



TRI-COUNTY
REGIONAL ENERGY NETWORK

SAN LUIS OBISPO • SANTA BARBARA • VENTURA

July 15, 2026

Energy Recovery Ventilators: Installation, Energy Savings, and Compliance

Nick Brown, Build Smart Group

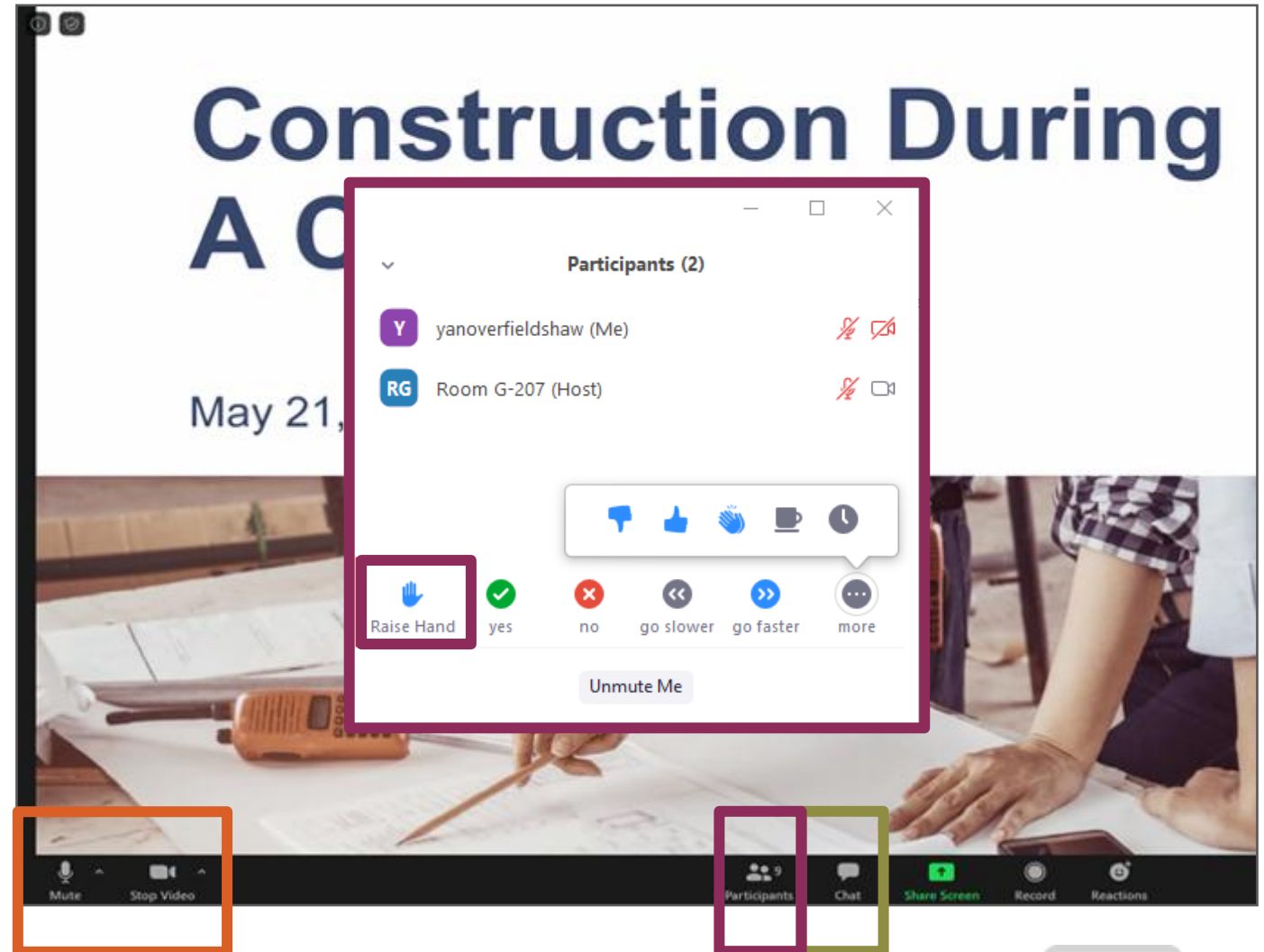
Scott Kelly, SK Fresh Air

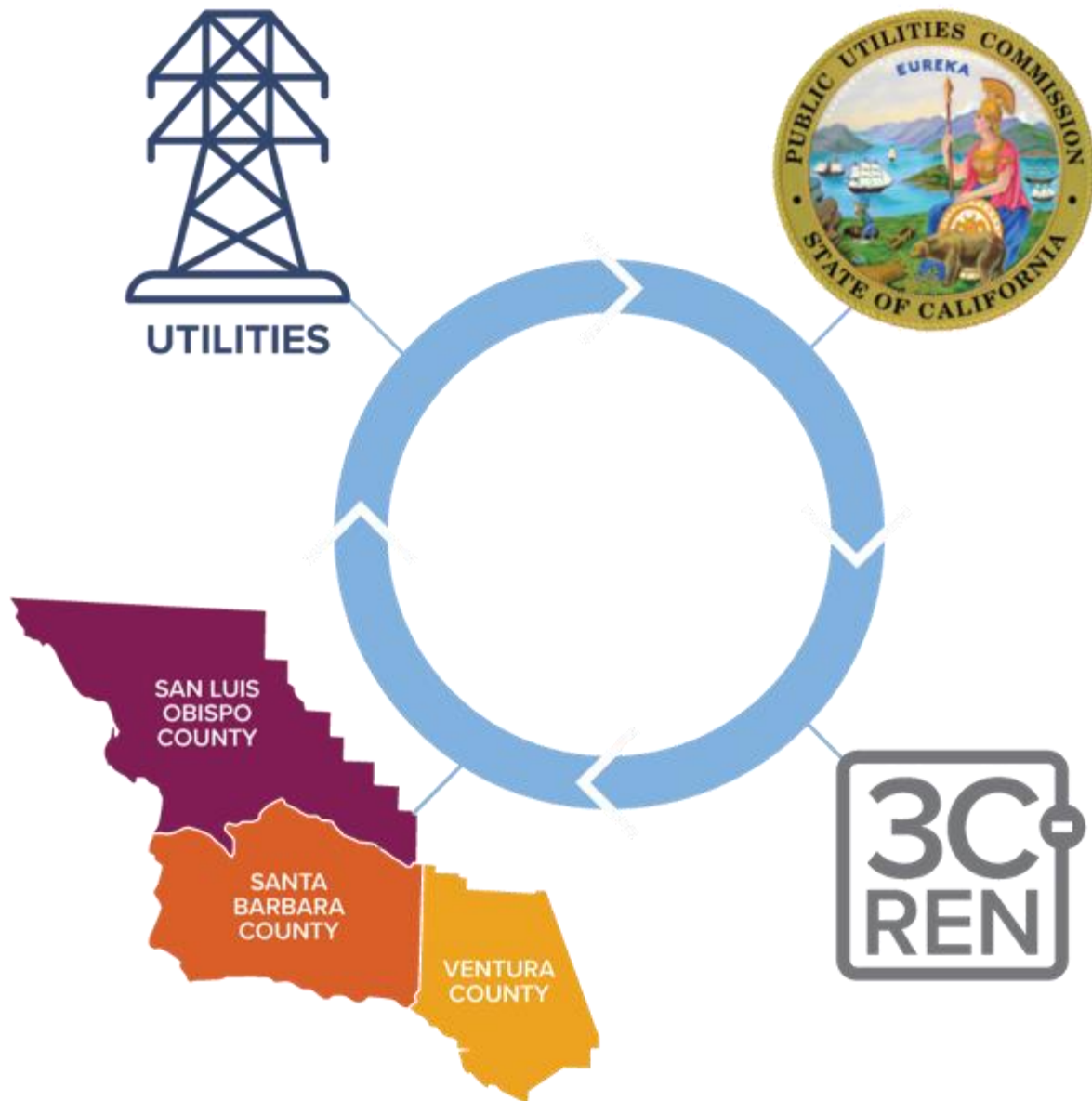


Before We Begin

Here are some quick reminders:

- Call in? Please **share** full name to confirm attendance
- To receive AIA LUs, you **must attend** at least 80% of the training. Attendance will be verified
- Use the "**Chat**" to share questions or comments
- Slides/recording are **shared** after most events and can be found on 3C-REN's on-demand page
- 3C-REN does **not** allow **AI notetakers**, unless used to accommodate a disability





Tri-County Regional Energy Network

3C-REN is a collaboration between the tri-counties

Our programs reduce energy use for a more sustainable, equitable and economically vibrant Central Coast

Our free services are funded via the CPUC, bringing ratepayer dollars back to the region



Our Services

Incentives



HOME ENERGY SAVINGS

3c-ren.org/for-residents
3c-ren.org/multifamily



COMMERCIAL ENERGY SAVINGS

3c-ren.org/commercial

Contractors can enroll at
3c-ren.org/contractors

Training



BUILDING PERFORMANCE TRAINING

3c-ren.org/events
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ENERGY CODE CONNECT

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View past trainings at
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Technical Assistance



AGRICULTURE ENERGY SOLUTIONS

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ENERGY ASSURANCE SERVICES

3c-ren.org/assurance



A photograph of a family of four sitting on a green couch in a bright, modern living room. Three young women with curly hair are laughing and huddled together on the left, while a man with a beard sits on the right, smiling. A woven basket and a potted plant are visible in the background.

July 16, 2026

ENERGY RECOVERY VENTILATORS

ENERGY SAVINGS AND COMPLIANCE CREDIT IN THE ENERGY CODE

March 5,
2025

NICK BROWN

President
Build Smart Group
Long Beach



SCOTT KELLY

General Contractor & Building Scientist
President, SK Fresh Air, LLC



OUR TIME TOGETHER

July 16, 2026



Energy Recovery Ventilators

IAQ appliances and HVAC energy savers in one



Mechanical Ventilation

Why the energy code requires it and how much is needed



How ERVs Work

Balanced ventilation with heat recovery



Energy Savings

How much energy do ERVs save in various California climate zones?



Compliance Credit

How much do ERVs help comply with Title 24?



Tips for Specifying ERVs

Making sure the right ERV is installed right

BASED ON RESEARCH FOR:



**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

**By Nick Brown, Build Smart Group
& Luke Morton, Morton Green Building Services**

LET'S GET ENGAGED

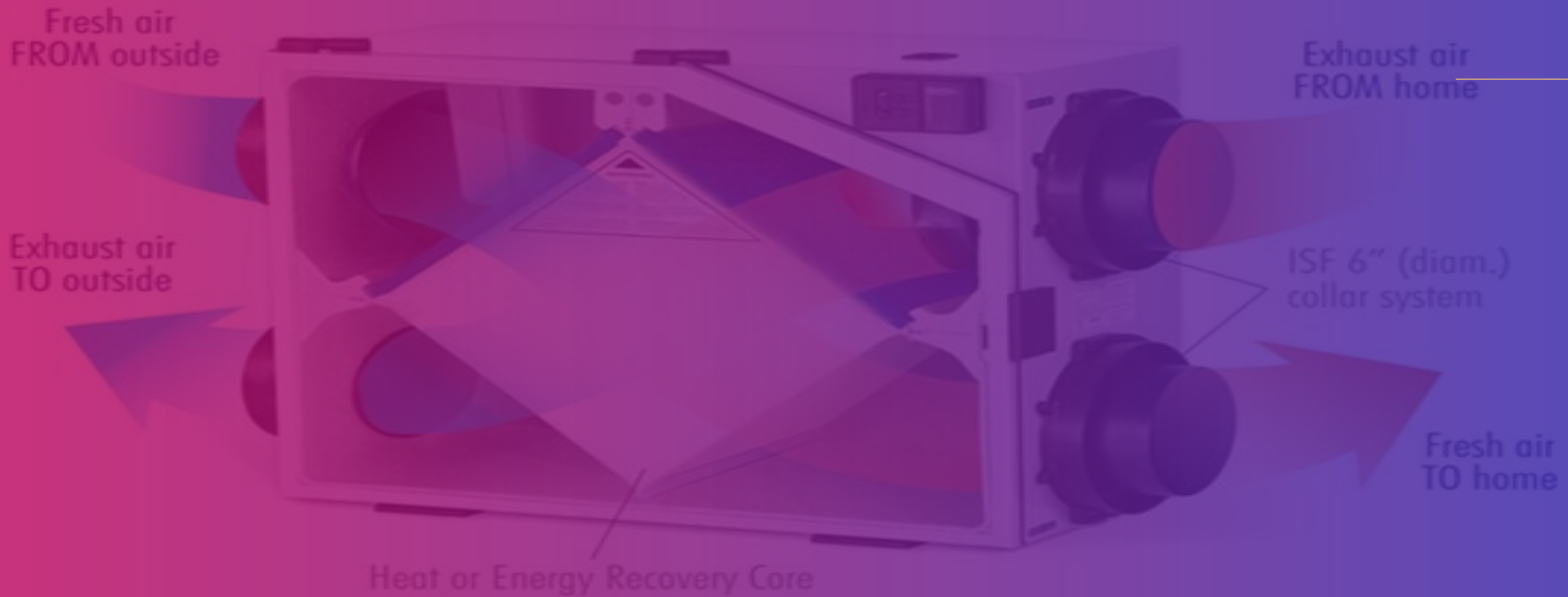
What does "Energy Recovery Ventilators" make you think?

recycle
a word
erv
efficient
expensive
fresh air
implicated
breathing
complicated
compliance credit
something that uses energy



menti.com
2732 3198

11 of 18 responded



ENERGY RECOVERY VENTILATORS

Let You Live Better, Sleep Better, and Work Better, and Your HVAC Run Better

WHY ENERGY RECOVERY VENTILATORS?

Indoor Air Quality

- ERVs provide continuous ventilation for indoor spaces to dilute pollutants and enhance IAQ
- They ventilate more effectively than spot ventilation fans such as bathroom exhaust
- They keep neutral pressure in the home, which improves control of IAQ

Energy Savings

- ERVs temper the incoming fresh air using the outgoing stale air
- This reduces the burden on the space conditioning system

WHY ENERGY RECOVERY VENTILATORS?

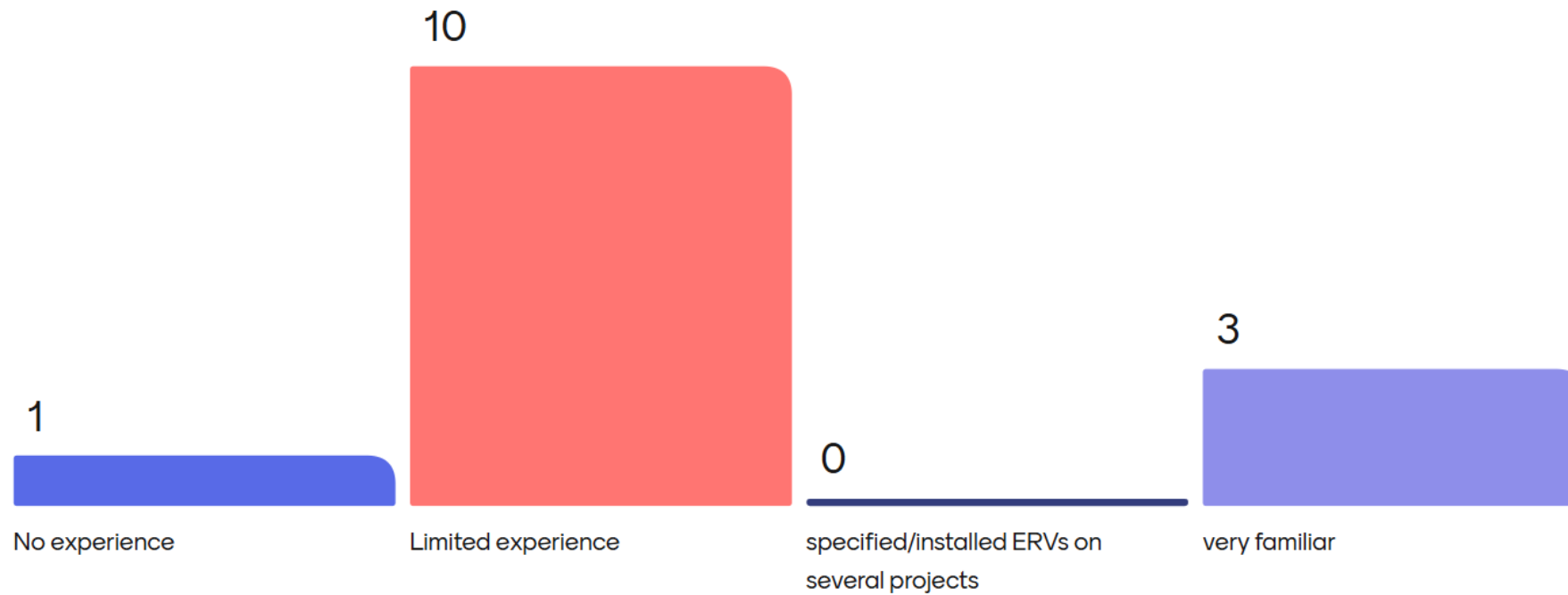
Energy Code Compliance

- ERVs are one of the most powerful compliance credits available because of the energy savings they can generate
- By using ERVs in your energy models, you can compensate for features that are not up to code, add extra glazing, etc.

Health

- ERVs allow you to boost ventilation in your home when needed, when the house is full or germs are going around
- By getting fresh air behind closed bedroom doors and into home offices, you perform better

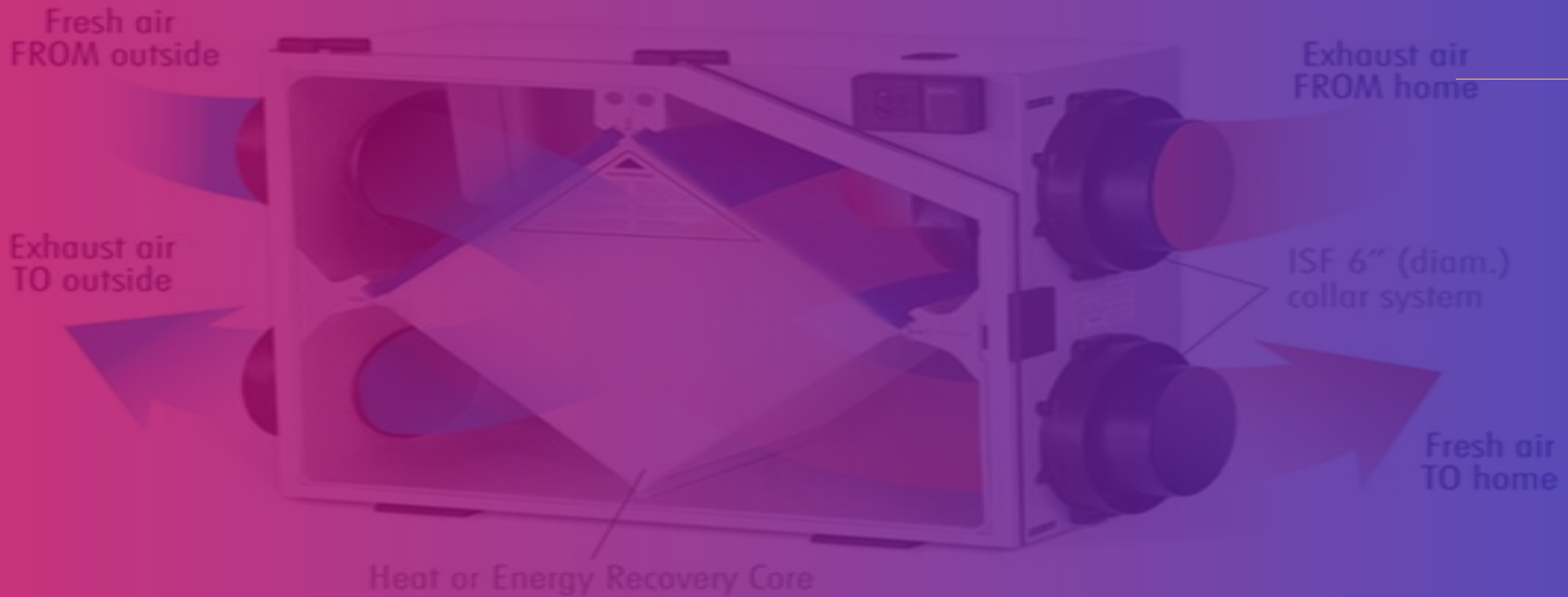
What is your experience level with RVs?



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14 of 18 responded





MECHANICAL VENTILATION

Why we need it, How to do it, How much?

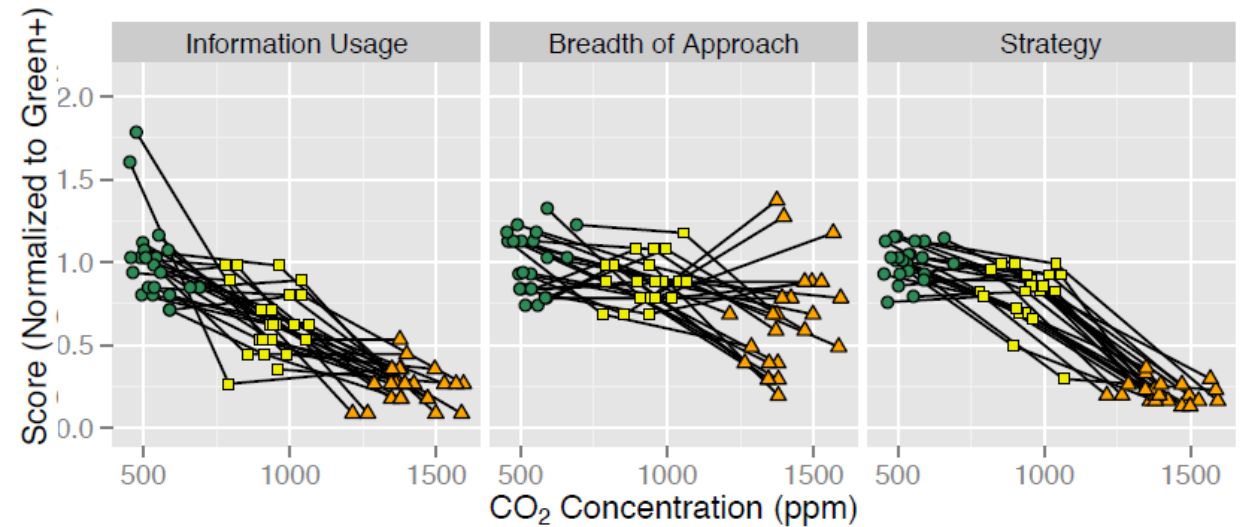
Energy Recovery Ventilators 2026

INDOOR AIR QUALITY

- Source Control
- Dilution of Pollutants
 - Mechanical Ventilation
 - Spot sources
 - Bathrooms
 - Kitchens
 - Whole home
- Mechanical Ventilation
 - ASHRAE 62.1 (nonres) & 62.2 (residential)
 - Title 24 adopts ASHRAE 62.2 for residential standards

INDOOR AIR QUALITY

- “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*



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

Range Hoods

§150.0(o)1.G.iii



New Standards Introduced for 2022



- ✦ Must meet requirements of Table 150.0-G by EITHER :
 - ✧ capture efficiency (CE) OR
 - ✧ Air flow (cfm)
- ✦ Higher air flow and CE required for gas ranges.
- ✦ In all cases, max 3.0 sones applies via ASHRAE 62.2, Section 7.2

✦ **HERS Verification Required**

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



HOW TO VENTILATE?

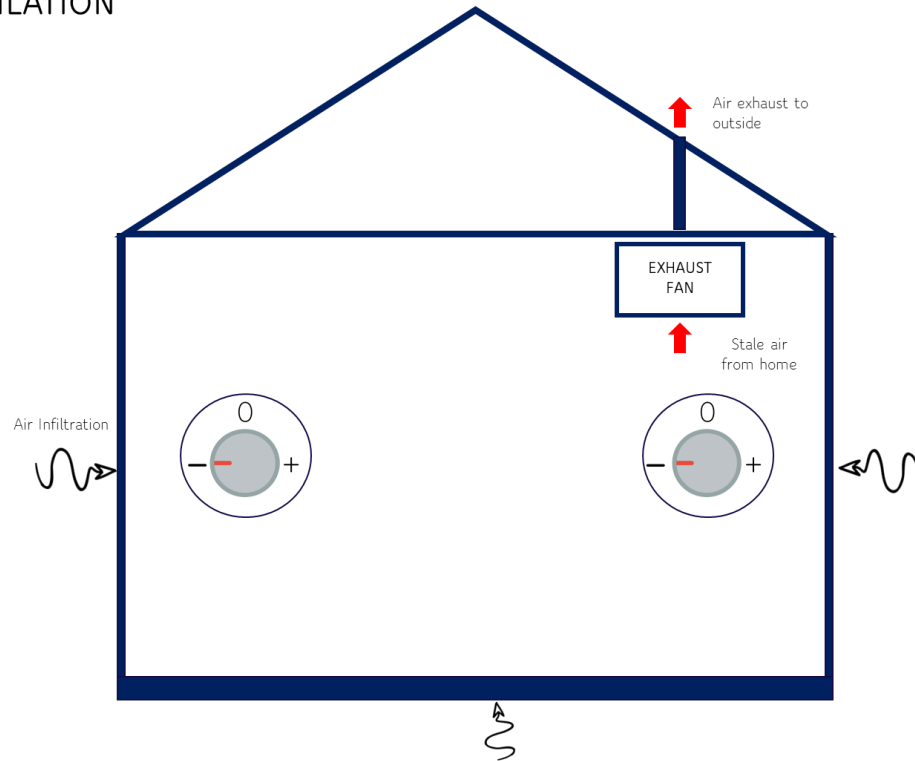
All new homes must have continuously operating mechanical ventilation systems (or equivalent intermittent)

- Exhaust only
- Supply only
- Balanced

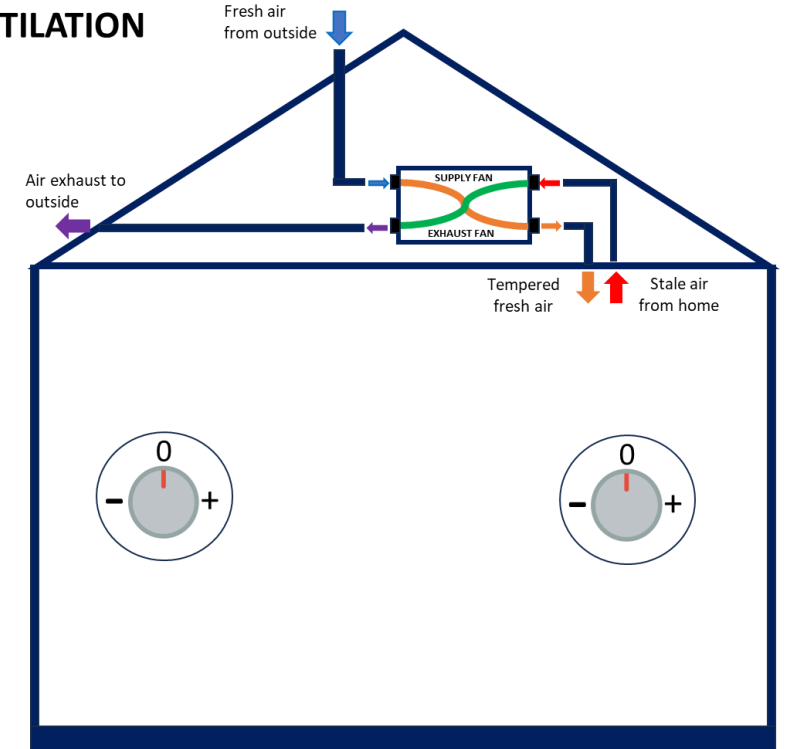


WHAT KIND OF VENTILATION?

EXHAUST VENTILATION



HEAT RECOVERY VENTILATION



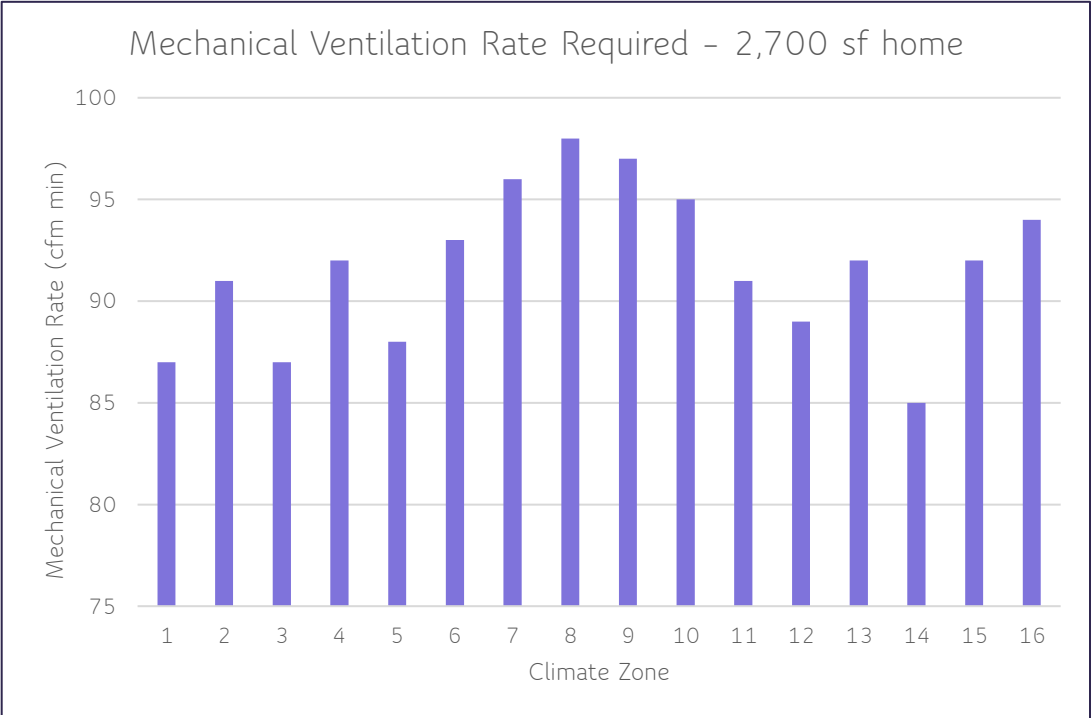
HOW MUCH VENTILATION?

2025 Energy Code requires minimum whole house ventilation rate:

Total Required Ventilation Rate
(Equation 150.0-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, ft²
 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.



INDOOR AIR QUALITY (IAQ) FANS								
01	02	03	04	05	06	07	08	09
Dwelling Unit	Airflow (CFM)	Fan Efficacy (W/CFM)	IAQ Fan Type	Includes Heat/Energy Recovery?	IAQ Recovery Effectiveness - SRE	Includes Fault Indicator Display?	HERS Verification	Status
SFam IAQVentRpt	84	0.35	Exhaust	No	n/a	No	Yes	

Scott's Take: Why You Might Want More Ventilation than Code Requires

Why more Ventilation per Occupant

- 7.5 or 15 cfm per occupant is the guideline
- Master bedroom: 2 occupants, 2 dogs, and 1 toddler

2 tubes per bedroom = 20-30 cfm is guideline

But how many do we really need?

Bottom up Approach to Air Flow

- If each occupant needs 7.5 cfm:
 - 2 tubes @ 15 cfm = 30 cfm OK
- If each occupant needs 15 cfm:
 - 4 tubes @ 15 cfm = 60 cfm OK
 - Balances 4 exhaust tubes in bathroom (2 water closet & 2 bathroom)

VENTILATION AFTER COVID-19

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



[Sci Rep.](#) 2019; 9: 2185.

Published online 2019 Feb 18. doi: [10.1038/s41598-019-38825-y](https://doi.org/10.1038/s41598-019-38825-y)

PMCID: PMC6379436

PMID: [30778136](#)

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

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³Center for Infectious Disease Dynamics, The Pennsylvania State University, University Park, USA

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VENTILATION AFTER COVID-19

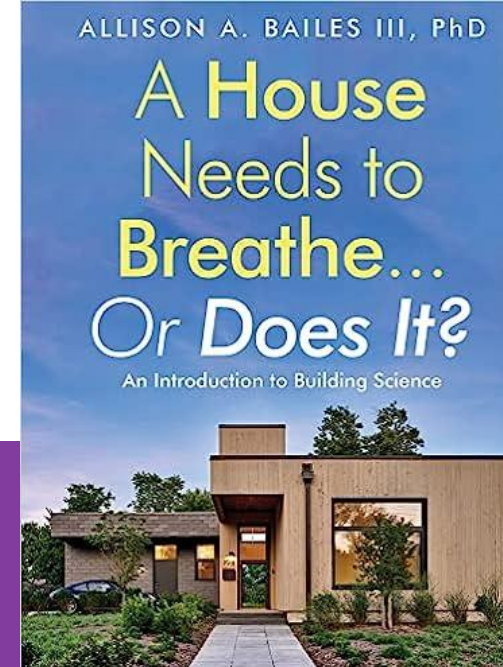
- “You building designers have a bigger impact on health than we clinicians”
- “Darn architects put wood on the walls [of our hospital] and it was peeling off the walls because it was dry in there. We added humidity to keep the wood trims on the wall and brought down infection rates by accident.”

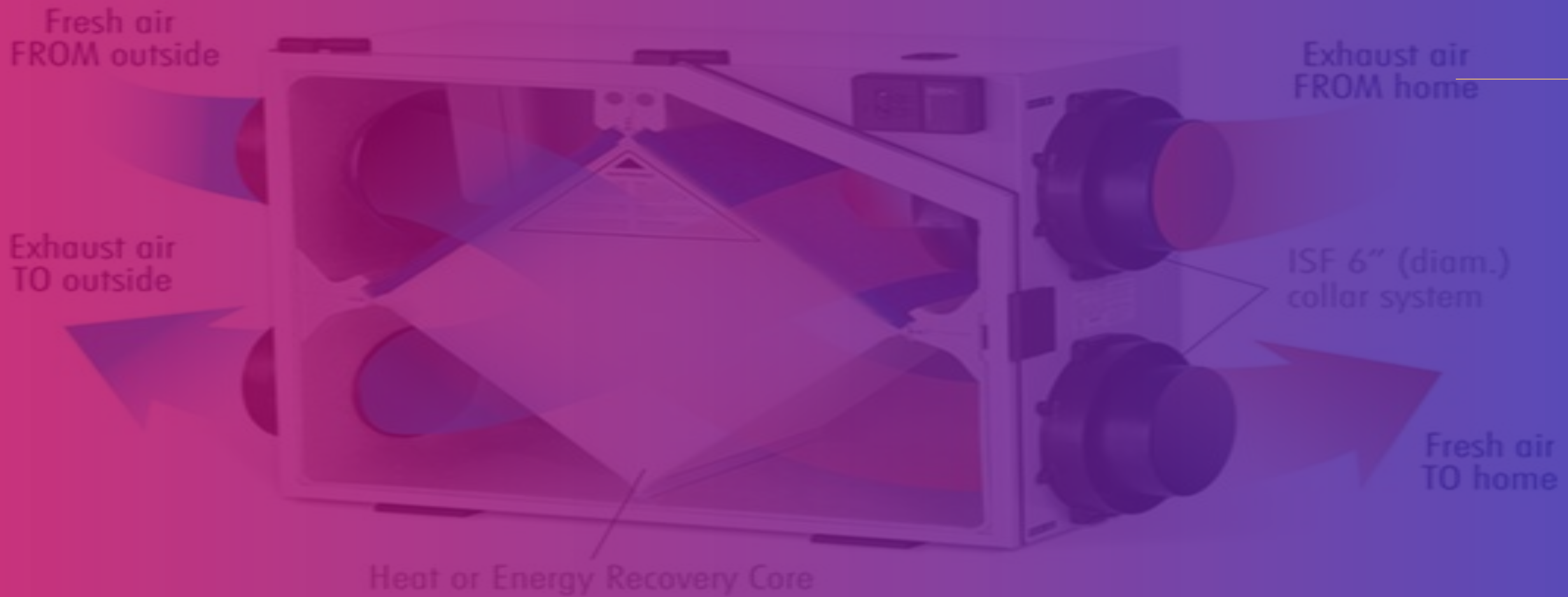


40TO60RH.COM
THE HEALTHY HUMIDITY

TO "E" OR TO "H"; THAT IS THE QUESTION

- ERVs have membranes that temper the incoming air using the humidity of the exhaust air
 - HRVs do not swap moisture (just heat)
 - Title 24 doesn't care about E vs H when it comes to ventilation ...
 - But occupants might care
 - Mild climates: HRVs better
 - Other climates: ERVs 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 ERVs WORK

Fresh filtered supply air + Exhaust stale air + Heat recovery

HOW ENERGY RECOVERY VENTILATORS WORK

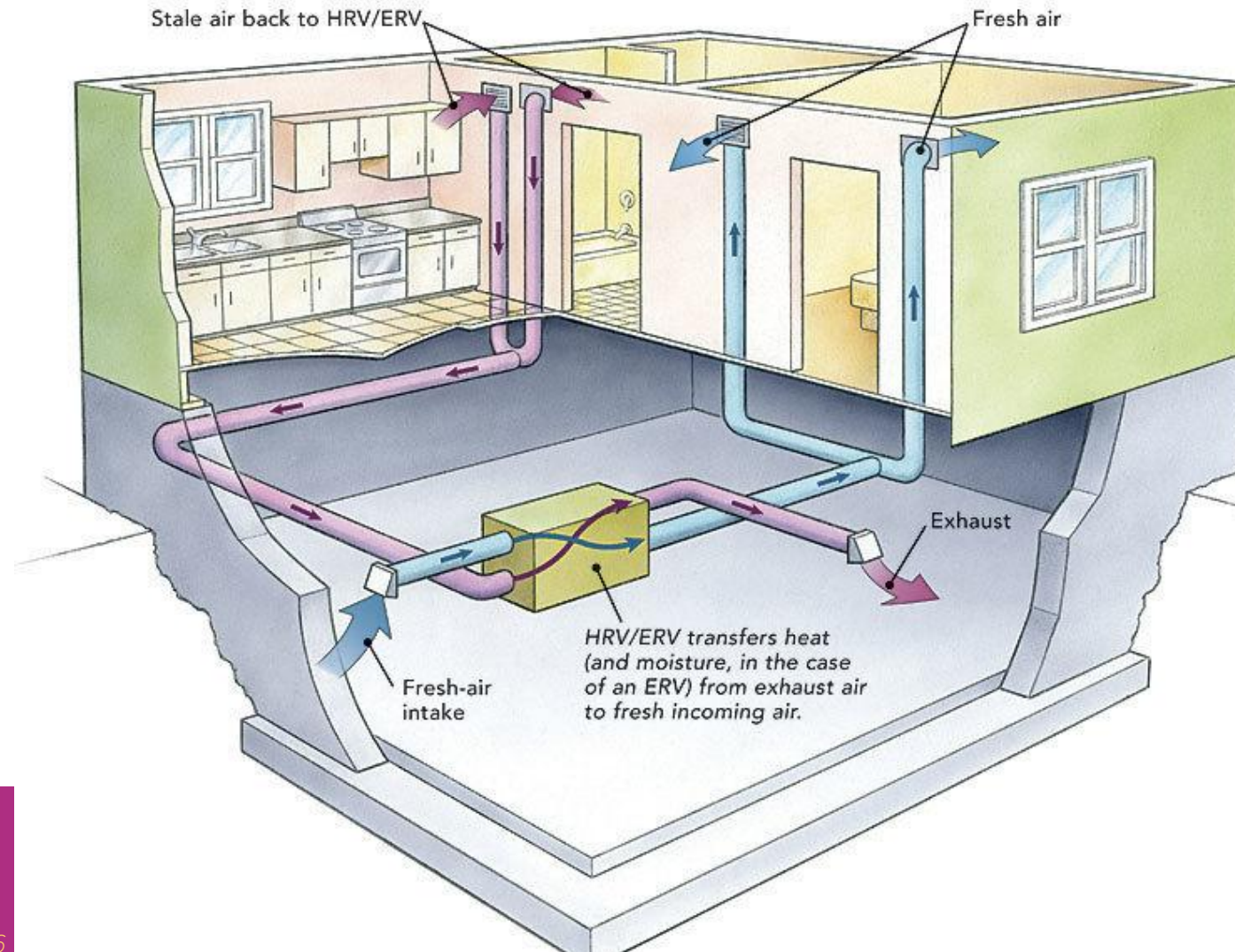


Illustration courtesy of
Fine Homebuilding

HOW ENERGY RECOVERY VENTILATORS WORK

- Fresh air brought in from known location & filtered
 - Supplied in ducts to bedrooms and living areas
- Stale air removed from areas with moisture
 - typically kitchen and bathrooms

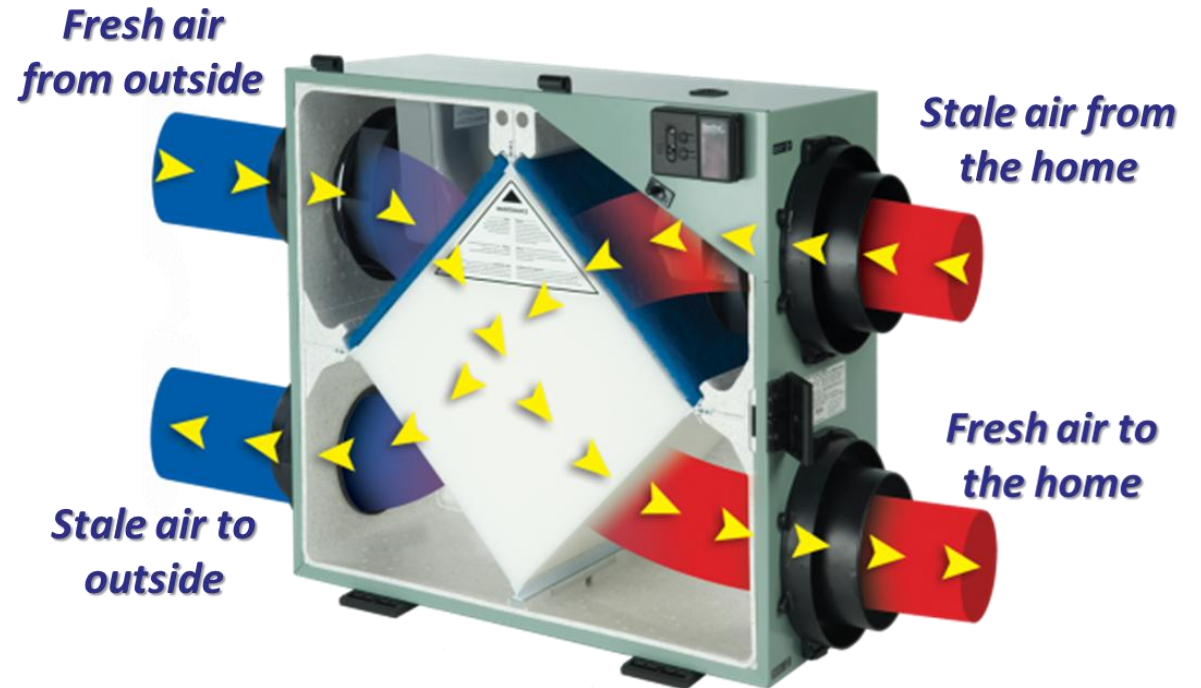
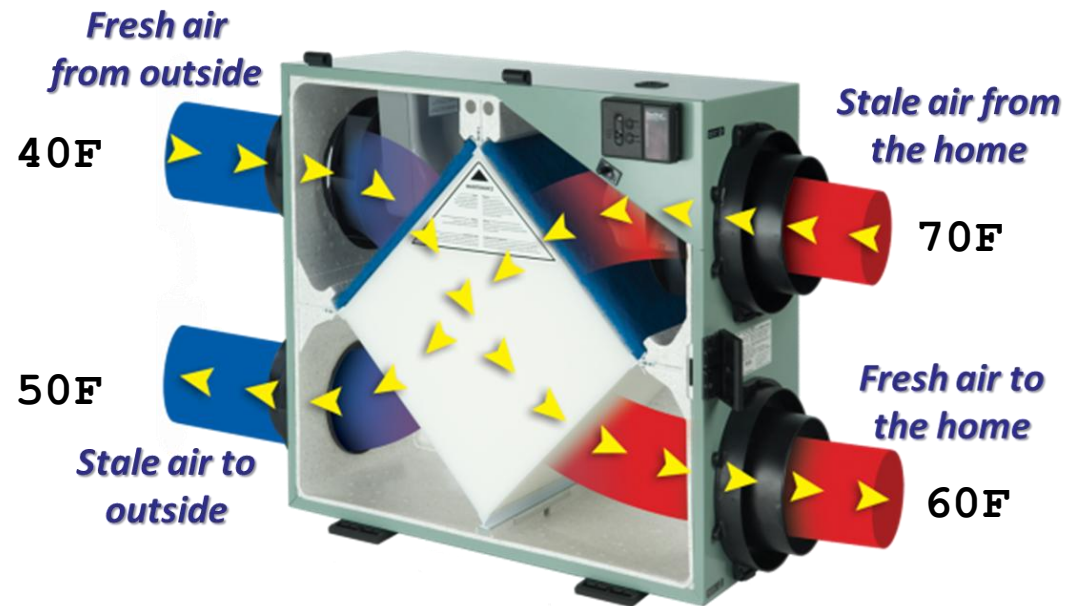


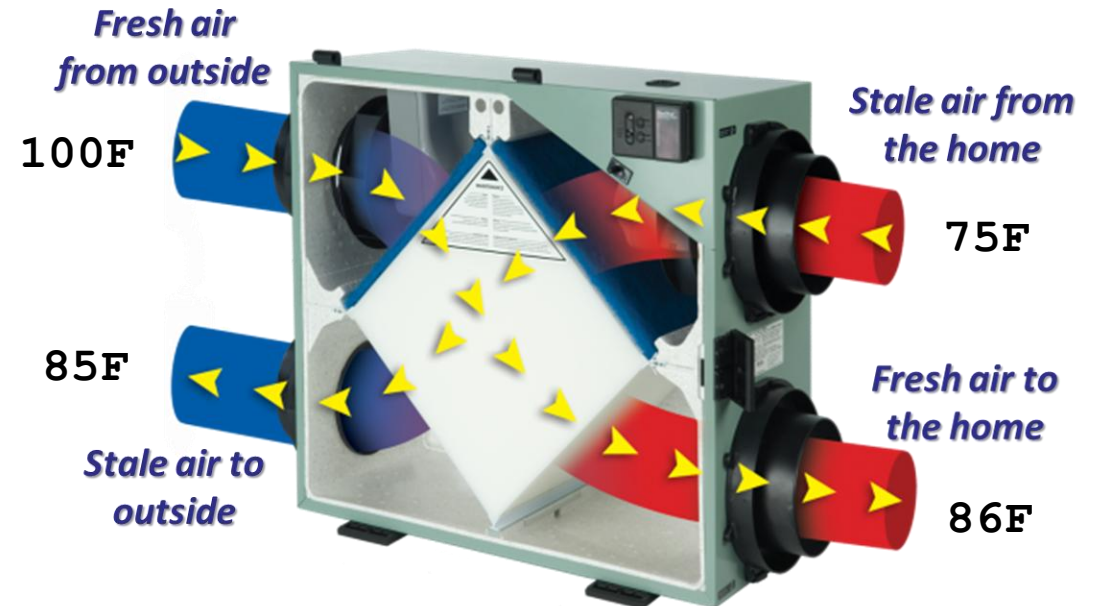
Illustration courtesy of Field Controls

THE HEAT RECOVERY PART

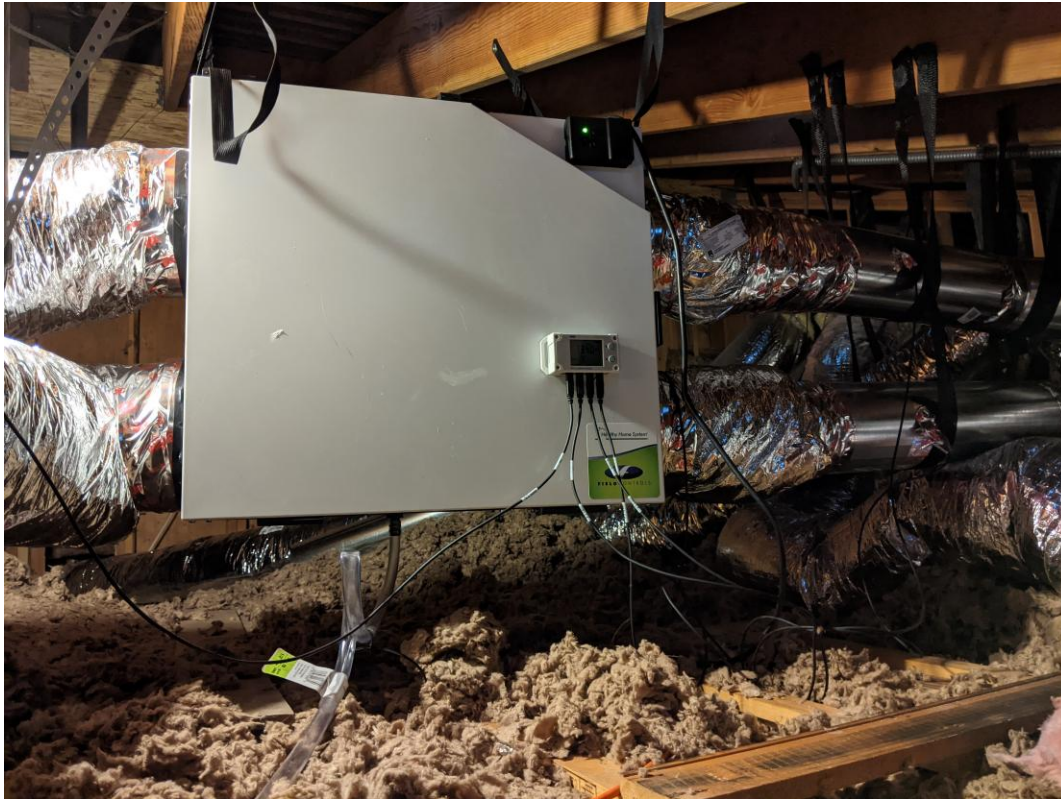
WINTER



SUMMER



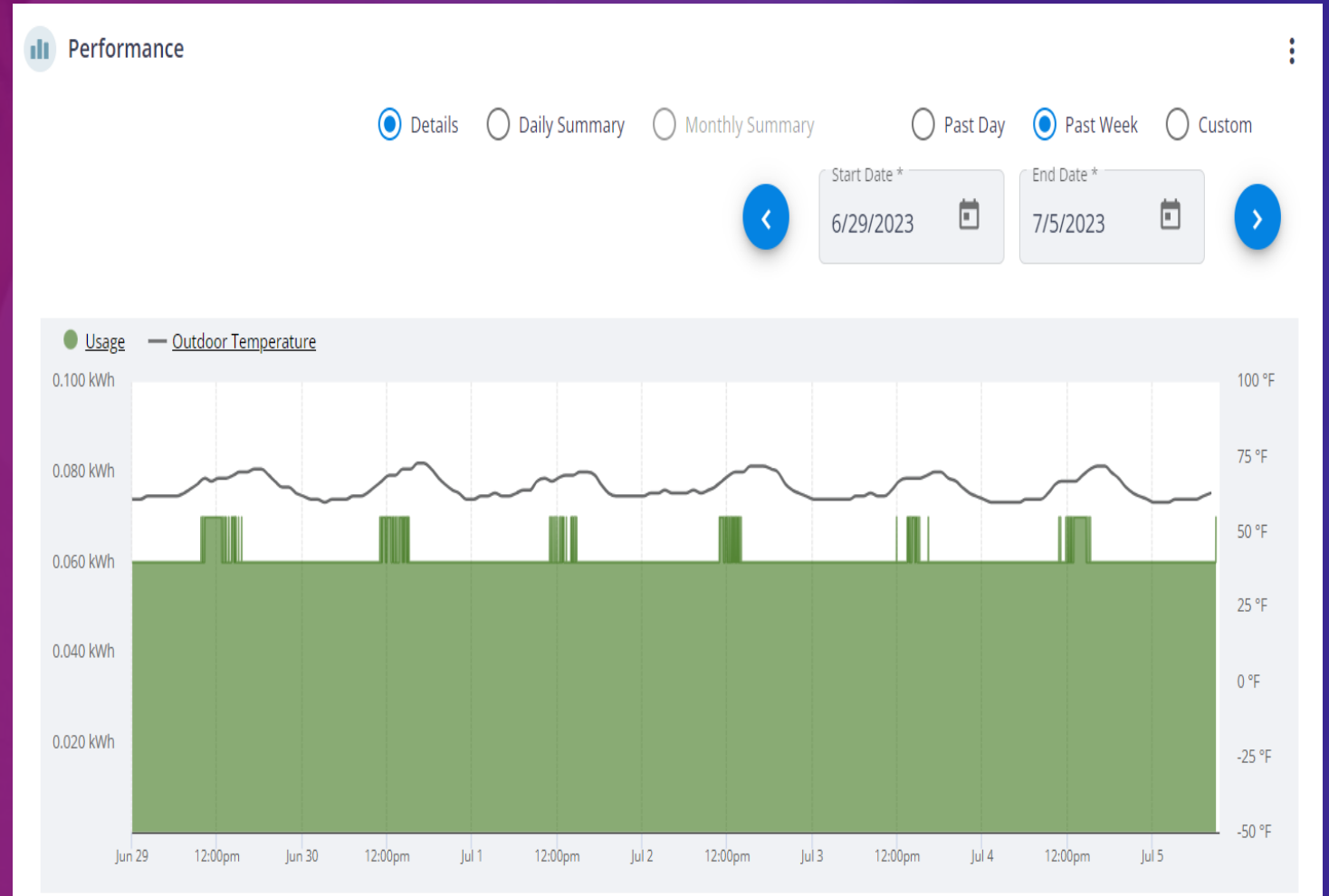
NICK'S RECOVERY VENTILATORS



DATA FROM NICK'S RVs

ADU ERV

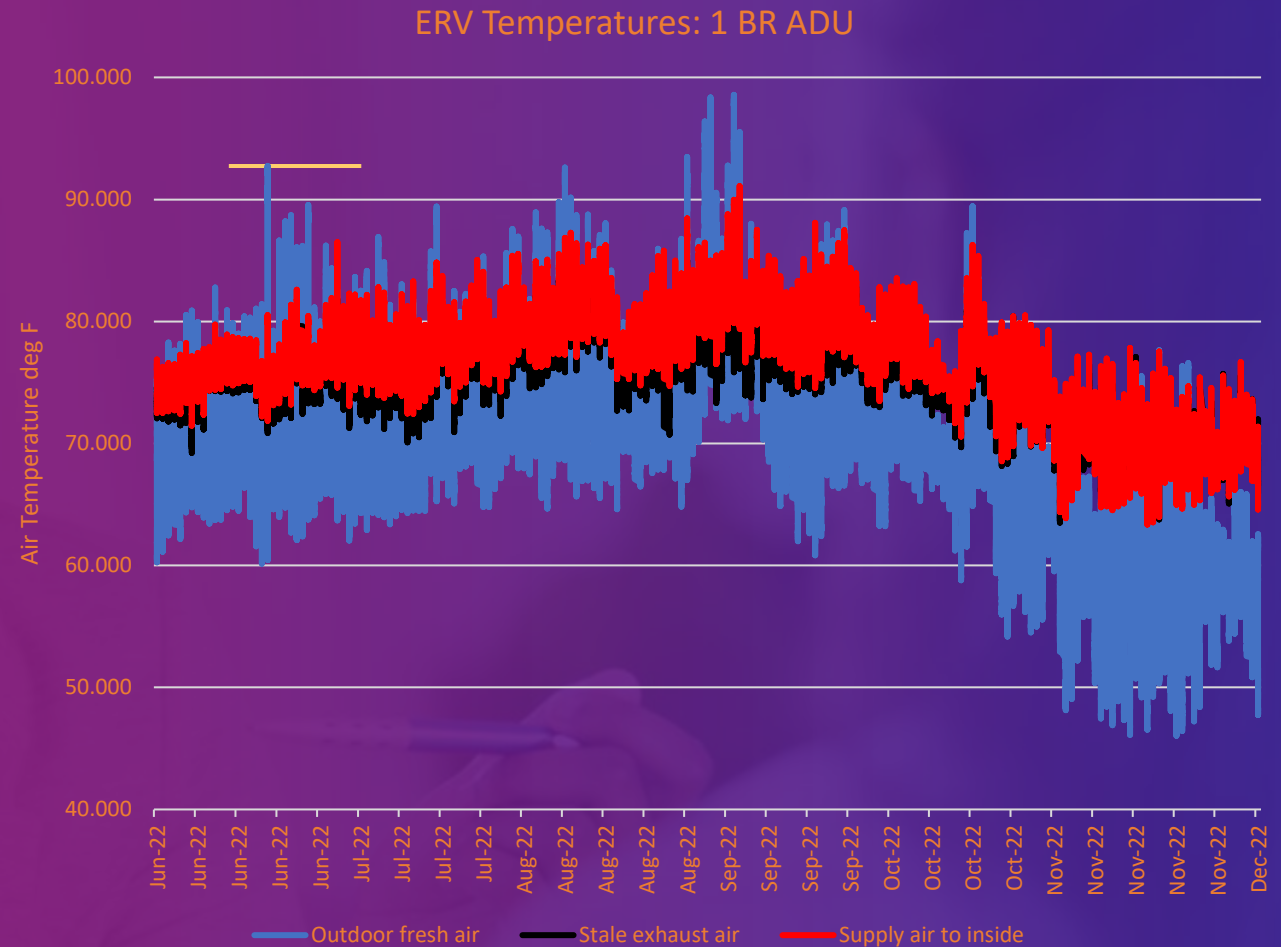
- 60 Watts continuous
- 60 cfm
- Boosts up to 70 Watts when humidity spikes



DATA FROM NICK'S ERV_s

ADU ERV

- 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

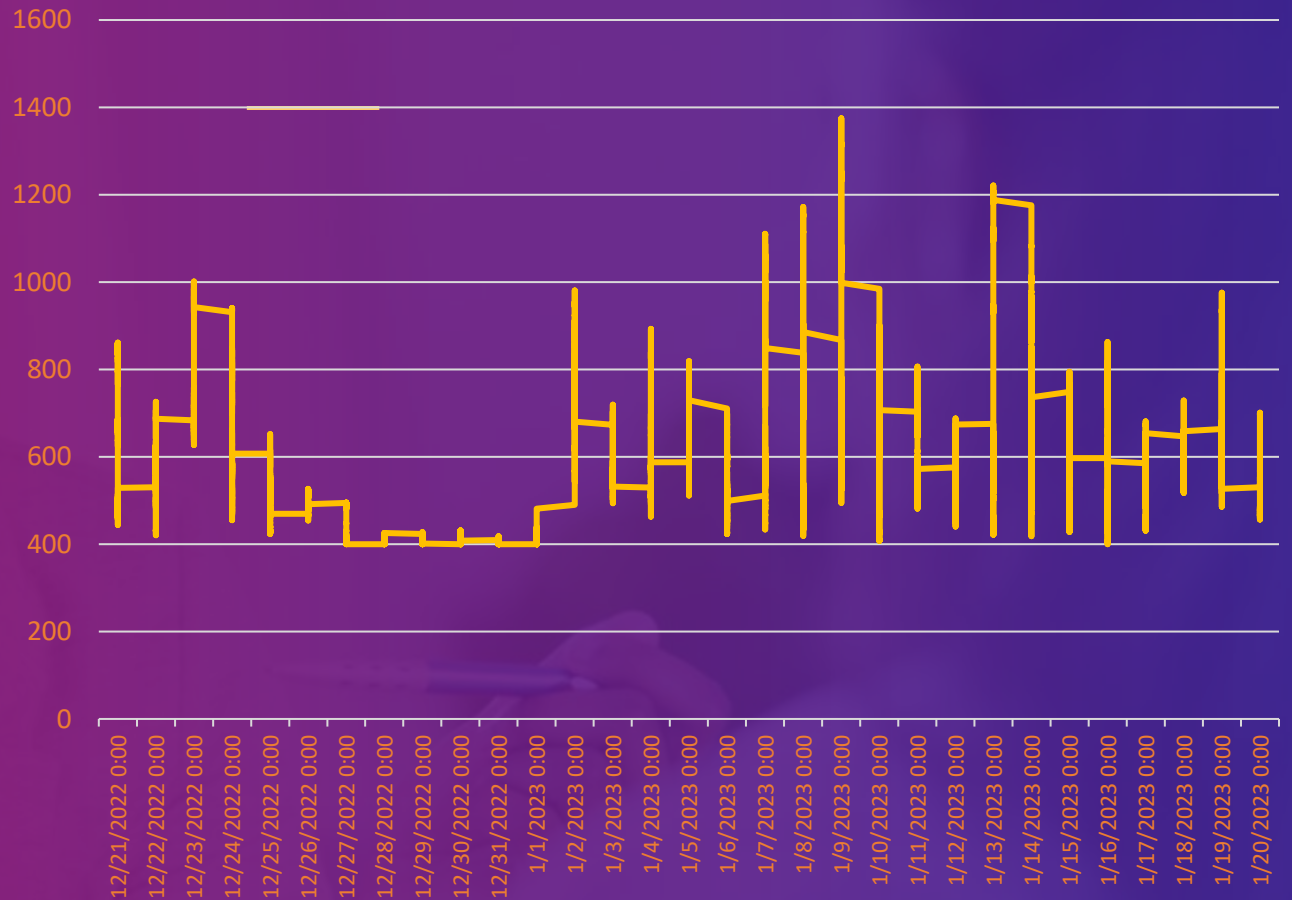


DATA FROM NICK'S ERV_s

ADU ERV

- CO₂ maintained under 800 in Winter months with windows closed
- Spikes up to 1,400 cfm occur with extra people in space - hence the need for Boost mode

CO₂ Concentration with ERV



Series 1

DATA FROM NICK'S ERVs

Fresh Air Behind Closed Bedroom Doors

CO₂ in bedroom spiked to 1,000-1,200 cfm during night time sleep before HRV connected
With HRV, CO₂ spikes limited to 700-800 cfm



IAQ IMPACT



SCOTT'S RECOVERY VENTILATORS

2026



RenewAire EVPremiumX
\$2,168.00 USD



Aldes InspirAIR TOP - 265 CFM - ERV
\$3,490.00 USD



Aldes InspirAIR ELITE - 150 CFM - ERV
\$1,590.00 USD

ERVs On The Market



SAVE \$971.91



Panasonic BalancedHome™ Elite Energy Recovery Ventilator - Side port, 160 CFM, 120V

Model: FV-16VEC1S

~~\$2,347.90~~

\$1,375.99

SAVE \$698.00



Broan ONE 150 CFM Energy Recovery Ventilator (ERV), Power Cord

Model: BLP150E75NS-PC



1 Review

~~\$1,627.00~~

\$929.00

MY STORE

10-Port Manifold Kit

\$3,190.00 USD

Shipping calculated at checkout.

Please choose your "In" and "Out" Boot Assembly Options

In Round - Out Round

In Round - Out High Sidewall

In Round - Out Pass Through

In High Sidewall - Out Round

In High Sidewall - Out High Sidewall

In High Sidewall - Out Pass Through

In Pass Through - Out Round

In Pass Through - Out High Sidewall

In Pass Through - Out Pass Through

Quantity

- 1 +

Add to cart

Buy with **shop**

More payment options

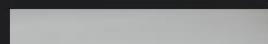
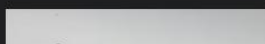
✓ Pickup available at 55 Hitchcock Way

Usually ready in 2-4 days

View store information



Welcome to our website!



MY STORE

8-Port Manifold Kit

\$2,690.00 USD

Shipping calculated at checkout.

Please choose your "In" and "Out" Boot Assembly Options

In Round - Out Round

In Round - Out High Sidewall

In Round - Out Pass Through

In High Sidewall - Out Round

In High Sidewall - Out High Sidewall

In High Sidewall - Out Pass Through

In Pass Through - Out Round

In Pass Through - Out High Sidewall

In Pass Through - Out Pass Through

Quantity

- 1 +

Add to cart

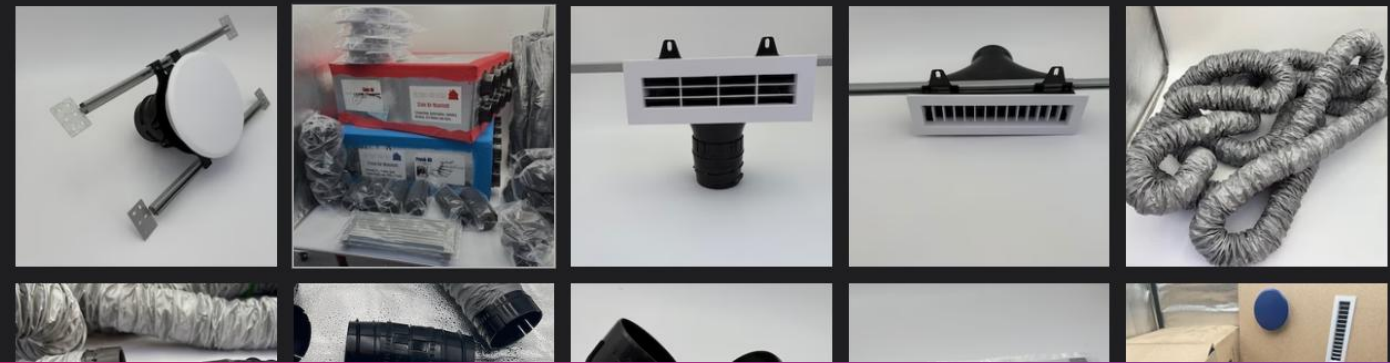
Buy with **shop**

More payment options

✓ Pickup available at 55 Hitchcock Way

Usually ready in 2-4 days

View store information





MY STORE

6-Port Manifold Kit

\$2,090.00 USD

Shipping calculated at checkout.

Please choose your "In" and "Out" Boot Assembly Options

In Round - Out Round

In Round - Out High Sidewall

In Round - Out Pass Through

In High Sidewall - Out Round

In High Sidewall - Out High Sidewall

In High Sidewall - Out Pass Through

In Pass Through - Out Round

In Pass Through - Out High Sidewall

In Pass Through - Out Pass Through

Quantity

- 1 +

Add to cart

Buy with **shop**

More payment options

✓ Pickup available at 55 Hitchcock Way

Usually ready in 2-4 days

View store information

🗨 Welcome to our website!





MY STORE

4-Port Manifold Kit

\$1,690.00 USD

Shipping calculated at checkout.

Please choose your "In" and "Out" Boot Assembly Options

- In Round - Out Round
- In Round - Out High Sidewall
- In Round - Out Pass Through
- In High Sidewall - Out Round
- In High Sidewall - Out High Sidewall
- In High Sidewall - Out Pass Through
- In Pass Through - Out Round
- In Pass Through - Out High Sidewall
- In Pass Through - Out Pass Through

Quantity

- 1 +

Add to cart

Buy with **shop**

More payment options

✓ Pickup available at 55 Hitchcock Way

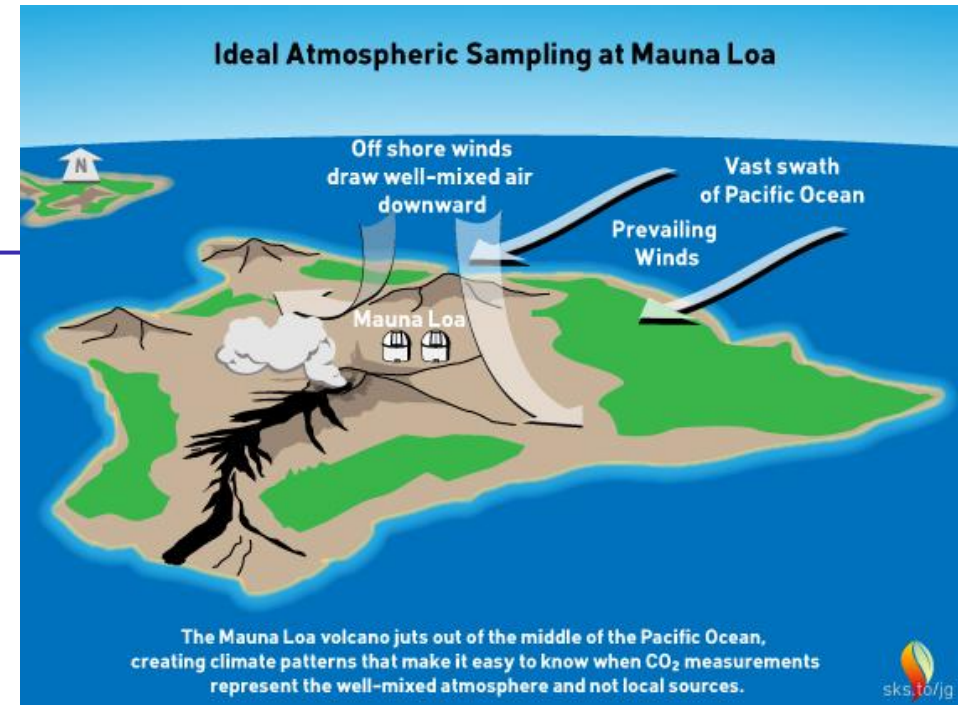
Usually ready in 2-4 days

View store information



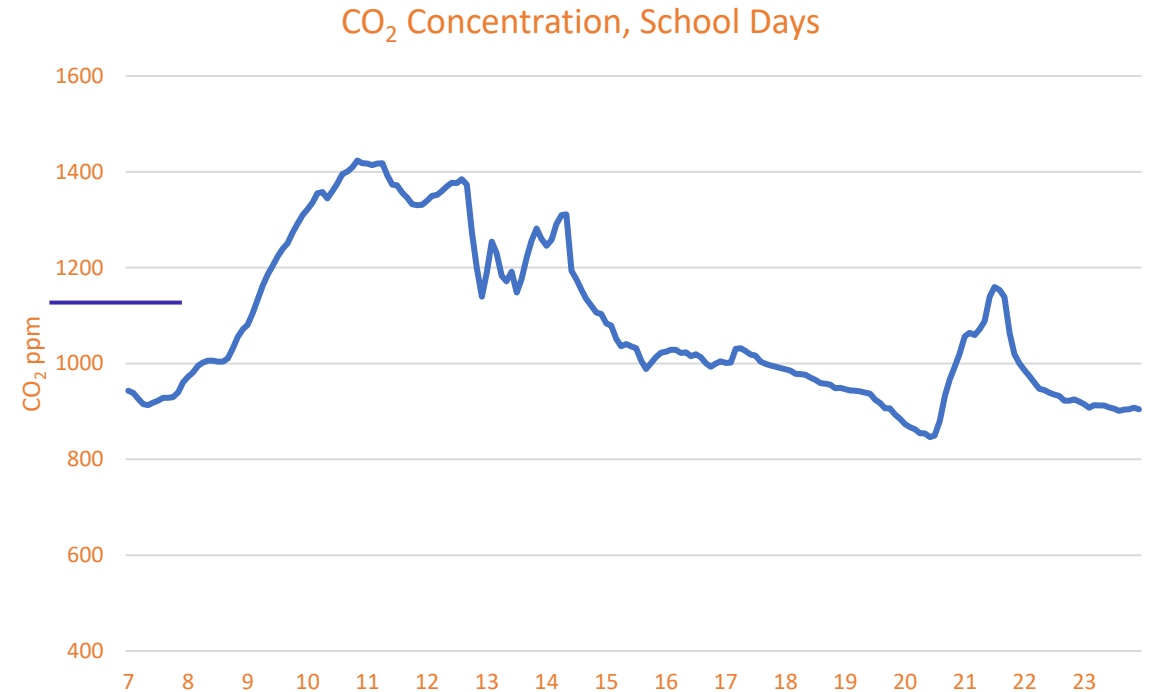
HOW MUCH CO₂ IS TOO MUCH?

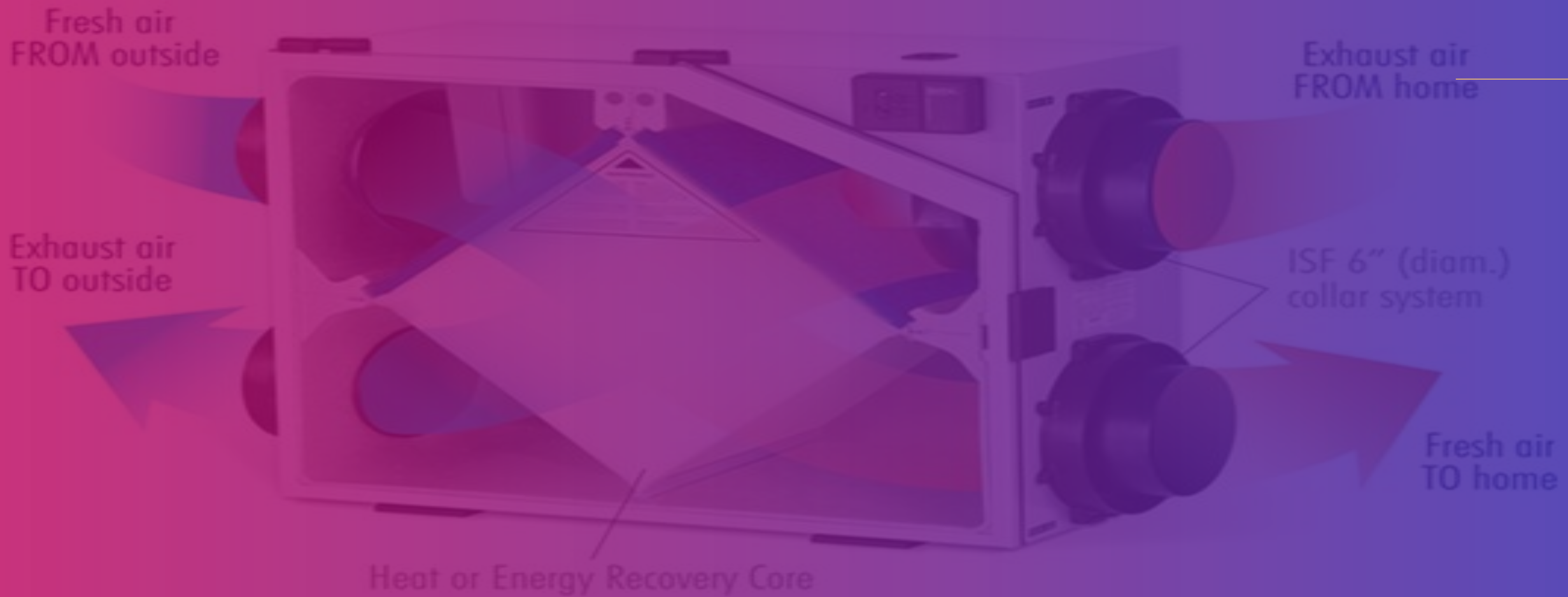
- Earth is at 424 ppm
- Harvard study used:
950 ppm = typical indoor levels
1,400 ppm = extreme
- CBRE used 800 ppm for their buildings
- Title 24 uses outdoor + 600 ppm for demand-control ventilation



COVID19 CLASSROOM CASE STUDY

- CO₂ steadily climbed to 1,400 ppm with 3 students on hot September day with windows closed
- ERV at 30 cfm into classroom kept CO₂ under 1,000 ppm





HOW MUCH ENERGY CAN THEY SAVE?

HVAC ENERGY SAVINGS

- Typical RVs: savings of 11-15% in CZ 1-5 vs exhaust only ventilation
- Best-in-Class RVs: 21-31% HVAC energy savings in CZ 1-5
- CZ 10-14 & 16 also show savings
- CZ 6-9 & 15 less well suited for energy savings with HRVs

The Math

TYPICAL RV

80 cfm exhaust fan: 28 Watts

80 cfm typical RV: ~56 watts

Annual extra ventilation energy = 245 kWh

Cooling energy savings, CZ5 = 0

Heating energy savings, CZ5 = 290 kWh

BEST-IN-CLASS RV

80 cfm B-I-C RV: ~40 Watts

Annual extra ventilation energy = 105 kWh

Cooling energy savings, CZ5 = 0

Heating energy savings, cZ5 = 395 kWh

HVAC ENERGY SAVINGS - TYPICAL RV

Climate Zone	HVAC Savings kWh	HVAC Savings therms	HVAC Savings mmbtu	Pct savings HVAC mmbtu	Cooling Savings kWh	Heating Savings kWh	Ventilation Savings kWh
1	301.8	-	1.0	6.9%	-	482.6	(180.6)
2	76.2	-	0.3	3.0%	15.0	256.2	(195.4)
3	21.7	-	0.1	1.5%	-	218.3	(195.4)
4	(17.9)	-	(0.1)	-1.2%	2.7	179.9	(199.0)
5	45.1	-	0.2	3.0%	-	235.2	(189.0)
6	(115.5)	-	(0.4)	-16.3%	5.3	95.7	(215.3)
7	(138.9)	-	(0.5)	-24.5%	(2.3)	76.8	(211.5)
8	(166.7)	-	(0.6)	-16.7%	(15.6)	69.4	(218.4)
9	(126.8)	-	(0.4)	-10.8%	(6.1)	90.3	(209.4)
10	(97.1)	-	(0.3)	-5.8%	(12.1)	120.8	(204.2)
11	44.4	-	0.2	1.4%	12.9	231.5	(199.0)
12	6.5	-	0.0	0.3%	2.2	203.0	(197.5)
13	(17.4)	-	(0.1)	-0.6%	24.0	163.7	(204.2)
14	31.0	-	0.1	1.0%	4.2	218.2	(190.4)
15	(103.5)	-	(0.4)	-2.3%	71.1	26.3	(199.0)
16	173.3	-	0.6	3.8%	(1.1)	376.1	(200.5)

Table 5: Impact of Changing Ventilation from Exhaust to HRV in 1-story Single Family Home with Heat Pump

Source: "Recovery Ventilators: Impact on Modeled Energy Use...", SoCal Gas, Feb 2022

HVAC ENERGY SAVINGS - B-I-C RV

Table 5: Energy impact of Best-in-class HRV in 2100 sq ft SFH with HP

Climate Zone	HVAC Savings kWh	HVAC Savings therms	HVAC Savings mmbtu	Pct savings HVAC mmbtu	Cooling Savings kWh	Heating Savings kWh	Ventilation Savings kWh
1	720.3	-	2.5	16.6%	-	810.1	(89.8)
2	394.3	-	1.3	15.7%	17.1	478.3	(101.0)
3	259.7	-	0.9	17.4%	-	360.7	(101.0)
4	200.8	-	0.7	13.9%	4.7	299.9	(103.7)
5	299.6	-	1.0	19.9%	-	395.7	(96.1)
6	42.2	-	0.1	5.7%	2.2	156.1	(116.2)
7	(5.2)	-	(0.0)	-1.5%	(10.0)	118.1	(113.3)
8	(27.7)	-	(0.1)	-3.1%	(18.1)	109.0	(118.6)
9	38.7	-	0.1	3.1%	(2.2)	152.5	(111.6)
10	101.0	-	0.3	5.9%	(1.2)	209.9	(107.7)
11	341.2	-	1.2	10.6%	47.9	397.0	(103.7)
12	267.0	-	0.9	9.2%	12.3	357.3	(102.6)
13	249.8	-	0.8	8.1%	64.6	292.9	(107.7)
14	337.2	-	1.1	10.6%	32.4	402.1	(97.2)
15	110.4	-	0.4	2.4%	180.6	33.6	(103.7)
16	554.4	-	1.9	12.2%	(4.8)	664.1	(104.9)

BEST-IN-CLASS RVs CAN DO MORE

- Integrated Heat Pumps for Heating & Cooling
- Ventilation Cooling via Bypass mode
 - Small Planet Supply study found 50 kWh cooling savings possible (Zehnder)
- Boost mode when added air flow needed
- Humidistat drives boost after a shower
- Demand control ventilation via CO₂ sensors



Automatic Fresh Air
Measurement & Control



Fresh Air Ventilation &
Recirculation Modes



Heat Pump Energy Recovery &
Conditioning



Variable Speed Compressor &
ECM Fans

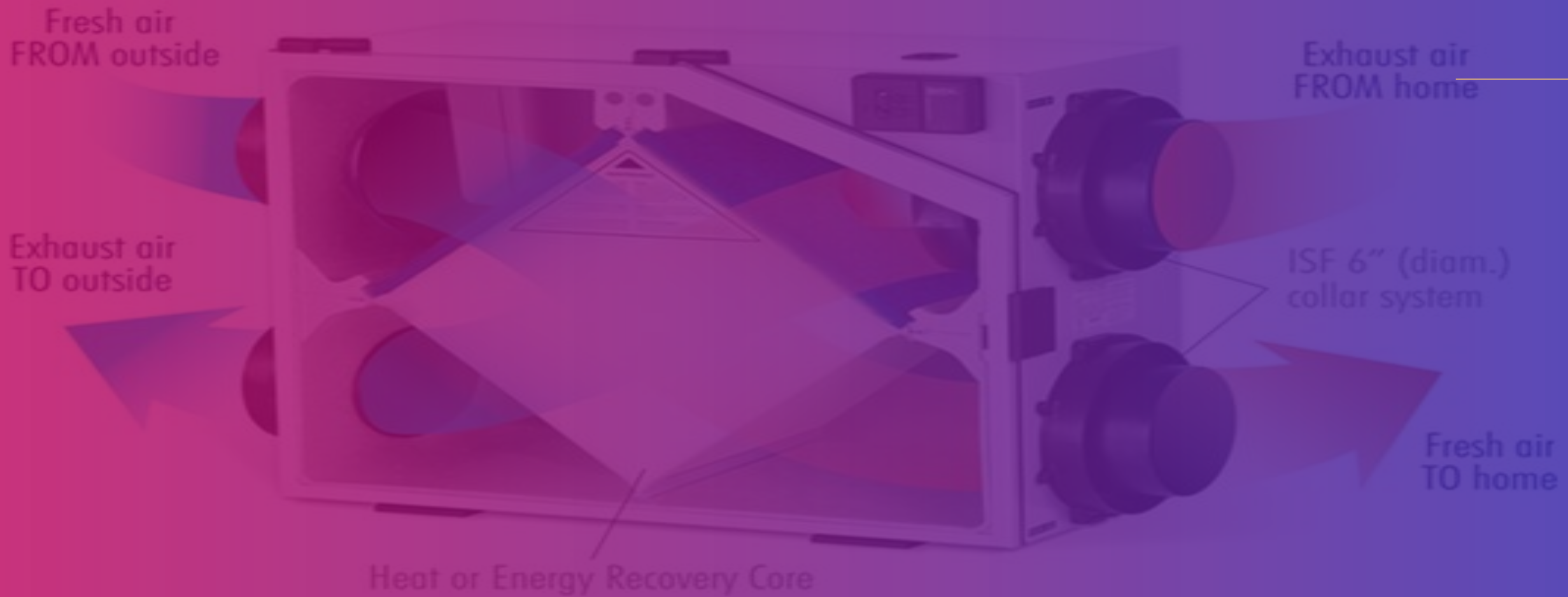


Elegant Controls
Internet Connected

How to Duct an ERV in a High-Performance Home

Video from a Recent Fire Rebuild in the Palisades





CODE COMPLIANCE & RVs

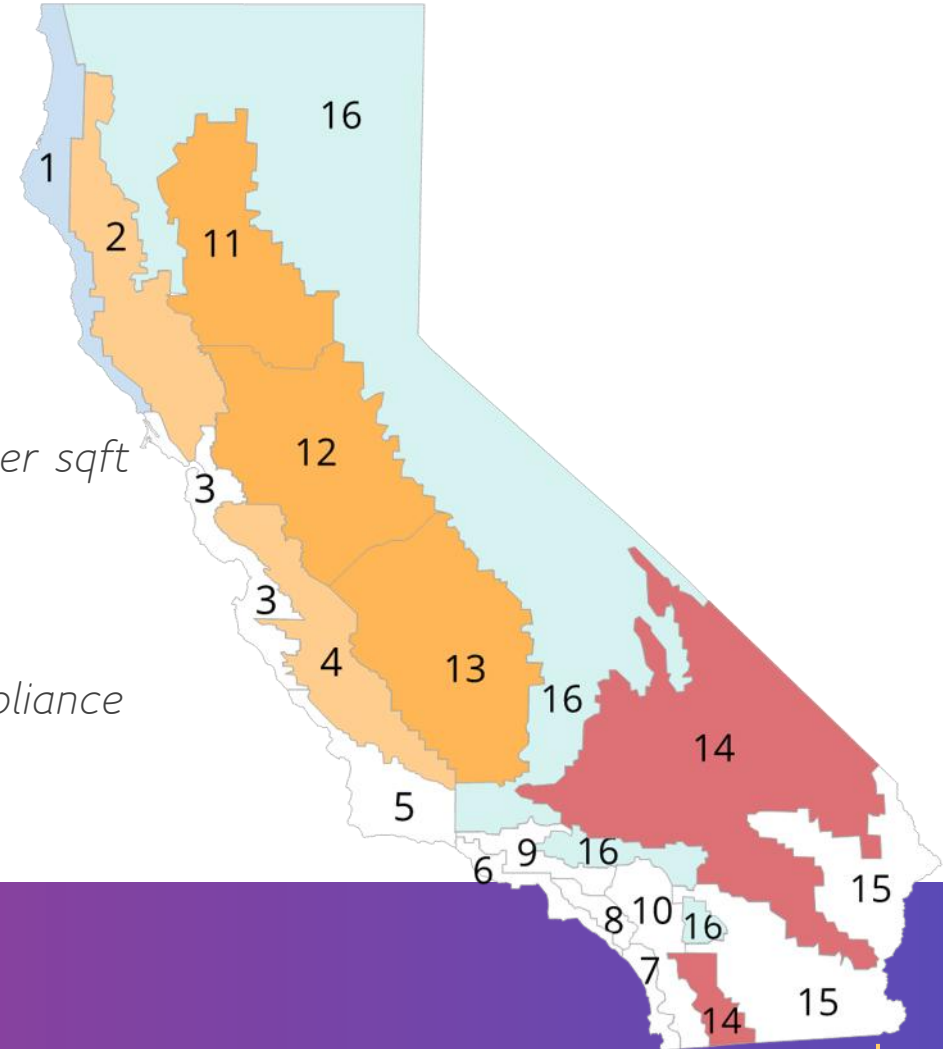
Miracle Workers in a White Box

Energy Recovery Ventilators 2026

When Are ERVs Required?

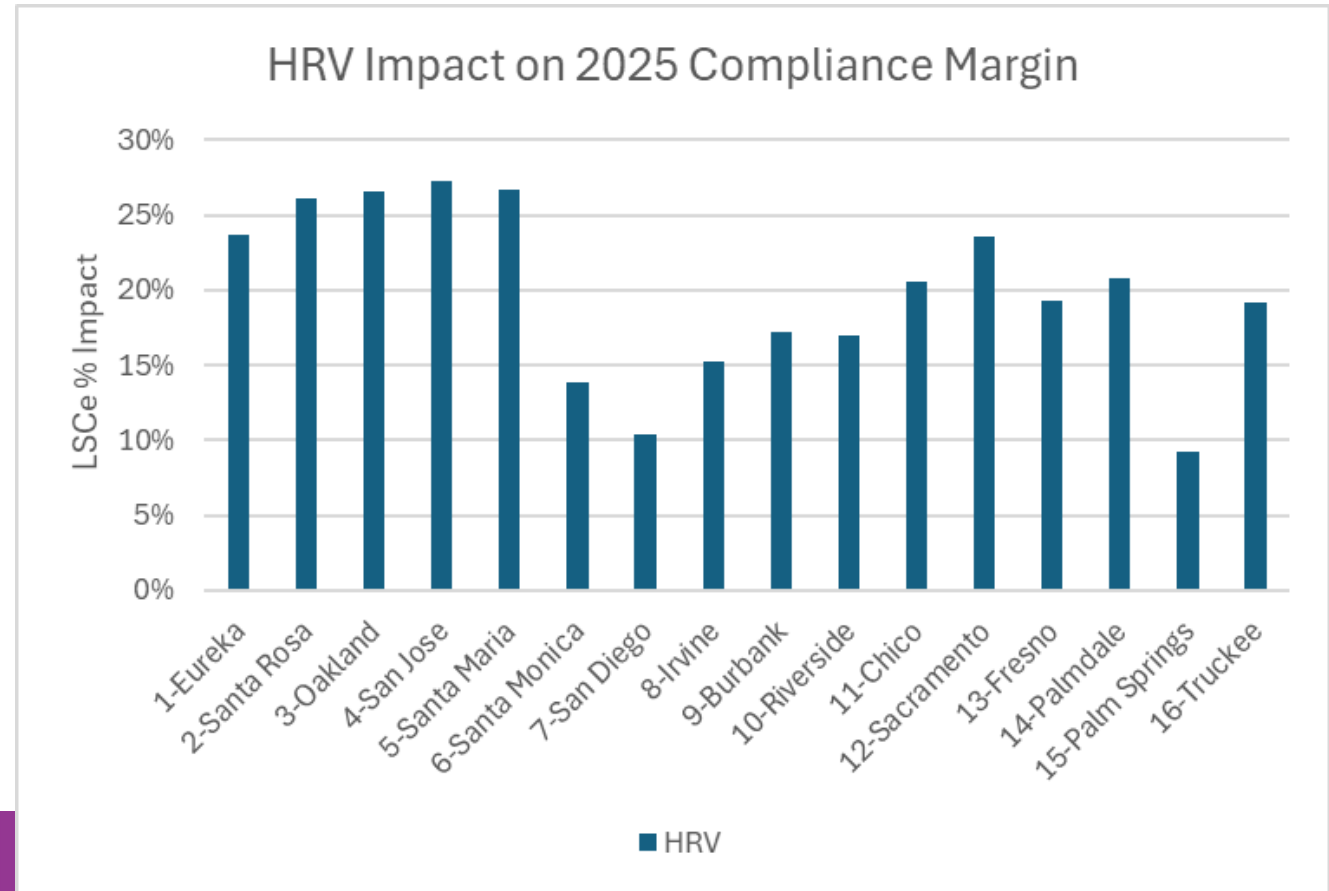
§160.2(b)2Aivb1 (Mandatory)
§170.2(c)3Biv (Prescriptive)

- ERVs are NEVER mandatory in Residential buildings
 - But they are Prescriptive Standard in half the state for multifamily
 - *Multifamily buildings have two choices for IAQ ventilation:*
 - 1) *Balanced ventilation in all dwelling units; OR*
 - 2) *Supply ventilation in all dwelling units*
 - 3) *Blower door testing of all units also mandatory (<0.3 cfm per sqft envelope)*
- ERVs are prescriptive standard in CZ 1,2,4,11-14,16*
- *Min 67% SRE @ 32F and max 0.6 W/cfm*
 - *If projects in those CZs don't use RVs, they take a stiff compliance penalty (~10%)*



RVs ARE POWERFUL IN COMPLIANCE

- Typical RVs:
Efficiency LSC Impact ~19.8%
Highest in CZ 1-5,12
- B-I-C RVs even better



WHAT ABOUT MULTIFAMILY?

Multifamily is Different

Title 24 requires balanced ventilation in multifamily units

- Therefore, no added fan energy to upgrade to RV
- Energy savings larger

But ERVs are prescriptive standard in CZ 1,2,4,11-14,16

- In those 8 CZs, installing ERVs just keeps pace
- In other 8 CZs, installing ERVs may give compliance credit

Will the 2028 Code Push ERVs Further?

- Exhaust ventilation still allowed in single-family buildings in 2025 code
- There are no prescriptive standards for ERVs in single-family either in 2025 code
- Are the Multifamily ERV standards coming soon to single-family?
 - *Not in 2028 - AB 130 prohibits updates to the residential 2025 code for 6 years*



MODELING RVs

Default exhaust ventilation

2story model template

Project | Analysis | EDR / PV | Battery | Notes | Building | Appliances / DHW | ADU | IAQ | Cool Vent | People | CSE Rpts

☐ Dwelling Attached (examples include a duplex or townhome)

Maximum Vertical Distance: ft

Model as: Minimum IAQ Ventilation: 60.4 CFM

Zone:

OK

ERV added

2story model template

Project | Analysis | EDR / PV | Battery | Notes | Building | Appliances / DHW | ADU | IAQ | Cool Vent | People | CSE Rpts

☐ Dwelling Attached (examples include a duplex or townhome)

Maximum Vertical Distance: ft

Model as: Minimum IAQ Ventilation: 53.3 CFM (55.0 balanced entered)

Fans: 1: Count: Zone: 55 CFM balanced

2:

☒ All supply air filters, outside air inlets, and H/ERV recovery cores are accessible per RACM Reference Manual

☐ IAQ system has fault indicator display (FID) in compliance with RACM Reference Manual

OK

MODELING ERVs

What Happens When I add an ERV?

- Proposed Design:
 - Airflow you entered
 - Watts per CFM you entered
 - Outdoor air cfm at temperature calculated using Recovery Efficiency you entered
- Standard Design***
 - Airflow you entered up to 125% of code minimum
 - Watts per CFM is default (0.70)
 - Outdoor air cfm at actual outdoor temperatures (no heat recovery)

*** except in MF CZs where prescriptive standard – there, an ERV is standard design

Defining the ERV

IAQ Fan: HRV 50 cfm

IAQ Fan Data

Currently Active Fan: **HRV 50 cfm**

Name: **HRV 50 cfm**

IAQ CFM: **55** CFM ☒ Includes Heat/Energy Recovery

W / CFM IAQ Vent: **0.7** W/CFM Sensible Recovery Efficiency (SRE): **67** %

IAQ Fan Type: **Balanced** Adjusted Sensible Recov Eff (ASRE): **72** %

☐ Interpolate SRE/ASRE from HVI Listed Ratings

OK

ERV CASE STUDY

6 new duplexes

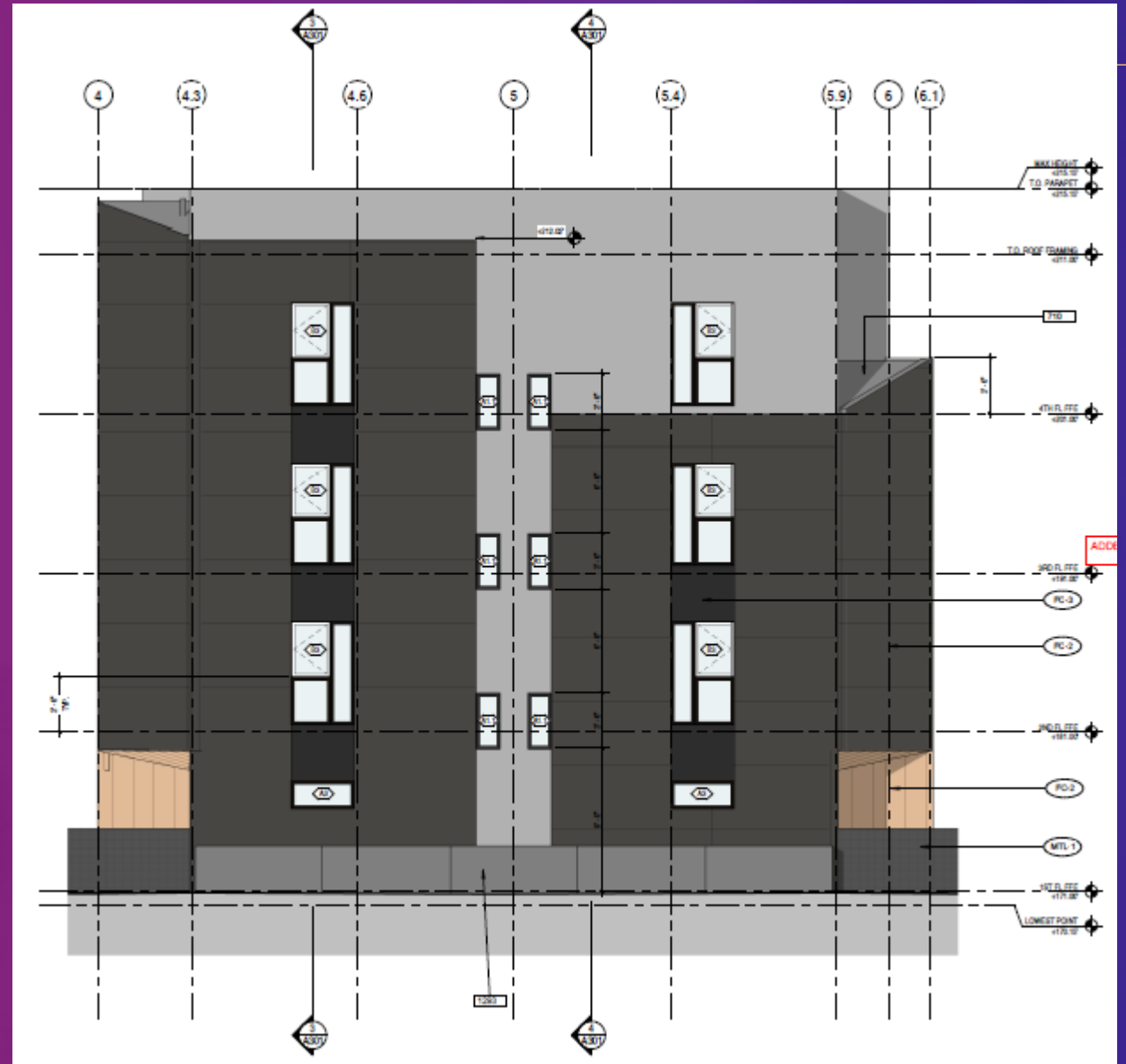
Los Angeles, CZ 8

Original compliance models had:

- VCHP credit for ductless minisplit heat pump

Builder missed those features, instead used:

- Central ducted heat pump
- Standard gas tankless WH uef .81



HOW ERV_s CAN SAVE A PROJECT



Nick Brown <nick@buildsmartgroup.com>

Jun 22, 2023, 2:02 PM



to **Emmanuel**

Guys:

I have done the what-ifs on 36th Street and have two options for you to get these to comply with Title 24. If you remember, we specified the VCHP credit for HVAC and a condensing gas tankless with uef=0.95 for water heating but they did a ducted standard heat pump (16 SEER, 9 HSPF) and standard gas tankless (uef=0.81). As a result, we were tight on compliance with margins of 0.1 and 0.2 on Units 1-4 (5&6 were not as tight), so we have to compensate for the extra energy use. Here are two options:

- 1) Add rigid foam to walls R-4 and above roof deck R-6 or more
- 2) Add a heat recovery ventilator. You will need to find space for the 4" ducts to get the air around the house and inlet and outlet through the walls somewhere, or we may be able to make do with two through-the-wall units that attach to the wall and don't need ducts

What do you think the client's preference would be? I've modeled these options on Units 1&2 and they seem like they could do the trick. I assume if it works on 1&2, it will work on units 3-6 as well.

Nick



As-Built

With ERV 72% SRE, 0.6 W/cfm

36th St. Duplexes Building A Unit 1 asbuilt v2

Compliance Summary	CO2 Emissions	Energy Design Rating	Energy Use Details	CO2 Details
	Energy Design Ratings:		Compliance Margins:	
	Efficiency ¹ (EDR)	Total ² (EDR)	Efficiency ¹ (EDR)	Total ² (EDR)
Standard Design	45.9	20.7		
Proposed Design	47.1	21.9	-1.2	-1.2

Result³: **DOES NOT COMPLY**

¹ Efficiency measures include improvements like a better building envelope and more efficient equipment
² Total EDR includes efficiency, photovoltaics and batteries
³ Building complies when all efficiency and total margins are greater than or equal to zero

Standard Design PV Capacity: 2.78 kWdc

PV System resized to 2.78 kWdc (a factor of 1.390) to achieve 'Standard Design PV' PV scaling

36th St. Duplexes Building A Unit 1 asbuilt HRV

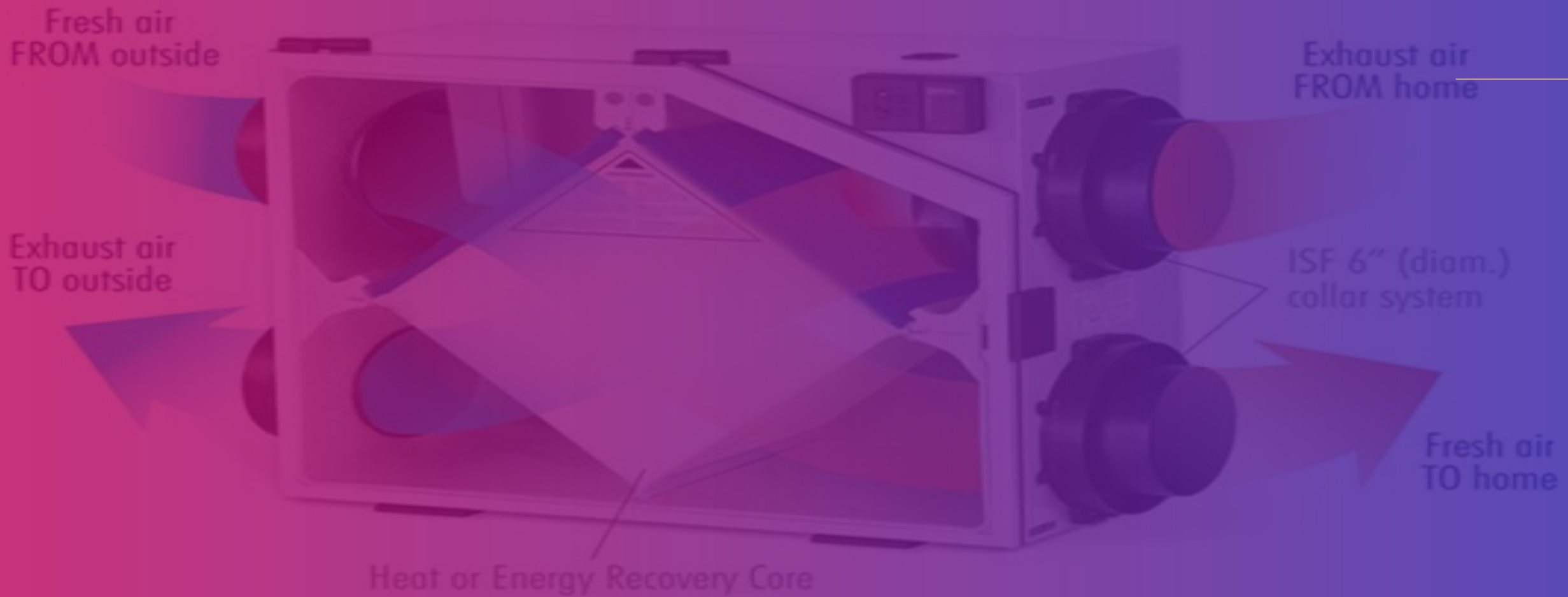
Compliance Summary	CO2 Emissions	Energy Design Rating	Energy Use Details	CO2 Details
	Energy Design Ratings:		Compliance Margins:	
	Efficiency ¹ (EDR)	Total ² (EDR)	Efficiency ¹ (EDR)	Total ² (EDR)
Standard Design	47.1	21.4		
Proposed Design	46.8	21.2	0.3	0.2

Result³: **COMPLIES**
(not current)

¹ Efficiency measures include improvements like a better building envelope and more efficient equipment
² Total EDR includes efficiency, photovoltaics and batteries
³ Building complies when all efficiency and total margins are greater than or equal to zero

Standard Design PV Capacity: 2.89 kWdc

PV System resized to 2.89 kWdc (a factor of 1.444) to achieve 'Standard Design PV' PV scaling



SPECIFYING & INSTALLING ERVs

COSTS of ERVs

Single family 2,000 sf home: 180 cfm = \$2,400 + duct kit \$3,100 + install \$4,000 = \$11,500

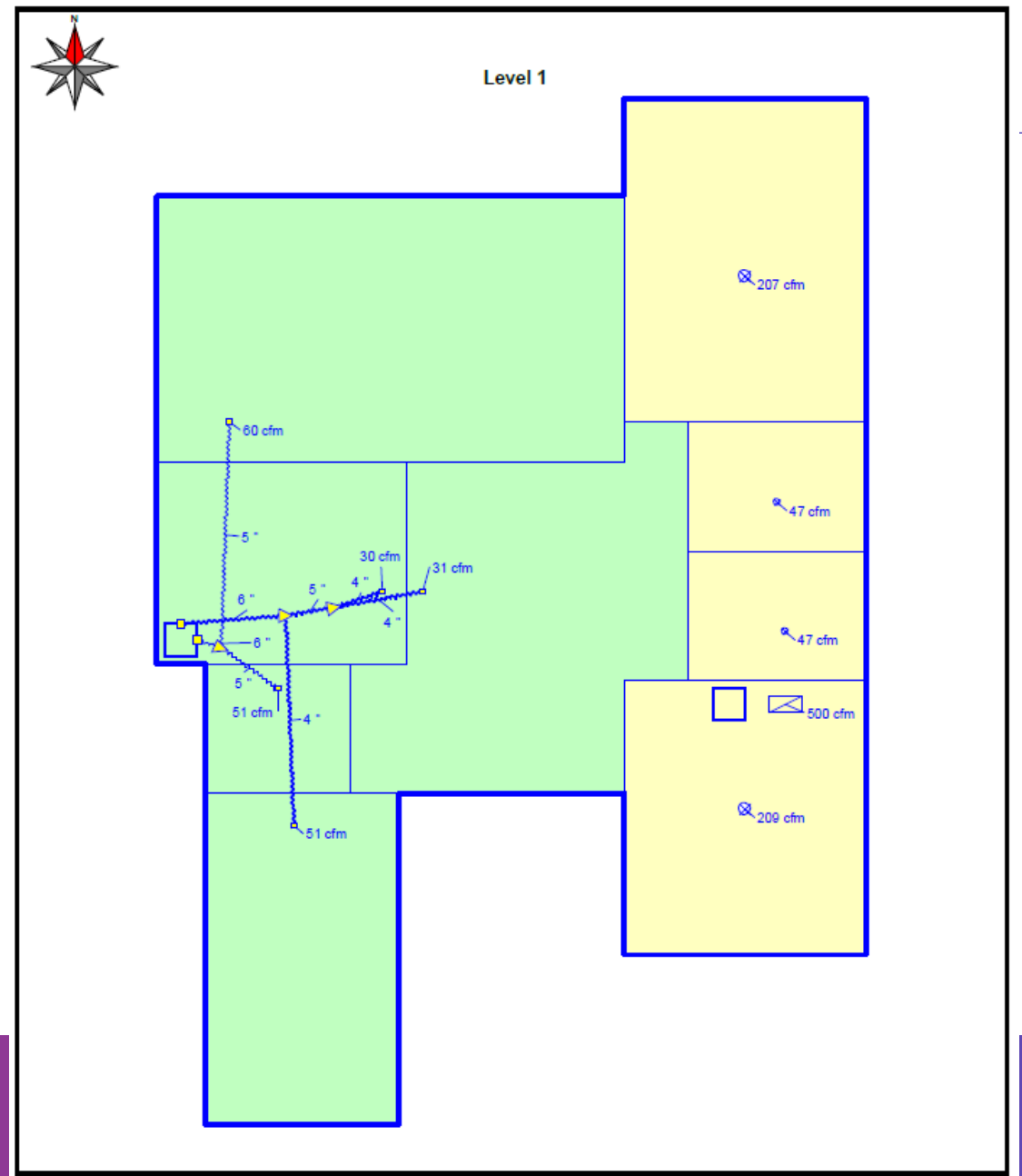
Large custom 6,000 sf home: Double

ADU: \$5,500

Multifamily units: Depends on volume, but approx. \$4,500 per unit

KEY QUESTIONS

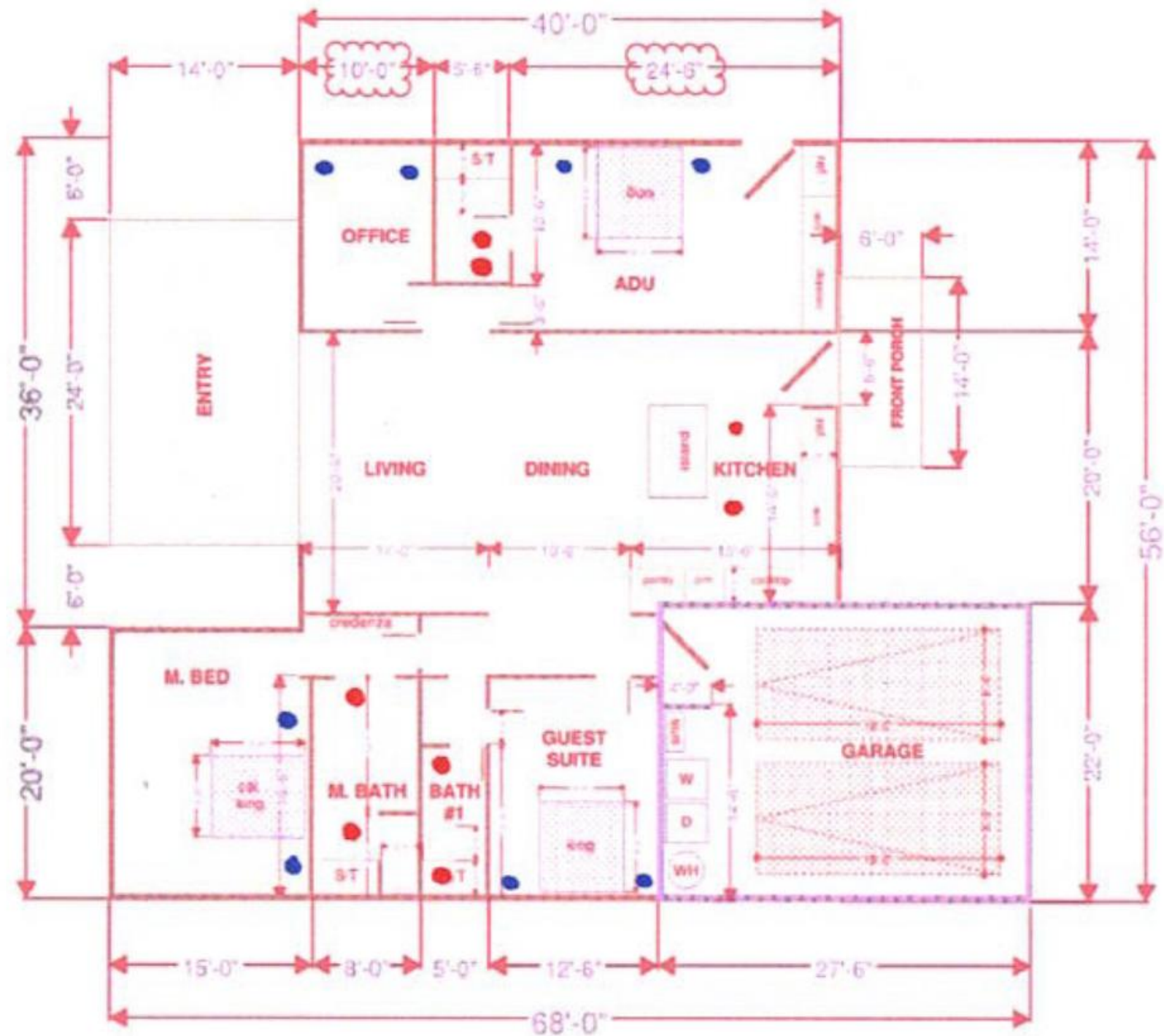
- Location of unit
- Duct routes
- CFM by room
- Supply & exhaust registers
- Envelope penetrations for ducts to outside
- Occupant controls



DESIGNING YOUR ERV

2250 sf 3 bed 3 bath

- Red=1 exhaust tube
- Blue=1 supply tube
- This house needs 8 of each
- $8 \times 15 \text{ cfm} = 120 \text{ cfm total}$



How to Pick Your ERV Product

1. Calculate cfm air flow using room by room approach (bottom up)
2. Check bottom up cfm against Title 24 required cfm – must meet or exceed Title 24
3. Choose a model that has 2X the max airflow of your calculated air flow
 - So they run much more efficiently and don't burn motors out quickly

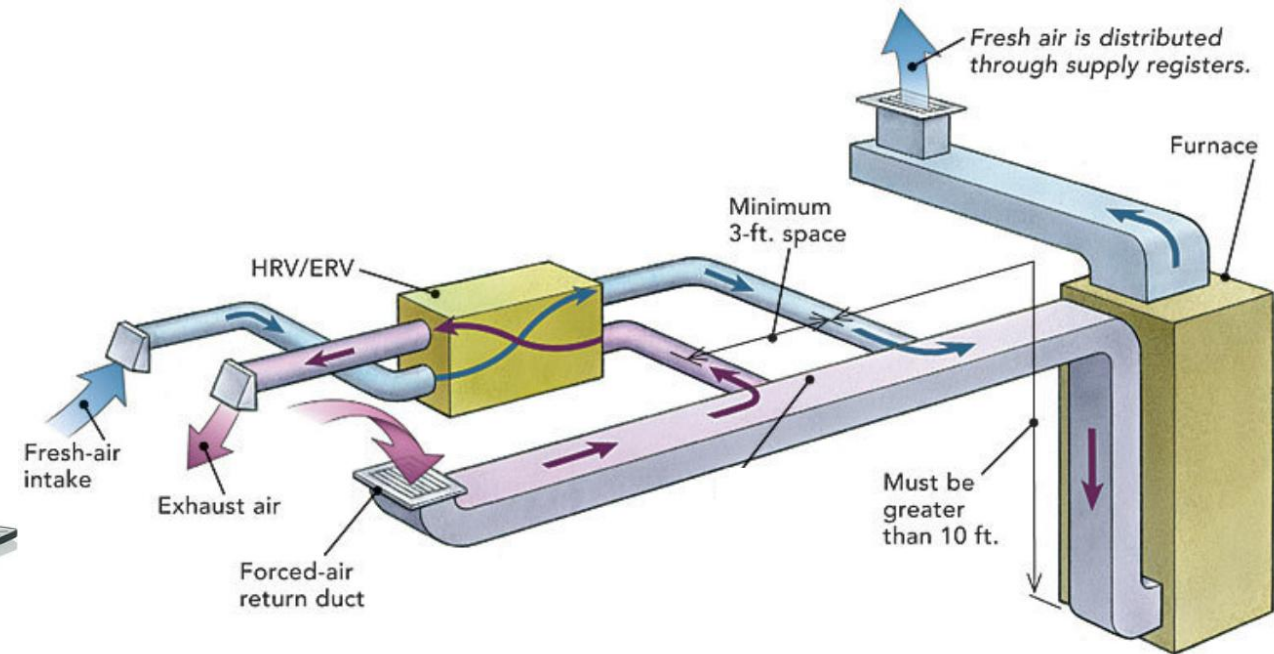
Example Calculation

1. Bottom up calculation: 120 cfm
2. Title 24 requirement: 97 cfm
3. Specify a model with ~200-250 cfm or Two Units with 120 cfm max air flow

This Unit Goes to 210 cfm
At 115 cfm:
0.7 W/cfm & 74% SRE
At 81 cfm:
0.4 W/cfm & 80% SRE

FV-21VEC1T												
Energy Performance												
Mode	Outdoor Temp		Net Air Flow		Power Consumed	Sensible Recovery Efficiency	Adjusted Sensible Recovery Efficiency	Total Recovery Efficiency	Adjusted Total Recovery Efficiency	Latent Recovery / Moisture Transfer	Apparent Sensible Effectiveness (NOT HVI Certified)	CFM/W
	°C	°F	L/S	CFM	Watt							
Heating	0	32	20	42	21	83	86	-	-	0.79	91	2.0
	0	32	31	66	28	81	84			0.70	88	2.3
	0	32	38	81	35	80	83	-	-	0.68	86	2.3
	0	32	77	163	115	74	78	-	-	0.59	80	1.4

OTHER RV CONFIGURATIONS



Scott's Latest Approach to Distribution



ERVs & Ductless Mini Allow for Vaulting

- RV replaces bathroom exhaust fan
 - Only requires 20 cfm in bathroom if continuous
- Ductless minisplit doesn't need an attic or closet location
- Ducted minisplit can fit in 16" soffit as an alternative to ductless



HVI Directory

The best place to find your RV performance statistics:

- CFM
- Watts
- Sensible Recovery Effectiveness (SRE)
- Apparent Sensible Recovery Effectiveness (ASRE)

Section III - HRV/ERV Directory Listing

HVI Publication 911: Certified Home Ventilating Products Directory ©

Section III - HRV/ERV Directory Listing

Filters

Brand Name

Product Category

1 to 100 (384)

100

Current as of June 30, 2023



Save HVI HRV/ERV Directory as a spreadsheet

Save detailed Airflow Ratings as a spreadsheet

Save detailed Energy Ratings as a spreadsheet

Product Category	Brand Owner	Brand Name	Model	Net Supply at 100 Pa (L/s)	Net Supply at 0.4" w.g. (cfm)	Model Details	Max Rated Sensible Recovery Efficiency at 0 deg C	Net Airflow @ Max Rated SRE (L/s)	Net Airflow @ Max Rated SRE (cfm)	Power Consumed @ Max Rated SRE (watts)	C439-18 Compliant
ERVs	Airia Brands Inc.	Lifebreath	130ERVD	68	144	Model Details	75	42	89	80	Yes
HRVs	Airia Brands Inc.	Lifebreath	155MAX	65	138	Model Details	75	30	64	72	Yes
ERVs	Airia Brands Inc.	Lifebreath	170ERVD	76	161	Model Details	77	23	49	60	Yes
ERVs	Airia Brands Inc.	Lifebreath	180ERVD	81	172	Model Details	77	32	68	26	Yes
HRVs	Airia Brands Inc.	Lifebreath	195DCS	83	176	Model Details	80	30	64	67	Yes
HRVs	Venmar Ventilation	vanEE	200H	90	191	Model Details	65	39	83	71	No

What are your takeaways on RVs?

practical information
hope it helps keep us hea
love the health benefits great benefits outway the costs
eye opening
can't wait to experience practical
great push to compliance
may not be right in zone6

Mentimeter



Open Menti to edit



Replace this slide



Add Menti slides



menti.com

2732 3198

11 of 18 responded

ERV_s ALLOW YOU TO BE YOUR MOST PRODUCTIVE SELVES



Links & Resources

www.SKfreshAir.com

www.HighPerformance.Build

<https://www.youtube.com/@scottkelly-na>

www.EnergyVanguard.com

www.GreenBuilderMedia.com

www.energycodeace.com



July 15, 2026

THANK YOU!

nick@buildsmartgroup.com

scott@skfreshair.com

Questions about Title 24?

3C-REN offers a *free* Code Coach Service

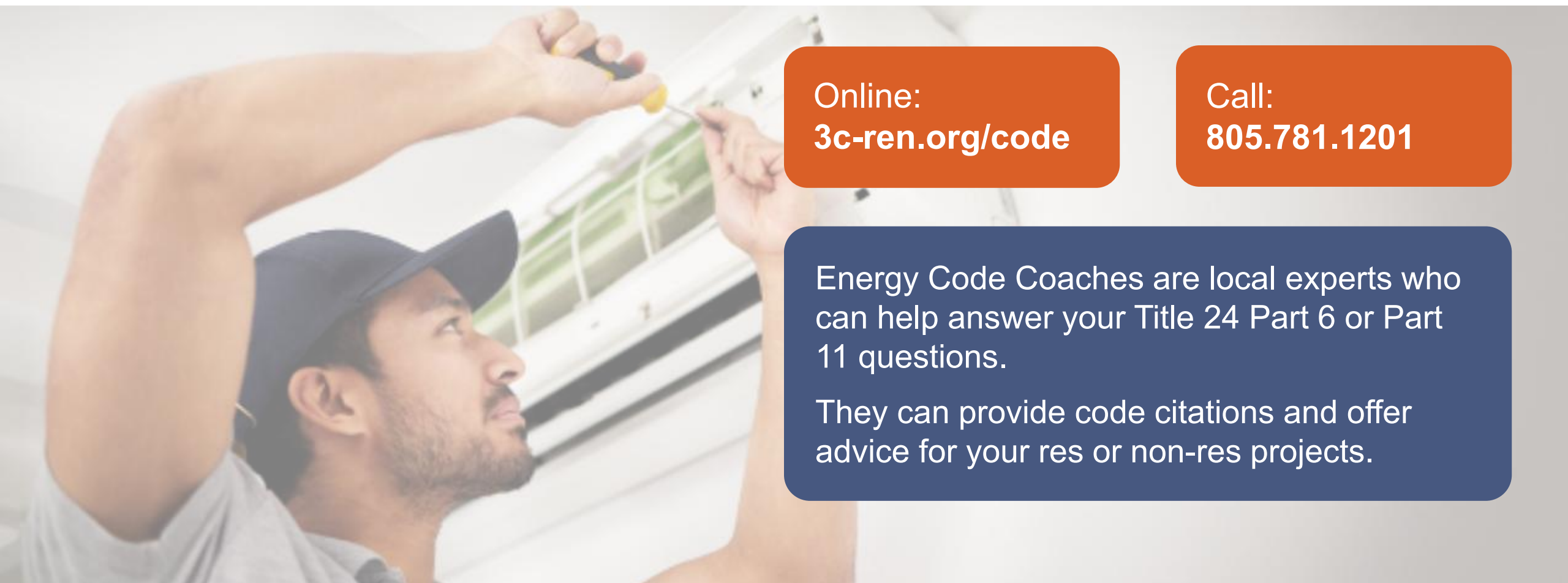


Online:
3c-ren.org/code

Call:
805.781.1201

Energy Code Coaches are local experts who can help answer your Title 24 Part 6 or Part 11 questions.

They can provide code citations and offer advice for your res or non-res projects.





Closing

Continuing Education Units Available

- Contact dresurreccion@co.slo.ca.us for AIA and ICC LUs

Coming to Your Inbox Soon!

- Slides & Recording

Other Upcoming Courses:

- [7/22 Next Generation Passive Solar & Passive House](#)
- [7/30 Using the ECC \(HERS\) Registry for Energy Code Compliance](#)
- [8/13 HPWH Installation Training in Oxnard \(in-person\)](#)
- [8/19 Ask the Experts: Energy Compliance & Modeling](#)
- [8/20 Introduction to Residential HVAC Design](#)
- [9/1 2025 Energy Code: Multifamily Ventilation](#)

Any phone numbers who joined? Please share your name!

