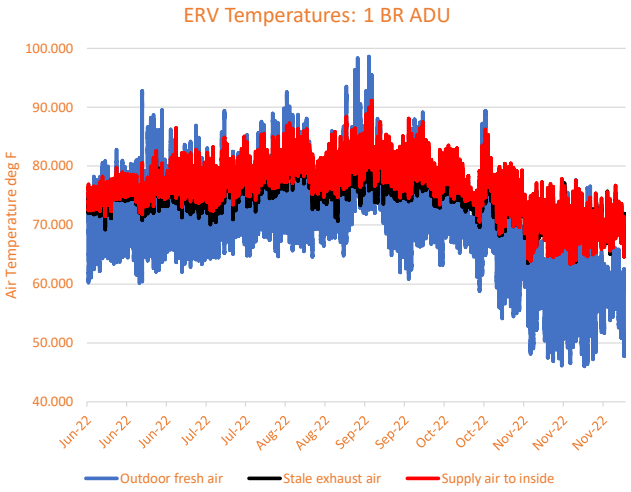


Illustration courtesy of Field Controls

TYPICAL DATA FROM RVs



- Supply air to space tempered in ERV
- Winter outdoor temps into 40s while supply air in mid-60s
- Summer outdoor temps to 100 while supply air in high-80s

How do Recovery Ventilators Work?

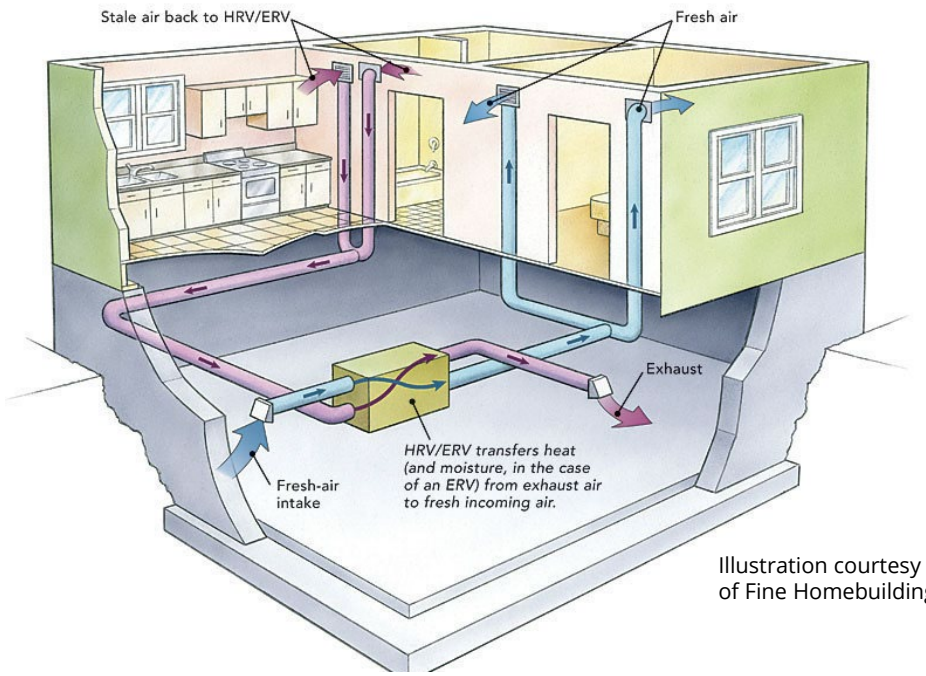
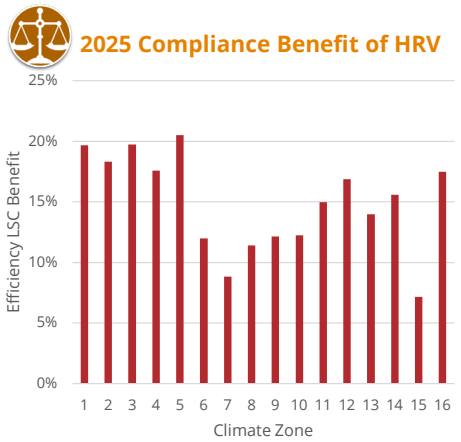


Illustration courtesy of Fine Homebuilding

Energy Code Compliance Benefits of HRV/ERV

- Recovery Ventilators average 15% boost to using the **Performance Approach** for compliance:
  - More in CZs with high heating loads
  - Less in milder and hotter CZs
- **Performance** compliance credit typically increases when:
  - Recovery effectiveness % is increased
  - Fan are more efficient (watts per cfm)
  - Increasing airflow beyond minimum (up to 125% of Energy Code minimums)
  - System is equipped with an FID



Based on modeling in 2025 CBECC software. 2,100 ft² home with balanced system supporting 72% sensible recovery effectiveness; fan efficacy 0.7 W/cfm; and 120% of Energy Code minimum airflow (91 cfm)

SoCalGas — A Sempra Energy utility

BUILD SMART

RECOVERY VENTILATORS: IMPACT ON MODELED ENERGY USE, ENERGY CODE COMPLIANCE, GREENHOUSE GAS EMISSIONS, AND PEAK ELECTRICITY DEMAND IN CALIFORNIA HOMES AND MULTIFAMILY BUILDINGS

February 16, 2022

This study presents the **energy savings** in the Performance Approach using ERV/HRVs: Link

- ❑ CZ 1-5 (coastal)
  - Meeting minimum requirements saves approximately 11-15%
  - "Best-in-class" ERV/HRV's can save up to 21-31%
- ❑ CZ 6-9 (mild) and 15 (desert) are less suited to ERV/HRVs

https://www.3c-ren.org/wp-content/uploads/2023/07/Best-in-Class-RV-final-report-June-2022.pdf

Evolving Building Energy Efficiency Ratings

For Multifamily Construction



Energy Code	New Construction	Additions	Alterations
2022	Source, TDVe, TDVt	TDV Energy	TDV Energy
2025	**Source, LSCe, LSCt**	**LSCe**	**LSCe**

New: "LSC"

t = "total" LSC metric (also factors in PV and flexibility)

e = "efficiency" LSC metric

Source Energy (Source):
The long run marginal source energy of fossil fuels that are combusted as a result of building energy consumed either directly at the building site or to meet the electrical demand of the building considering the long-term marginal hourly resources of Commission-projected electric system resource procurement. For a given hour, the value in that hour for each forecasted year is averaged to get a lifetime average source energy.

Long-term System Cost (LSC):
CEC-projected present value of costs to California's energy systems over a period of 30 years. Does not represent a prediction of individual utility bills. Ensures that all modeled building features are specified on a one-for-one equivalent energy use or equivalent energy cost basis. Consists of large data sets that convert electricity, gas and propane to LSC energy. The rate of conversion varies for each hour of the year, climate zone, energy type (electricity, natural gas and propane), and building type (low-rise residential, high-rise residential, nonresidential, and hotel/motel).

Compliance Metrics (2025)

Efficiency LSC

a score representing the building energy efficiency expressed in terms of LSC based metric

Includes energy used by:
- Envelope
- Indoor Fans
- HVAC
- DHW
- Other loads (self-utilization credit and lighting when applicable)

Total LSC

a score representing the building's Total LSC while also factoring in PV + Flexibility

Includes energy used by:
- Efficiency measures
- Indoor Fans
- Photovoltaics
- Batteries
- Precooling

Source

a score representing the building energy efficiency expressed in terms of an hourly source carbon based metric

Includes energy used by:
- Envelope
- Indoor Fans
- HVAC
- DHW
- Photovoltaics
- Batteries
- Other loads

A building complies ONLY if **all three** compliance scores are met
(**each** Proposed Design score is **lower or equal** to Standard Design score)

Big Picture: Other Benefits of HRV/ERV



- ERV/HRVs can be used to meet **Mandatory** and **Prescriptive** IAQ fan requirements of the Energy Code
- ERV/HRVs can also fulfill **Mandatory** local bathroom exhaust fan requirement
  - If a **continuous control** scheme is used for the bathroom exhaust fan (versus demand controlled), the airflow requirements are reduced to 20 cfm (Table 160.2-F)
- Some ERV/HRVs come equipped with enhanced features that can further improve the indoor air of the dwelling unit:
  - Boost mode for high humidity or high CO_2
  - Demand controlled ventilation in which the fan cfm is adjusted based on CO_2 level
  - Summertime bypass feature to provide fresh cool air when outside air is favorable

Check Your Understanding #4

What do you think?

How much Performance Compliance credit is possible for multifamily projects using ERV/HRVs?

a. About 15% on average for typical ERV/HRV depending on climate zone

b. None, they are **Mandatory** and cannot change the compliance results

c. 100%, since all projects will comply when using ERV/HRVs



Check Your Understanding #5

What do you think?

What are some other benefits of Recovery Ventilators? (Select all that apply)

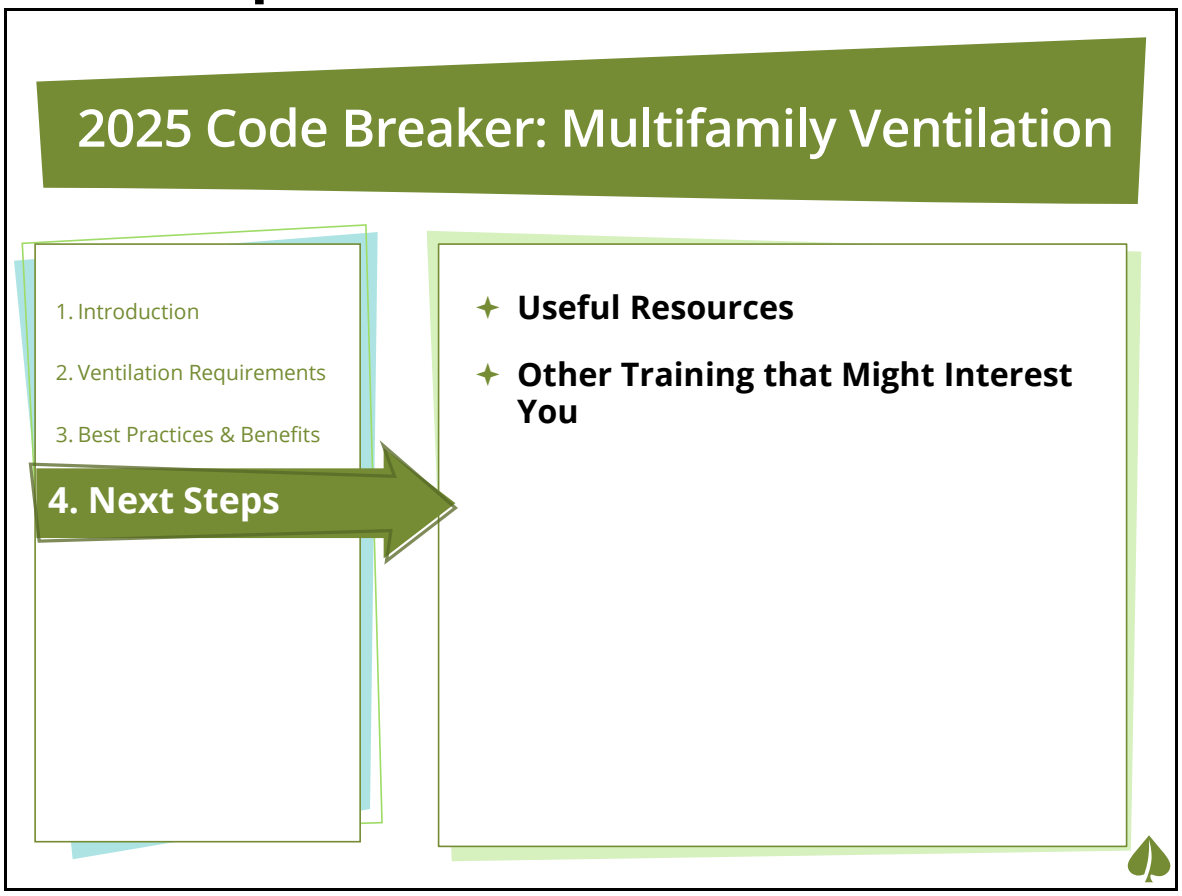
a) Lower CO_2 levels boosts cognitive performance and sleep quality

b) Some ERV/HRVs can automatically increase air flow when contaminants are detected

c) Incoming fresh air temperature is more comfortable than supply ventilation without heat recovery



Next Steps


2025 Code Breaker: Multifamily Ventilation
1. Introduction
2. Ventilation Requirements
3. Best Practices & Benefits
4. Next Steps
Useful Resources
Other Training that Might Interest You

2025 Fact Sheets on Energy Code Ace



Virtual Classes



What's New in 2025 Nonresidential Energy Code
Online Live Event



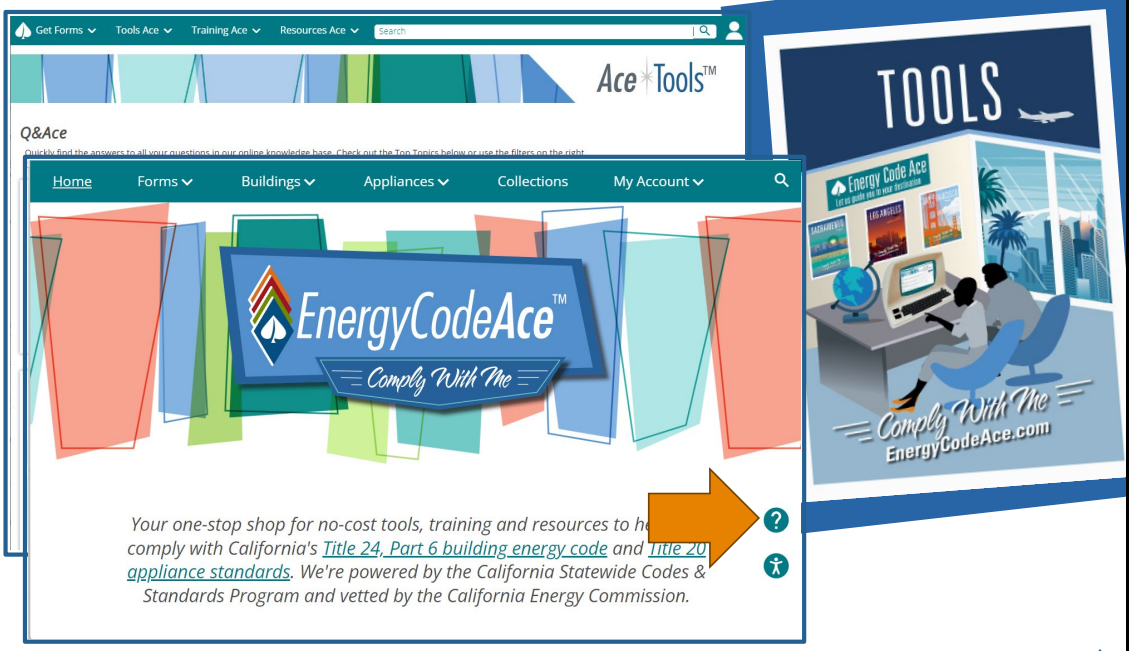
What's New in 2025 Residential Energy Code
Online Live Event



Multifamily Standards for Energy Consultants
Online Live Event



Q & Ace and Helpdesk



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Contacts & Evaluation



Thank you

Please feel free to reach out to us with your questions and comments!

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