



We will be starting soon!

Thanks for joining us



Recovery Ventilators: Energy Savings and Compliance Credit in the 2022 Energy Code



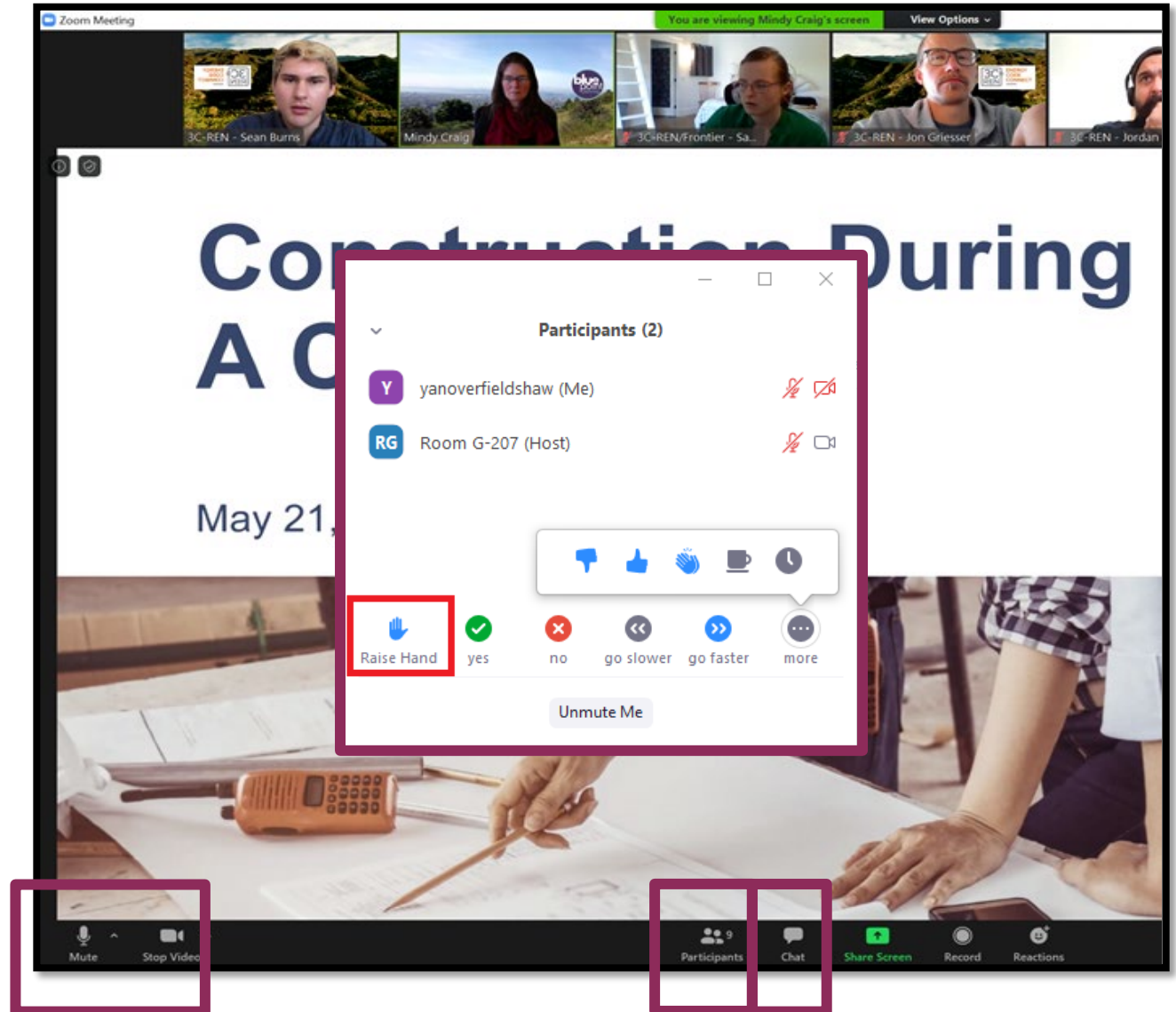
Nick Brown – Build Smart Group

March 5, 2024



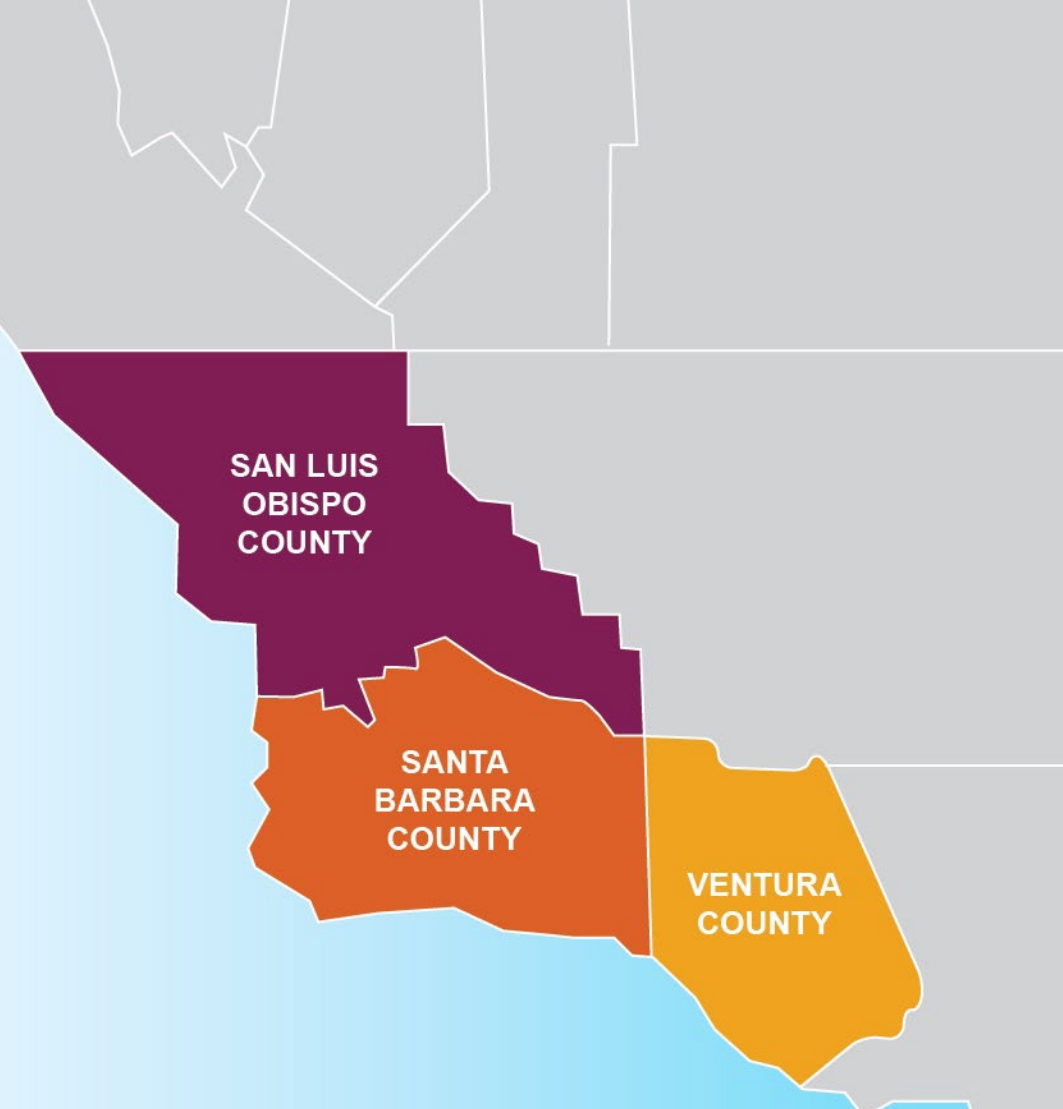
Zoom Orientation

- 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





**ENERGY
CODE
CONNECT**

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

Energy Code Coach:
3c-ren.org/codes
805.781.1201

Event Registration:
3c-ren.org/events





BUILDING PERFORMANCE TRAINING

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

Event Registration:
3c-ren.org/events





HOME
ENERGY
SAVINGS

Multifamily (5+ units)

- No cost technical assistance
- Rebates up to \$750/apartment plus additional rebates for specialty measures like heat pumps

Single Family (up to 4 units)

- Sign up to participate!
- Get paid for the metered energy savings of your customers

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



A photograph of four people sitting on a green couch in a living room, laughing and smiling. A man in a light blue shirt is on the right, and three women are on the left. The room has a white wall, a brown bag on a shelf, and a potted plant.

March 5,
2024

RECOVERY VENTILATORS

ENERGY SAVINGS AND COMPLIANCE CREDIT IN THE 2022 ENERGY CODE

NICK BROWN

President
Build Smart Group
Long Beach



OUR TIME TOGETHER

March 5, 2024



Recovery Ventilators

IAQ appliances and HVAC energy savers in one



Mechanical Ventilation

Why the energy code requires it and how much is needed



How RVs Work

Balanced ventilation with heat recovery



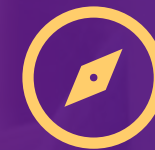
Energy Savings

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



Compliance Credit

How much do RVs help comply with Title 24?



Tips for Specifying RVs

Making sure the right RV 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

slido



What does "Heat Recovery Ventilators" make you think?

Fresh air
FROM outside

Exhaust air
TO outside

Exhaust air
FROM home

ISF 6" (diam.)
collar system

Fresh air
TO home

Heat or Energy Recovery Core

RECOVERY VENTILATORS

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

Recovery Ventilators 2022

WHY RECOVERY VENTILATORS?

Indoor Air Quality

- RVs 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

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



WHY RECOVERY VENTILATORS?

Energy Code Compliance

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

Health

- RVs 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

slido



What is your experience level with RVs?

Fresh air
FROM outside

Exhaust air
TO outside

Exhaust air
FROM home

ISF 6" (diam.)
collar system

Fresh air
TO home

Heat or Energy Recovery Core

MECHANICAL VENTILATION

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

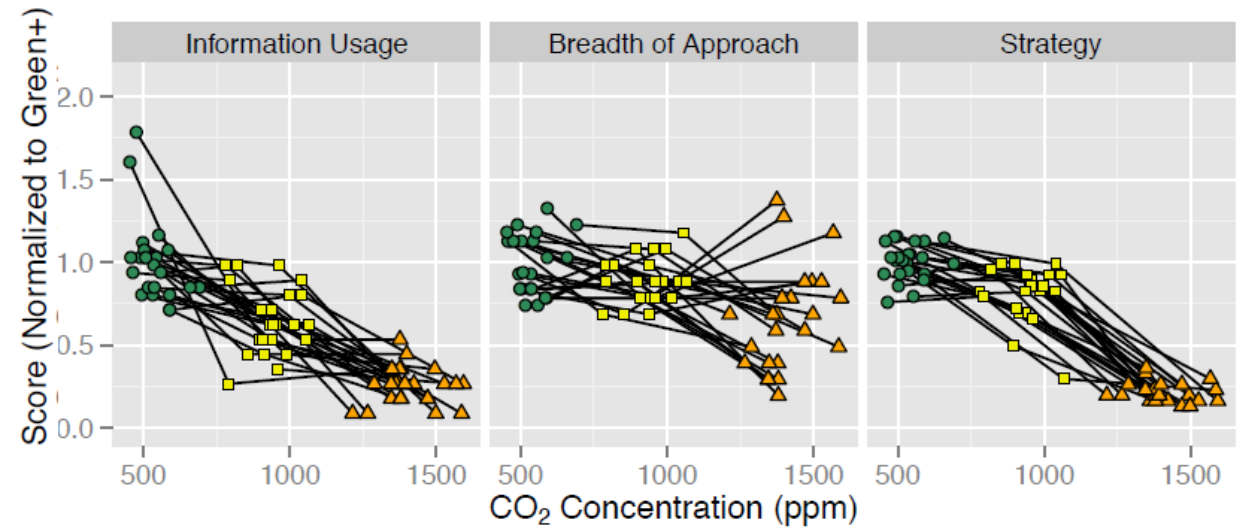
Recovery Ventilators 2022

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*



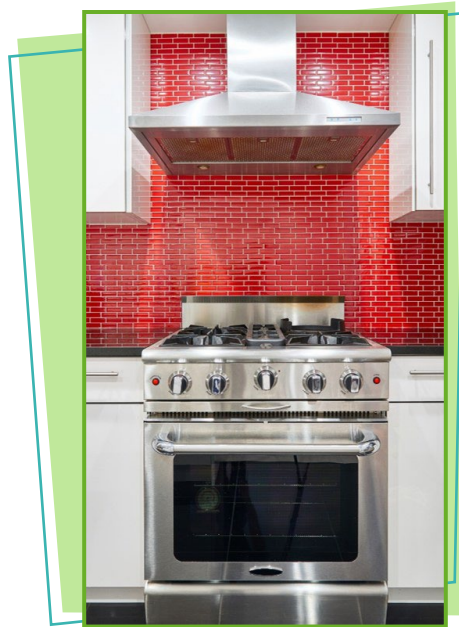
Allen, MacNaughton, et al, “Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, ...” *Environmental Health Perspectives*, October 2015

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?

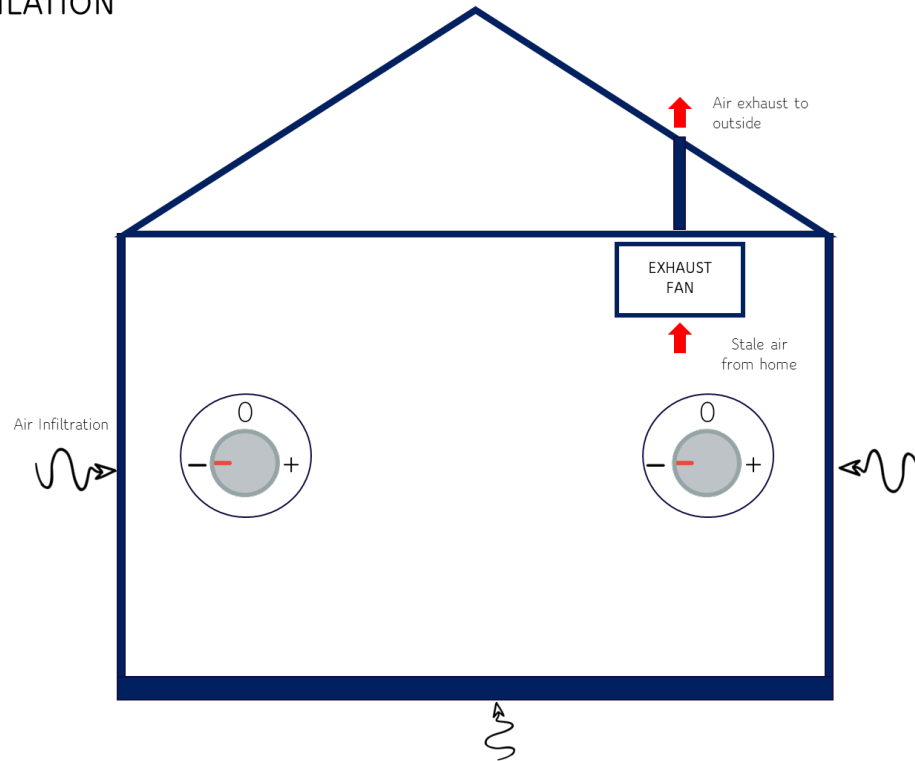
All new homes must have continuously operating mechanical ventilation systems (or equivalent intermittent)

- Exhaust only
- Supply only
- Balanced

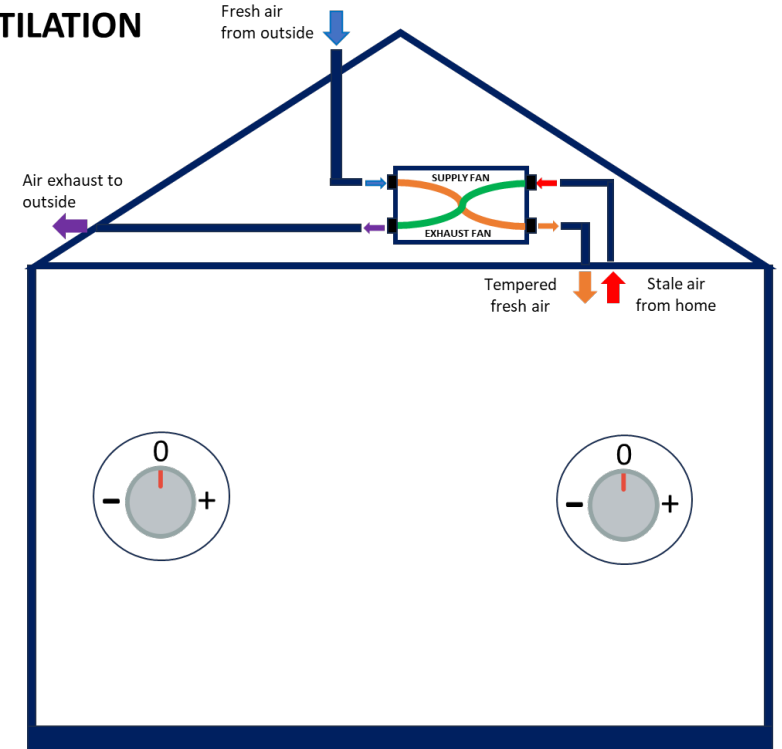


WHAT KIND OF VENTILATION?

EXHAUST VENTILATION



HEAT RECOVERY VENTILATION



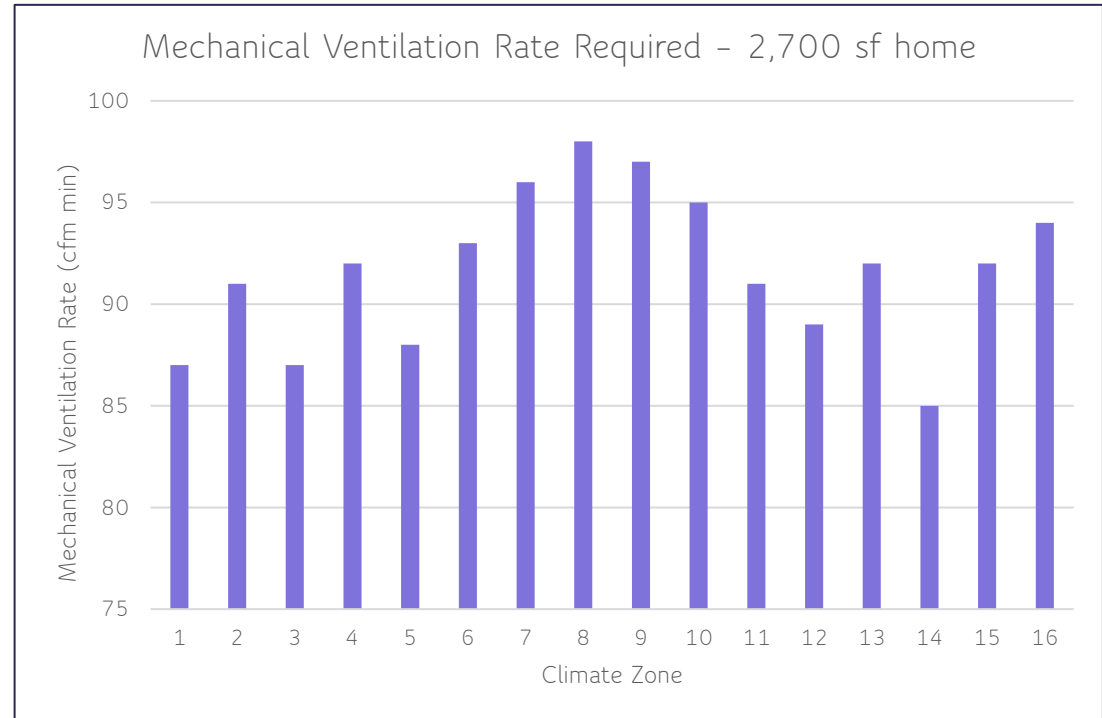
HOW MUCH VENTILATION?

2022 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	



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](https://pubmed.ncbi.nlm.nih.gov/30778136/)

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

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#Contributed equally.

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VENTILATION AFTER COVID-19

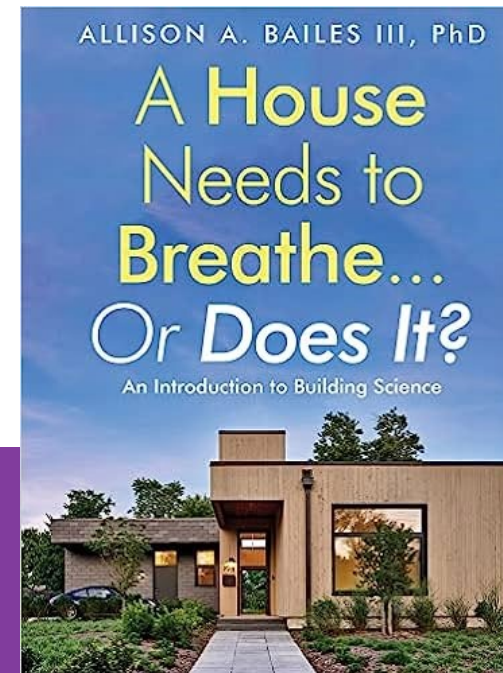
- “You building designers have a bigger impact on health than we clinicians”
- “Darn architects put wood on the walls [of our hospital] and it was peeling off the walls because it was dry in there. We added humidity to keep the wood trims on the wall and brought down infection rates by accident.”



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 RVs ...
 - 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..."*



Fresh air
FROM outside

Exhaust air
TO outside

Exhaust air
FROM home

ISF 6" (diam.)
collar system

Fresh air
TO home

Heat or Energy Recovery Core

HOW RVs WORK

Fresh filtered supply air + Exhaust stale air + Heat recovery

Recovery Ventilators 2022

HOW RECOVERY VENTILATORS WORK

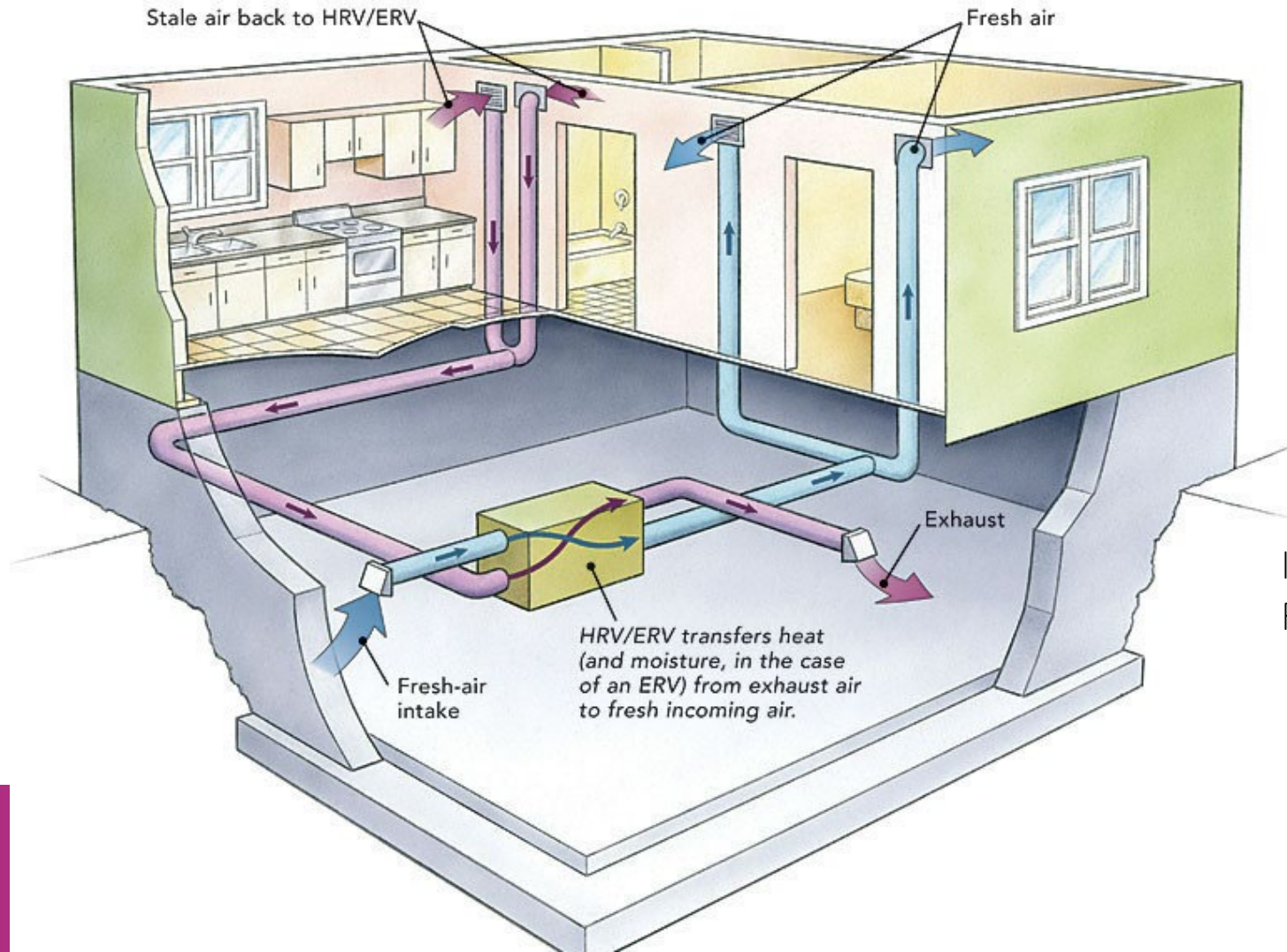


Illustration courtesy of
Fine Homebuilding

HOW 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

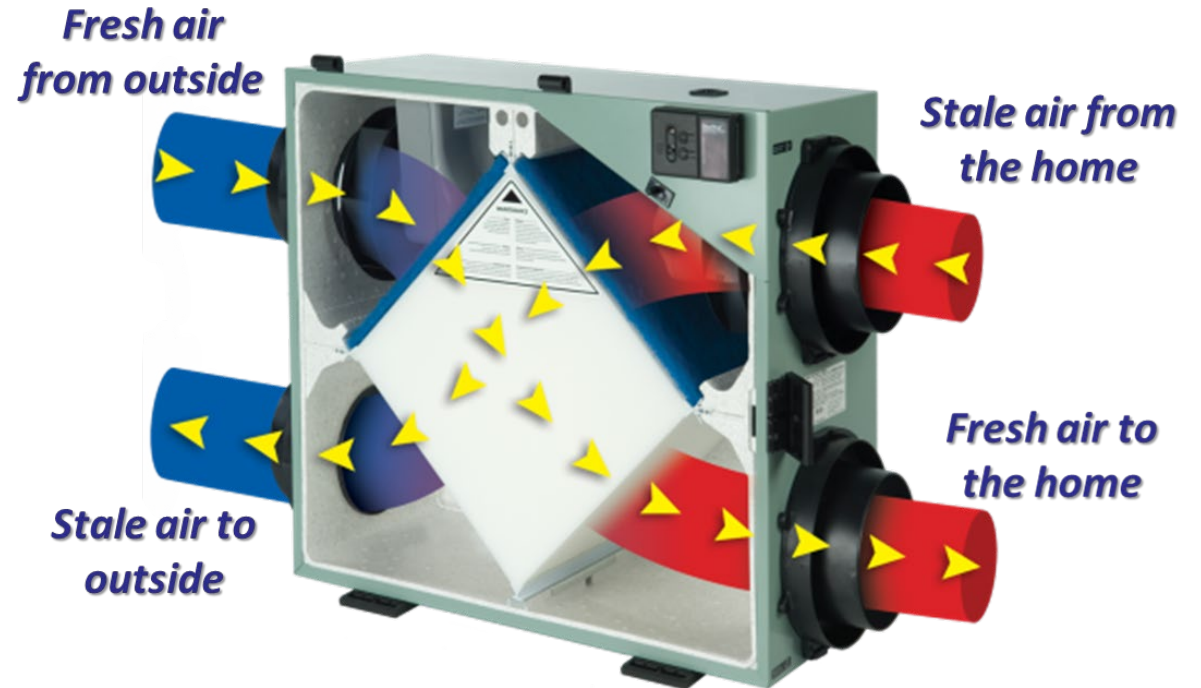
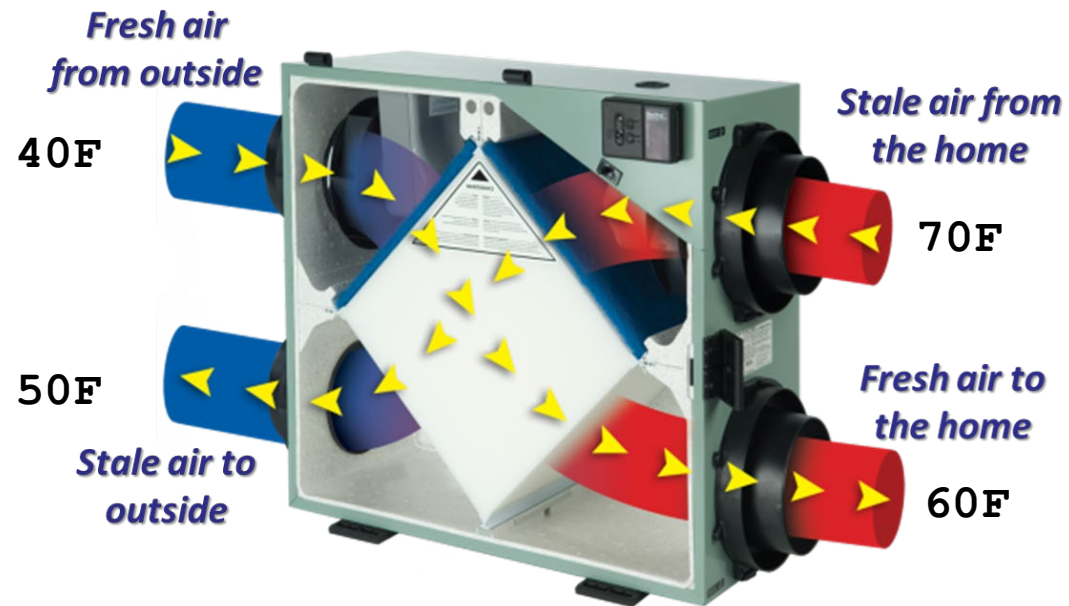


Illustration courtesy of Field Controls

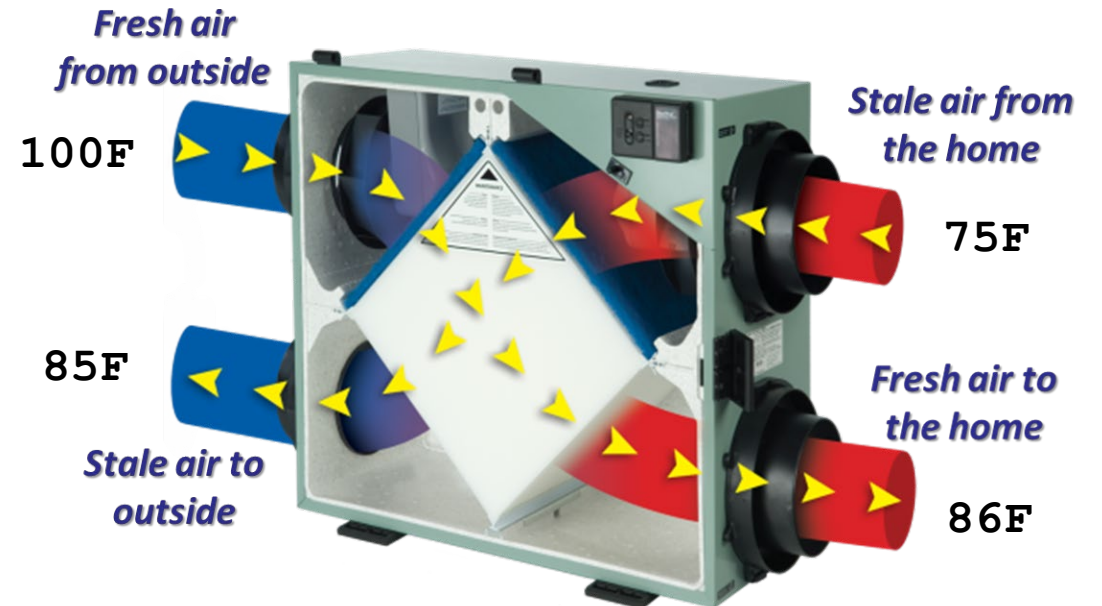


THE HEAT RECOVERY PART

WINTER



SUMMER



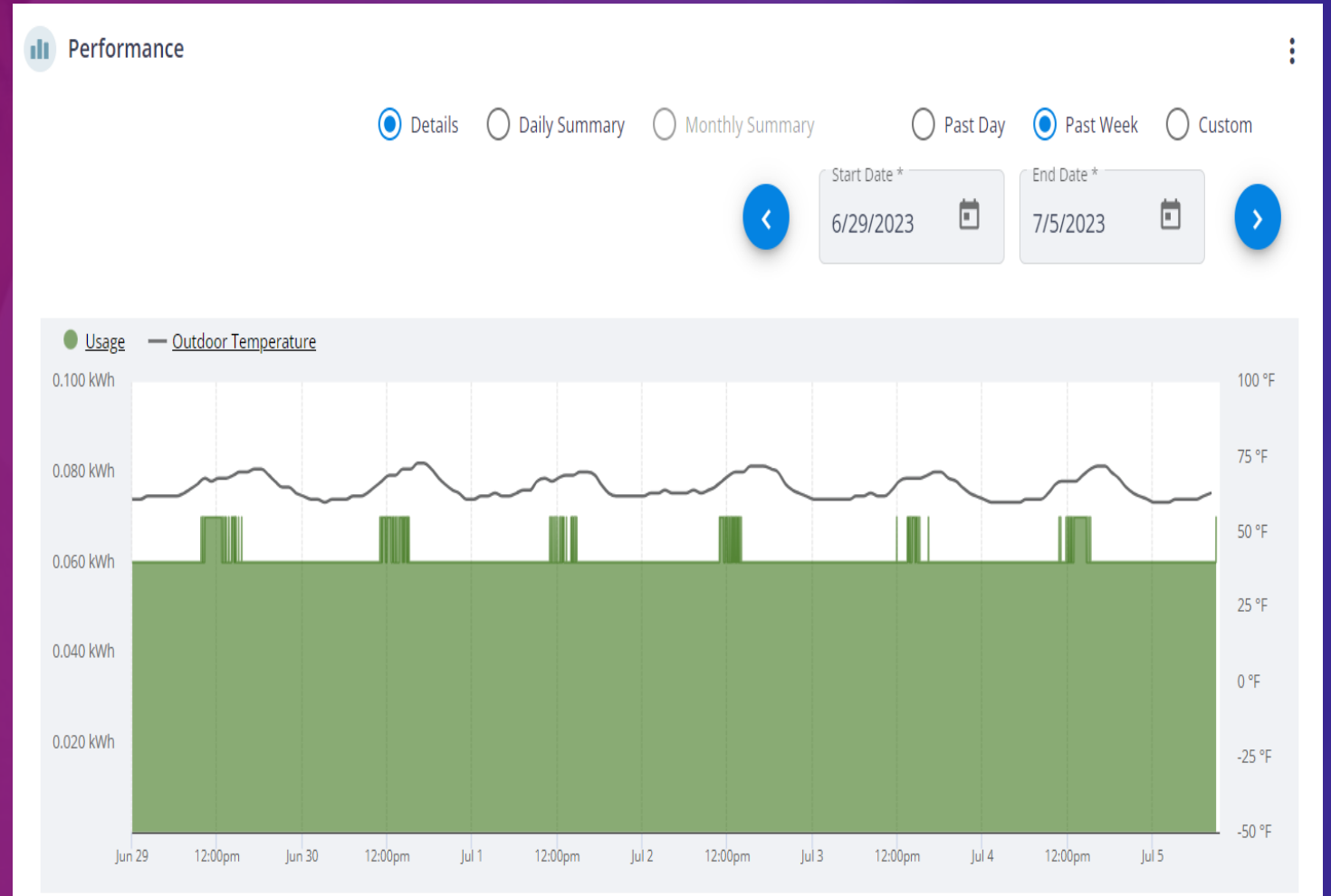
MY RECOVERY VENTILATORS



DATA FROM MY RVs

ADU ERV

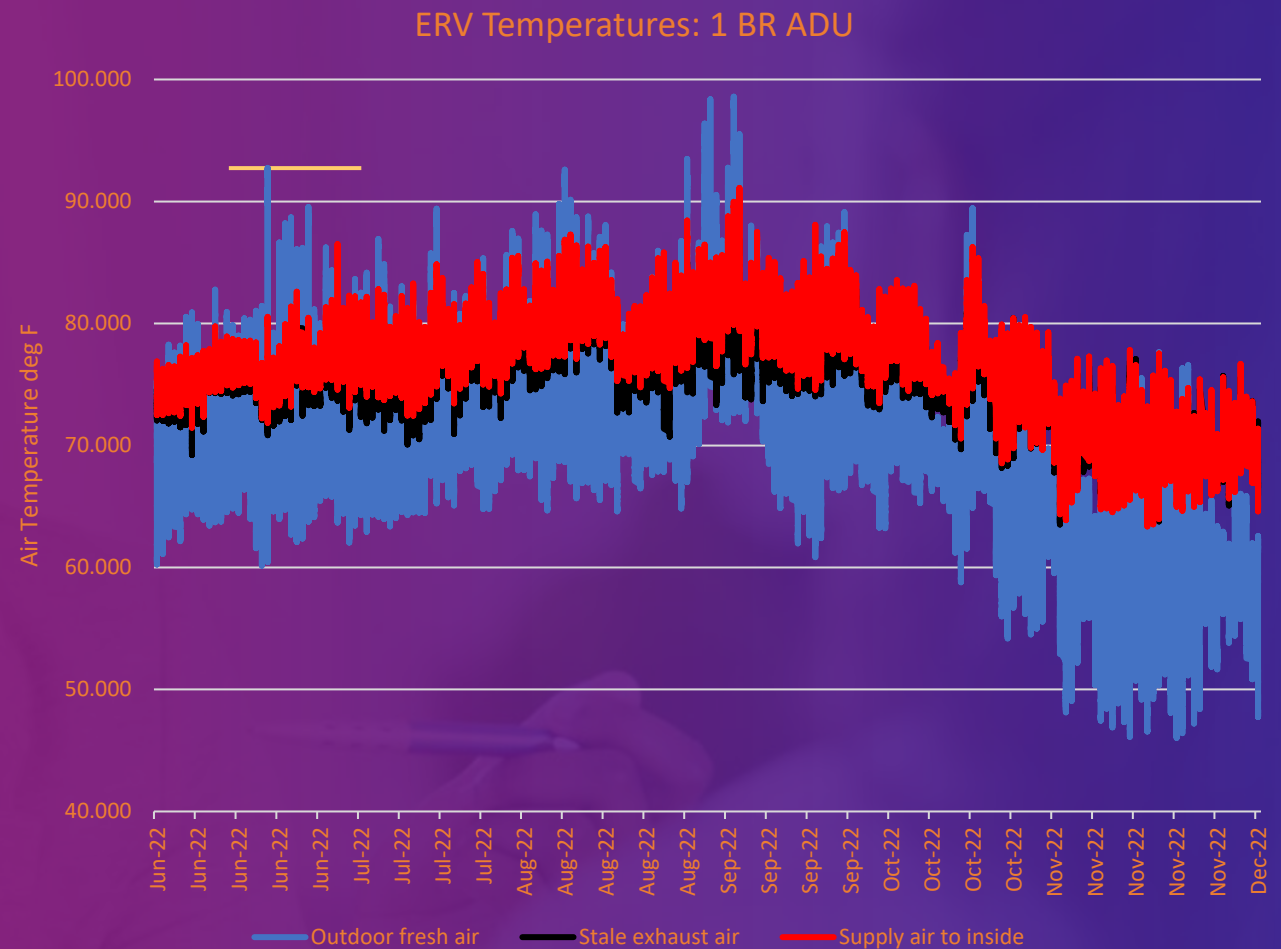
- 60 Watts continuous
- 60 cfm
- Boosts up to 70 Watts when humidity spikes



DATA FROM MY RVs

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

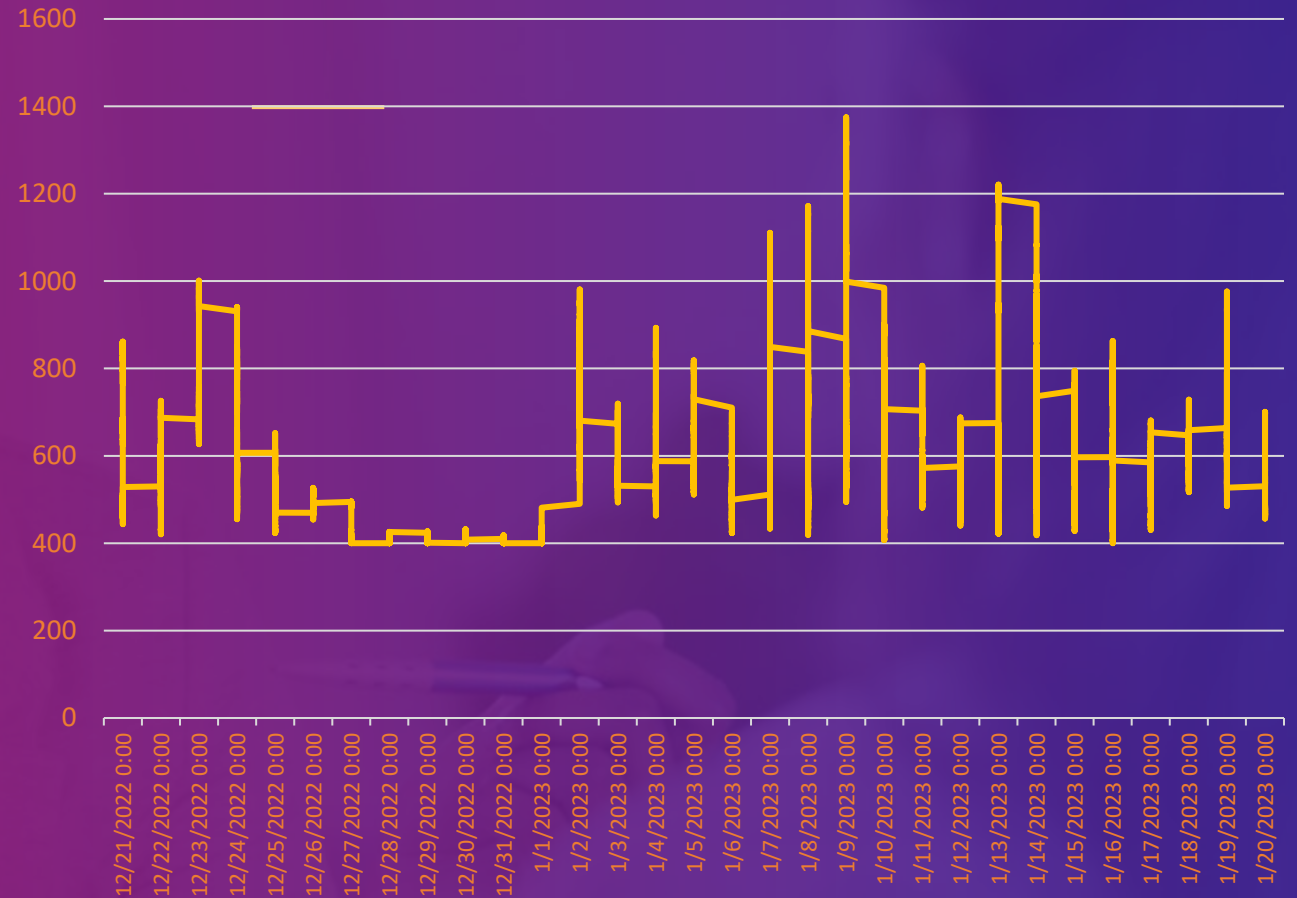


DATA FROM MY RVs

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

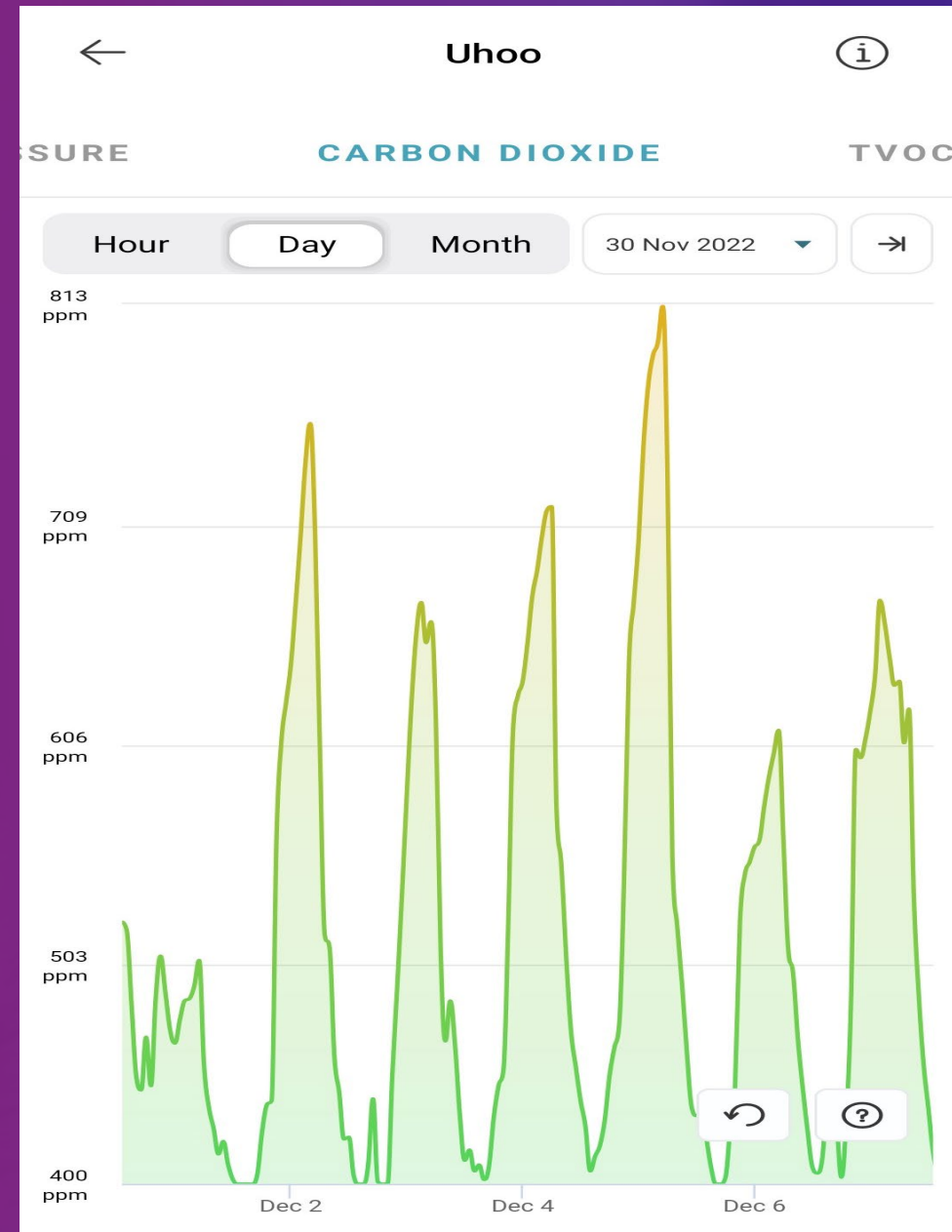
CO₂ Concentration with ERV



DATA FROM MY RVs

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

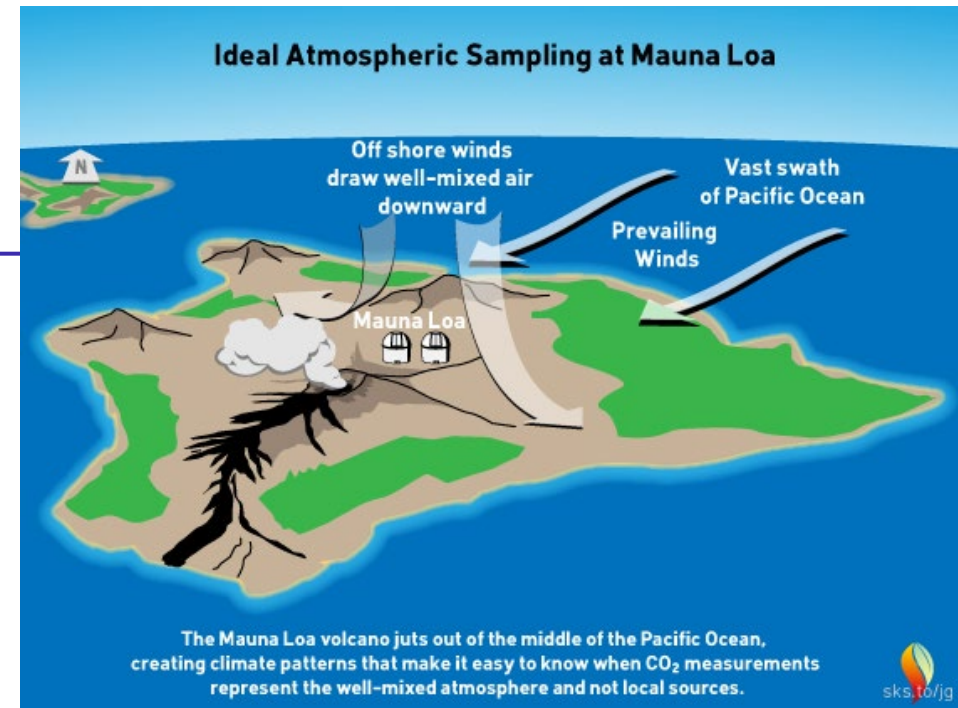


IAQ IMPACT



HOW MUCH CO₂ IS TOO MUCH?

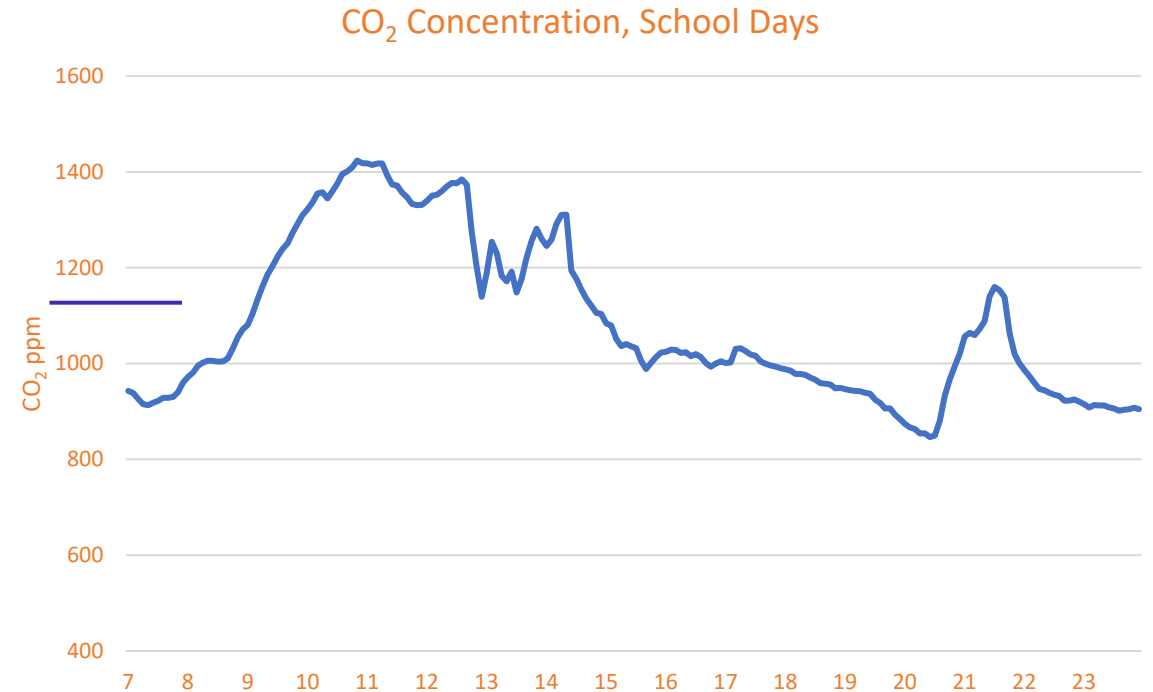
- Earth is at 421 ppm
- Harvard study used:
 - 950 ppm = typical indoor levels
 - 1,400 ppm = extreme
- CBRE used 800 ppm for their buildings
- Title 24 uses outdoor + 600 ppm for demand-control ventilation





COVID19 CLASSROOM CASE STUDY

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



Fresh air
FROM outside

Exhaust air
TO outside

Exhaust air
FROM home

ISF 6" (diam.)
collar system

Fresh air
TO home

Heat or Energy Recovery Core

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

- 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

slido



What is the trade-off we make when using RVs?

Fresh air
FROM outside

Exhaust air
TO outside

Exhaust air
FROM home

ISF 6" (diam.)
collar system

Fresh air
TO home

Heat or Energy Recovery Core

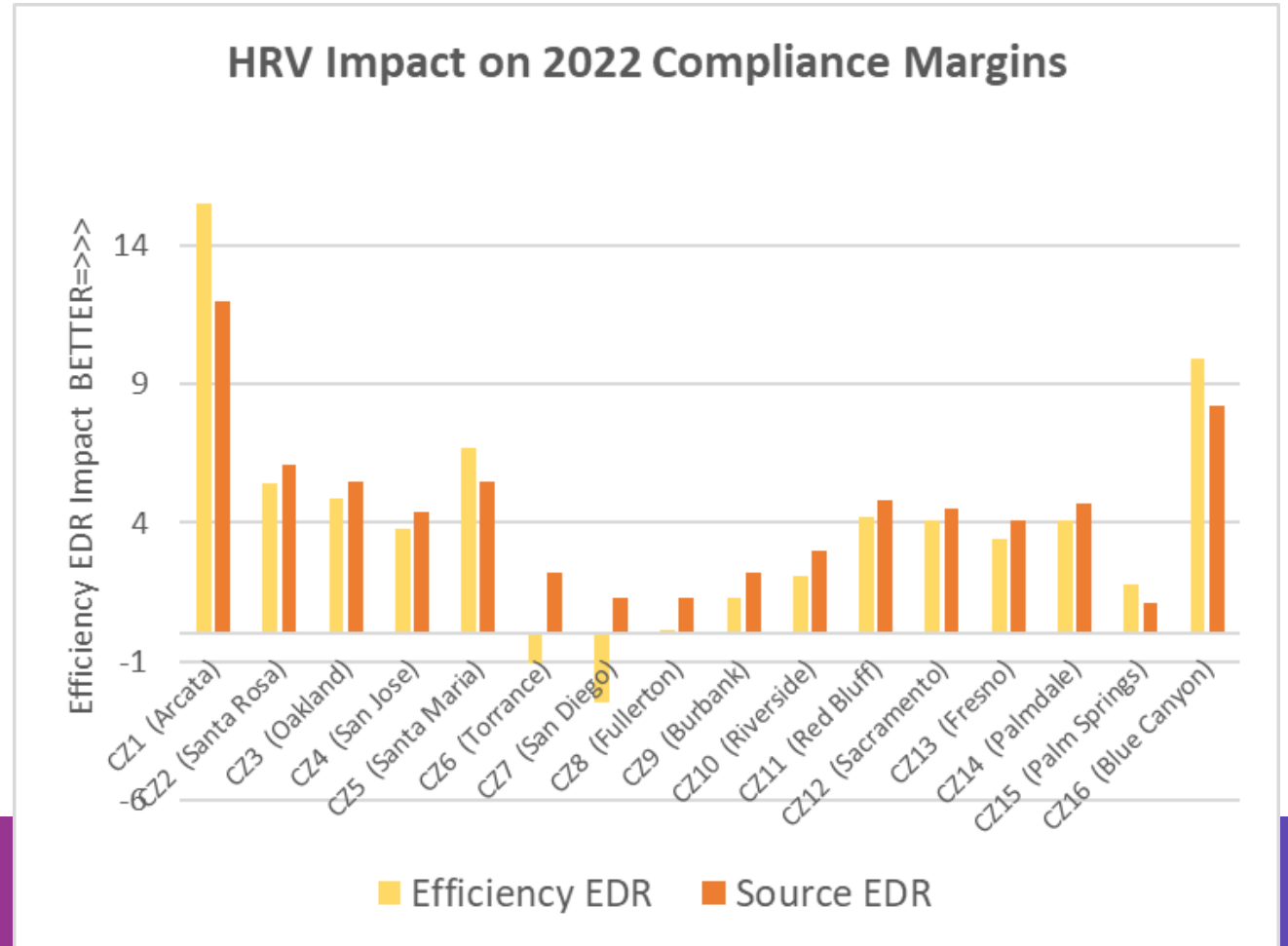
CODE COMPLIANCE & RVs

Miracle Workers in a White Box

Recovery Ventilators 2022

RVs ARE POWERFUL IN COMPLIANCE

- Typical RVs:
 - Efficiency EDR Impact ~10%
 - Highest in CZ 1,2,3,5,16
- B-I-C RVs:
 - Efficiency EDR Impact ~14%



WHAT ABOUT MULTIFAMILY?

Multifamily is Different

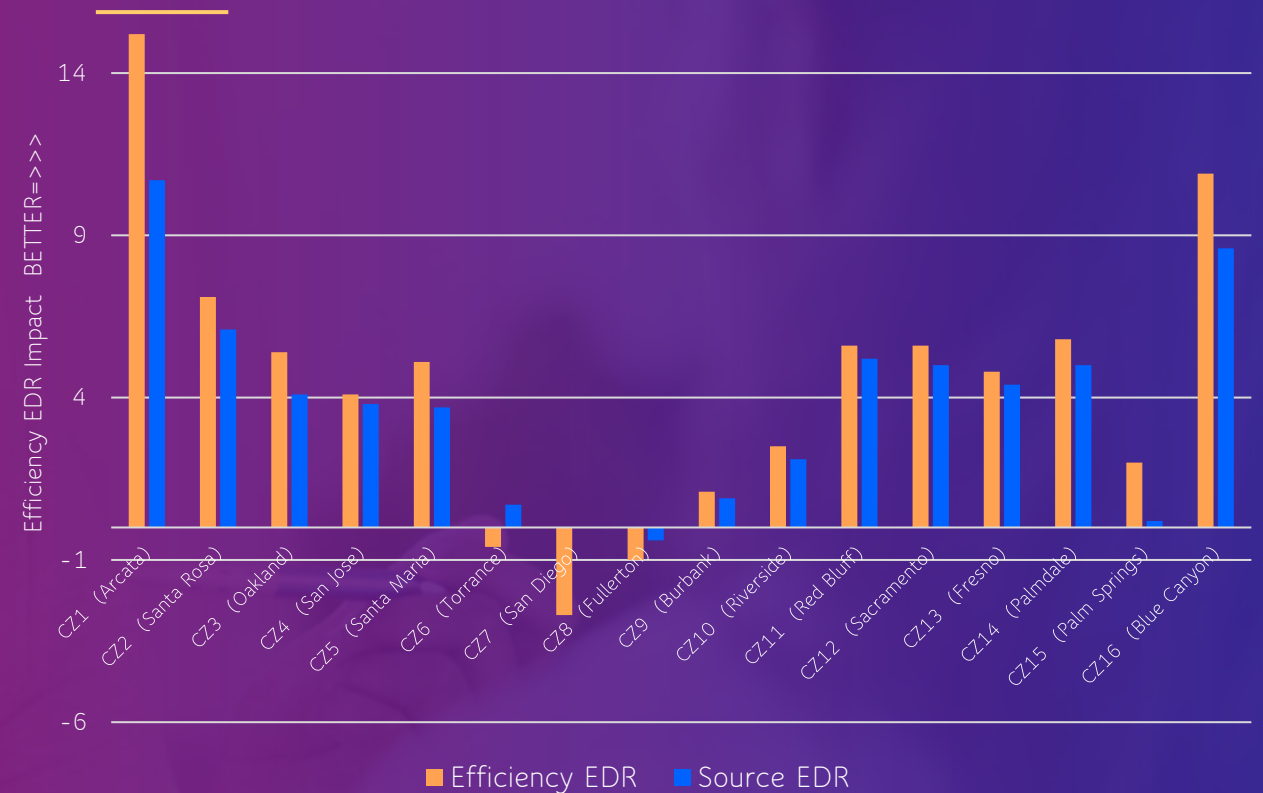
Title 24 requires balanced ventilation in multifamily units

- Unless builder does blower door testing on all units

Therefore, no added fan energy to upgrade to RV

- Energy savings larger
- Title 24 compliance impact larger than single family

HRV Impact on Multifamily 2022 Compliance Margins



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

RV 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 RVs

What Happens When I add an RV?

- 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)

Defining the RV

IAQ Fan: HRV 50 cfm

IAQ Fan Data

Currently Active Fan: HRV 50 cfm

Name: HRV 50 cfm

IAQ CFM: 55 CFM

W / CFM IAQ Vent: 0.7 W/CFM

IAQ Fan Type: Balanced

Includes Heat/Energy Recovery

Sensible Recovery Efficiency (SRE): 67 %

Adjusted Sensible Recov Eff (ASRE): 72 %

Interpolate SRE/ASRE from HVI Listed Ratings

OK

RV CASE STUDY

6 new duplexes

Los Angeles, CZ 8

Original compliance models had:

- VCHP credit for ductless minisplit heat pump
 - Condensing gas tankless WH uef .95
- Builder missed those features, instead used:
- Central ducted heat pump
 - Standard gas tankless WH uef .81



HOW RVs CAN SAVE A PROJECT



Nick Brown <nick@buildsmartgroup.com>

to Emmanuel

Jun 22, 2023, 2:02 PM



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 HRV 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

Fresh air
FROM outside

Exhaust air
TO outside

Exhaust air
FROM home

ISF 6" (diam.)
collar system

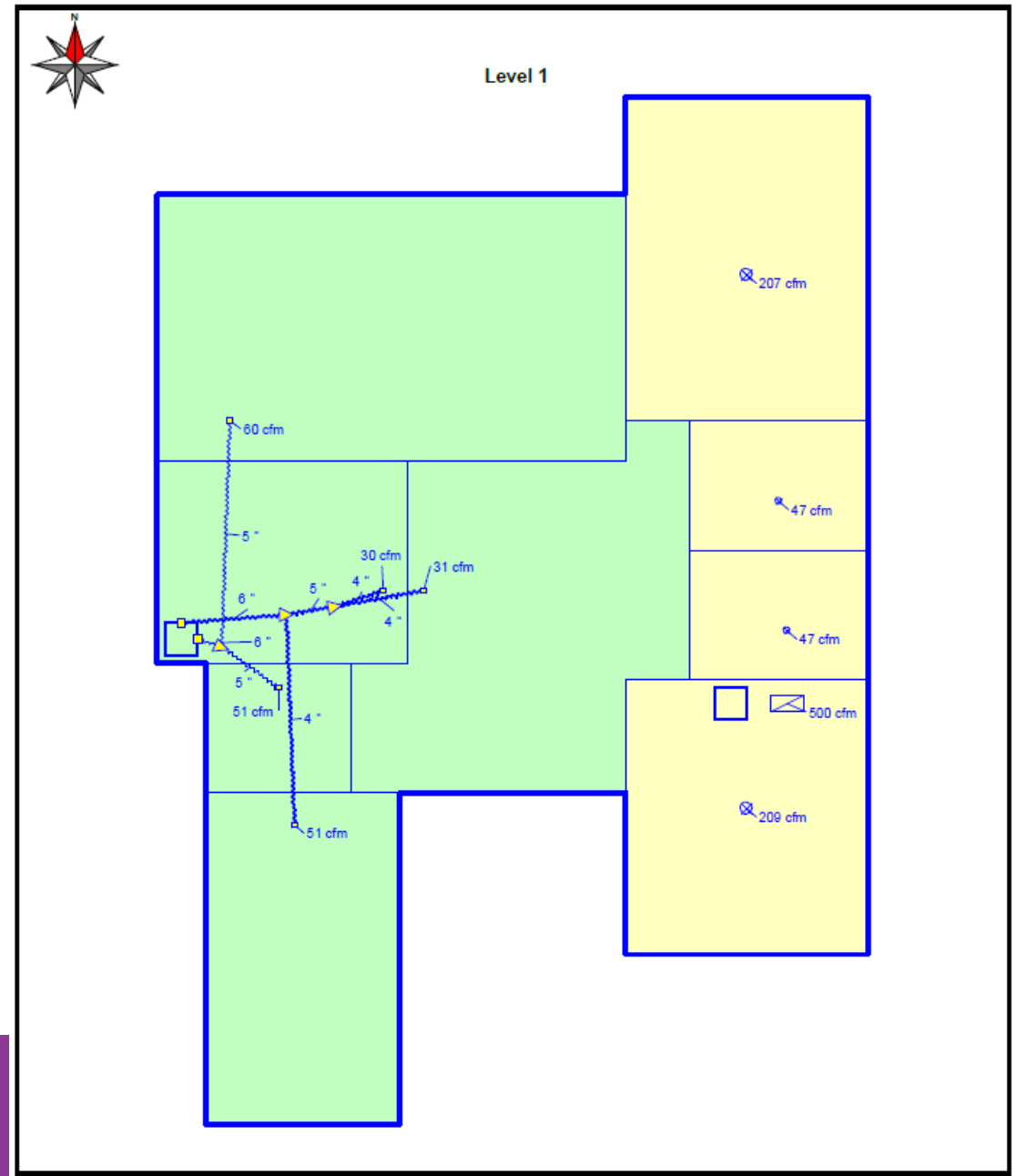
Fresh air
TO home

Heat or Energy Recovery Core

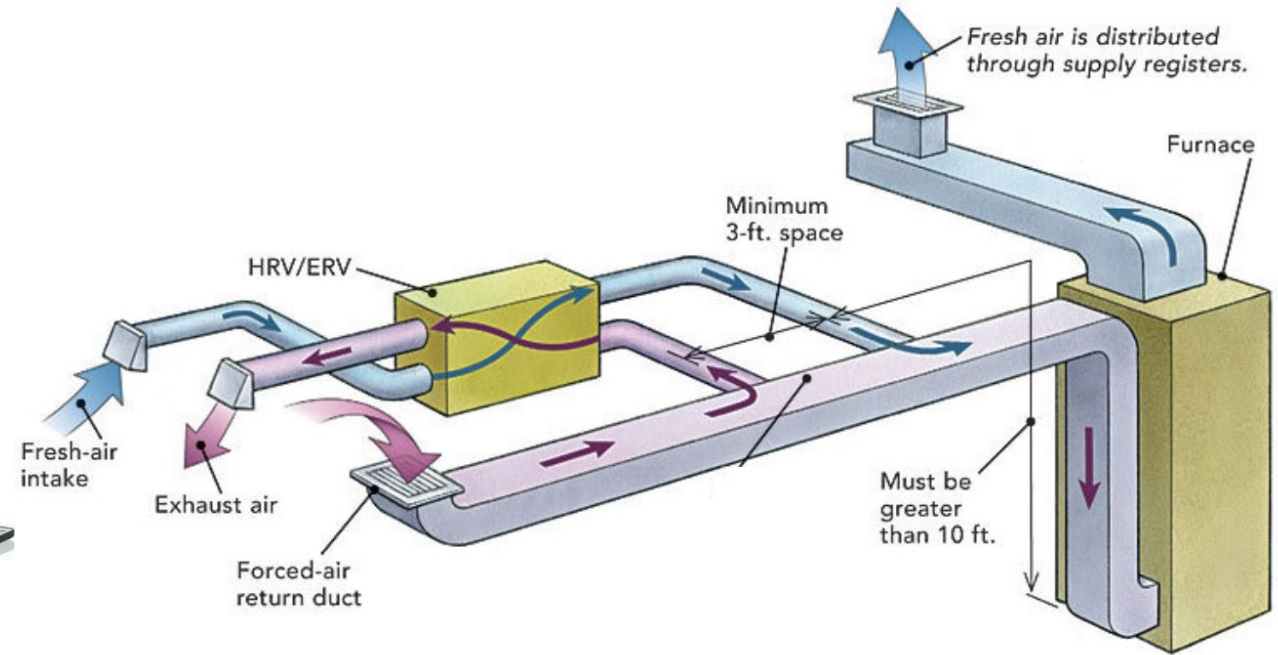
SPECIFYING & INSTALLING RVs

KEY QUESTIONS

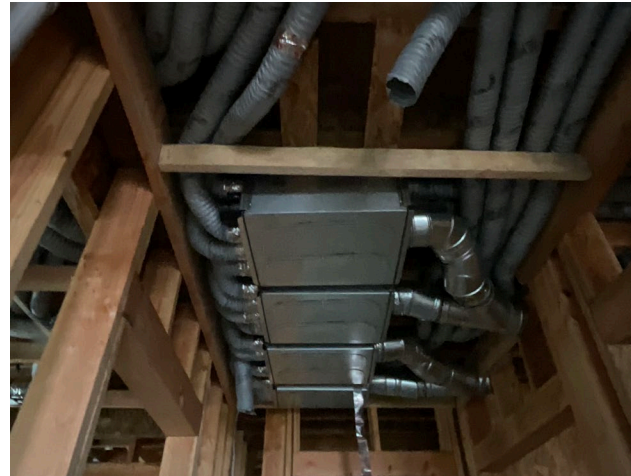
- Location of unit
- Duct routes
- CFM by room
- Supply & exhaust registers
- Envelope penetrations for ducts to outside
- Occupant controls



OTHER RV CONFIGURATIONS



DISTRIBUTION SYSTEMS



Photos Courtesy of Scott Kelly,
<https://www.highperformance.build/>

RVs & 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

1 to 100 (384)

100

Current as of June 30, 2023

Brand Name

Product Category



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

slido



What are your take-aways on RVs?

RVs ALLOW YOU TO BE YOUR MOST PRODUCTIVE SELVES





March 5,
2024

THANK YOU!

nick@buildsmartgroup.com

Questions about Title 24?

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



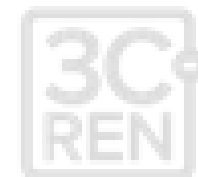
Online:
3c-ren.org/codes

Call:
805.781.1201

Energy Code Coaches are local experts who can help answer your Title 24 questions. Coaches have decades of experience in green building and energy efficiency improvements. They can provide citations and offer advice for your project to help your plans and forms earn approval the first time.

Closing

- Continuing Education Units Available
 - Contact shuskey@co.slo.ca.us for AIA and ICC LUs
- Coming to Your Inbox Soon!
 - Slides, Recording, & Survey – Please Take It and Help Us Out!
- Upcoming Courses:
 - March 7th - [High Performance Buildings & Careers – Class 1: High Performance Fundamentals Series](#)
 - March 13th - [Energy Code Implementation: Single Family Additions and Alterations](#)
 - March 14th - [Using Building Science to Design and Build High Performance Homes – Class 2: High Performance Fundamentals Series](#)
 - March 20th - [Energy Code Compliance: Using HERS Measures \(Part 2\)](#)
 - March 21st - [Detailing for High Performance Roofs and Walls](#)
 - March 28th - [Multi-Family Domestic Hot Water](#)
- Visit www.3c-ren.org/events for our full catalog of trainings.





Thank you!

For more info:
3c-ren.org

For questions:
info@3c-ren.org



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