OREGON HOUSING & COMMUNITY SERVICES

Multifamily Energy Program

HIGH PERFORMANCE VENTILATION

Date: February 27, 2020

Presenter: Nick Young, Association for Energy Affordability

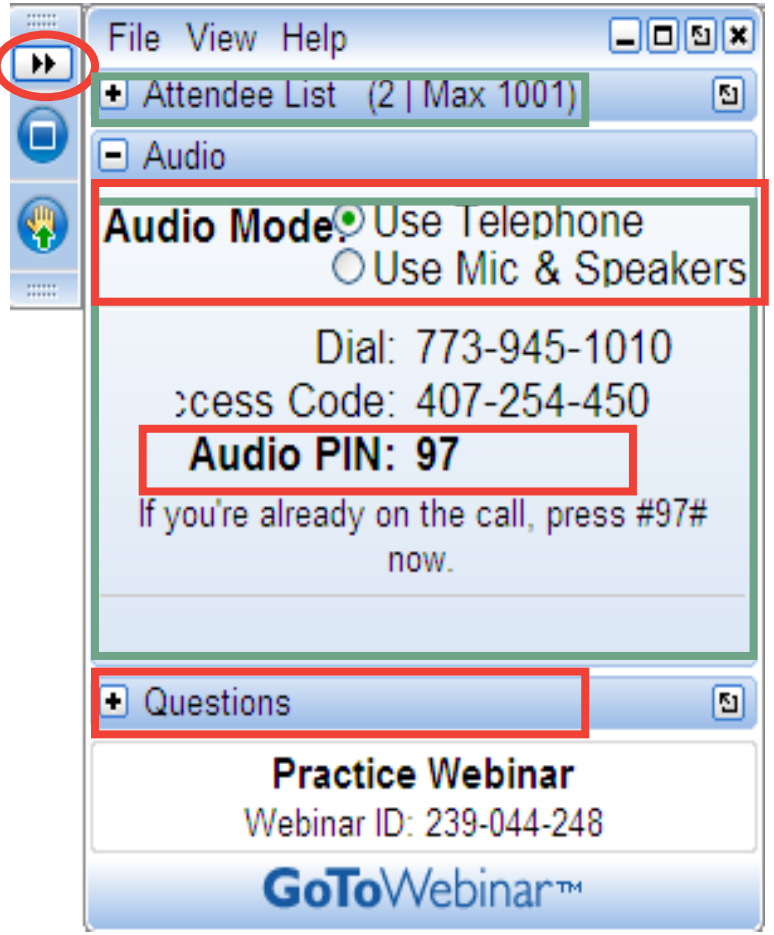
OREGON HOUSING and COMMUNITY SERVICES

TRC

ASSOCIATION FOR ENERGY AFFORDABILITY INC.

USING GOTOWEBINAR

Open and close your **control panel**



Choose **audio mode**

Enter your **audio pin**

Type **questions** in the chat box

Questions will be taken at the end of the presentation.

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- **Thursday, February 27th, 2020, 12pm:**
  High-Performance Ventilation | REGISTER NOW

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MEET THE TRAINER

Nick Young
Association for Energy Affordability

OR-MEP INCENTIVES

The OHCS Multifamily Energy Program (OR-MEP) provides incentives for energy efficiency measures that results in ELECTRIC SAVINGS

Qualifying Energy Efficiency Measures

The OHCS Multifamily Energy Program provides incentives for energy efficiency measures that results in electric savings, including the following:

AGENDA

- Ventilation Basics
- Natural Ventilation
- Exhaust Ventilation
- Balanced Ventilation
- Ventilation Case Studies

VENTILATION BASICS

EXISTING MULTIFAMILY BUILDINGS ARE…

under ventilated

OVER VENTILATED

EraDiCaLy ventilated

I n te r m I tt ent ly ve n t ila te d

WHY VENTILATE?

Remove air pollutants

- Carbon monoxide (CO)
- Carbon dioxide (CO2)
- VOCs – glues in building materials, solvents
- Particulates – PM 2.5 from cooking/dust/outdoors
- Tobacco smoke
- Radon

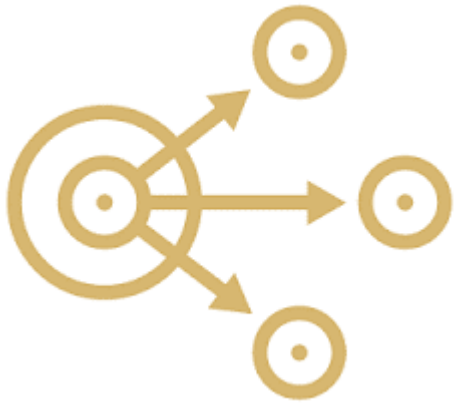
Remove moisture

- Bath, shower, cooking
- People

Bring in fresh, clean air

GREAT VENTILATION PROVIDES:

DISTRIBUTION



Fresh air is delivered to each living space.

FILTRATION

Fresh air and/or room air is continuously filtered.

BALANCE

Pressures in adjacent spaces are balanced.

KEY VENTILATION SYSTEM CHARACTERISTICS

Are there fans?	Where are the fans blowing?	When do the fans operate?	What space does each fan serve?	Is there heat recovery?
•**Yes:** Active / mechanical ventilation •**No:** Passive / natural ventilation	•**In:** Supply ventilation •**Out:** Exhaust ventilation •**Both:** Balanced ventilation	•**Always:** Continuous •**Sometimes:** Intermittent	•**Single unit:** Individual or unitary ventilation •**Stack of units, floor, or whole building:** Central	•**Yes:** Most efficient; only possible w/ balanced •**No:** Less efficient, more common

QUESTION BREAK

NATURAL VENTILATION

NATURAL VENTILATION

- **No Mechanical Ventilation**
  - Open windows or central shafts for air flow
  - Infiltration of air into and through apartments
- **Advantages**
  - Already there in older buildings
  - Low maintenance
- **Disadvantages**
  - Nearly impossible to deliver consistent flow rates
  - Uncomfortable for occupants
  - Incoming air unfiltered
  - No longer allowed in new buildings (must have fans)

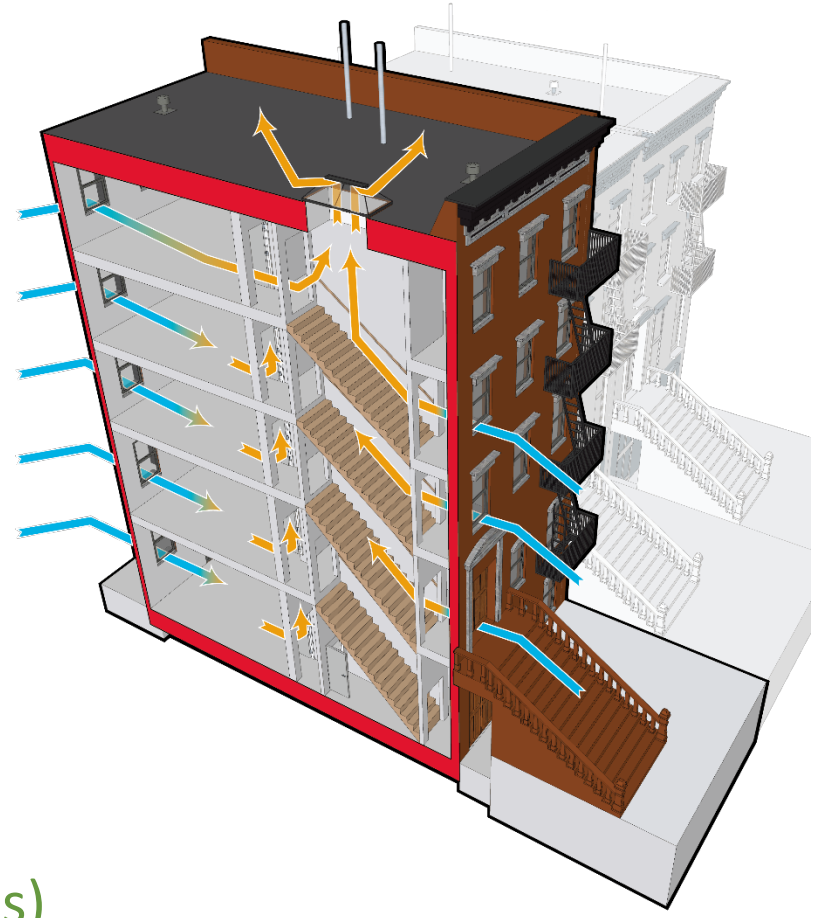


Image: Association for Energy Affordability

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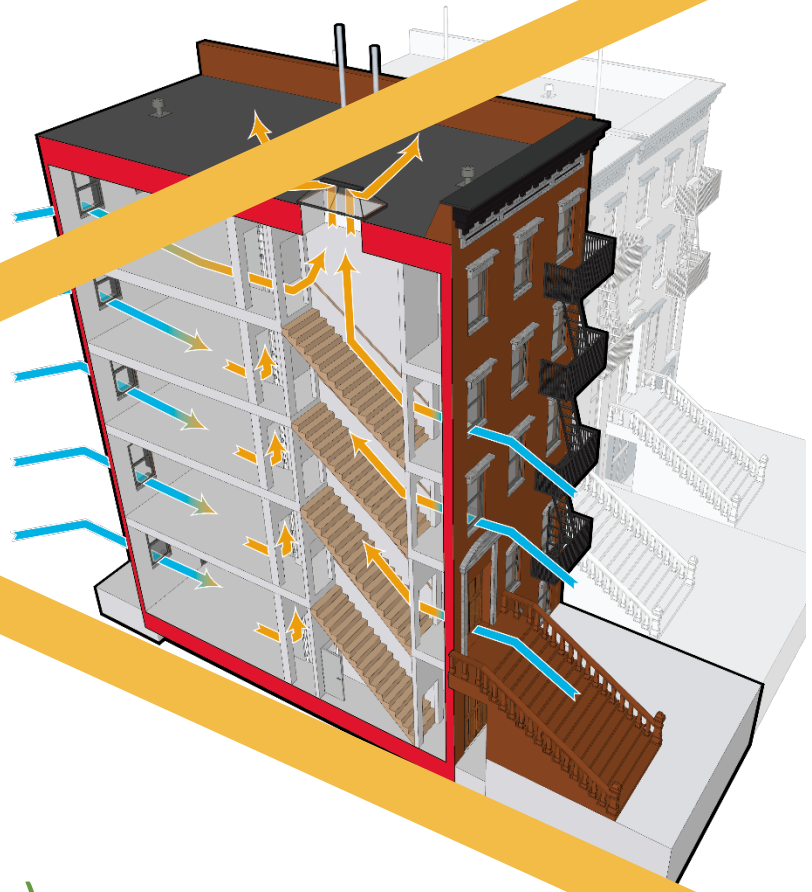

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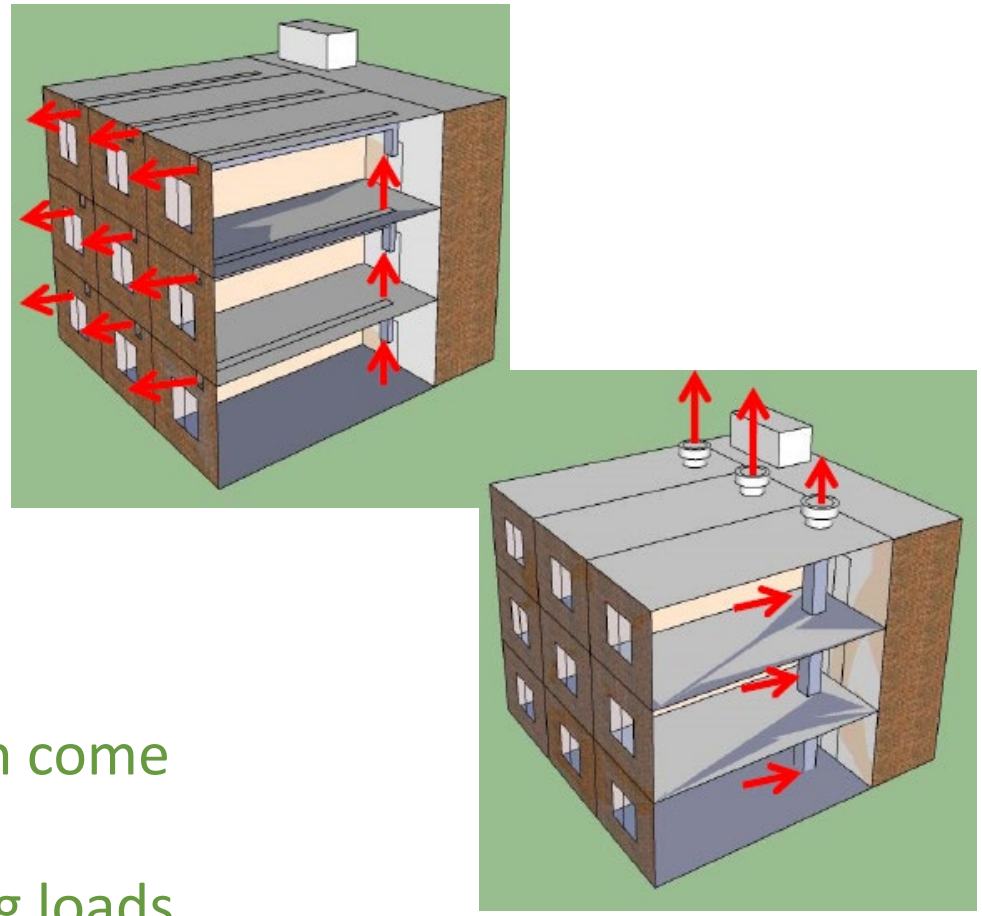
EXHAUST VENTILATION

EXHAUST-ONLY VENTILATION

- **Exhaust Fans in Bath & Kitchen**
  - Fans can be individual or central
- **Advantages**
  - Low first cost
- **Disadvantages & Resulting Impacts**
  - Noise → lack of use
  - Cheap equipment → premature failure
  - Poor installation → poor airflow
  - Uncontrolled infiltration → Makeup air can come in from anywhere, unfiltered
  - No heat recovery → higher heating/cooling loads



Images: Building America

EXHAUST-ONLY VENTILATION – BEST PRACTICES

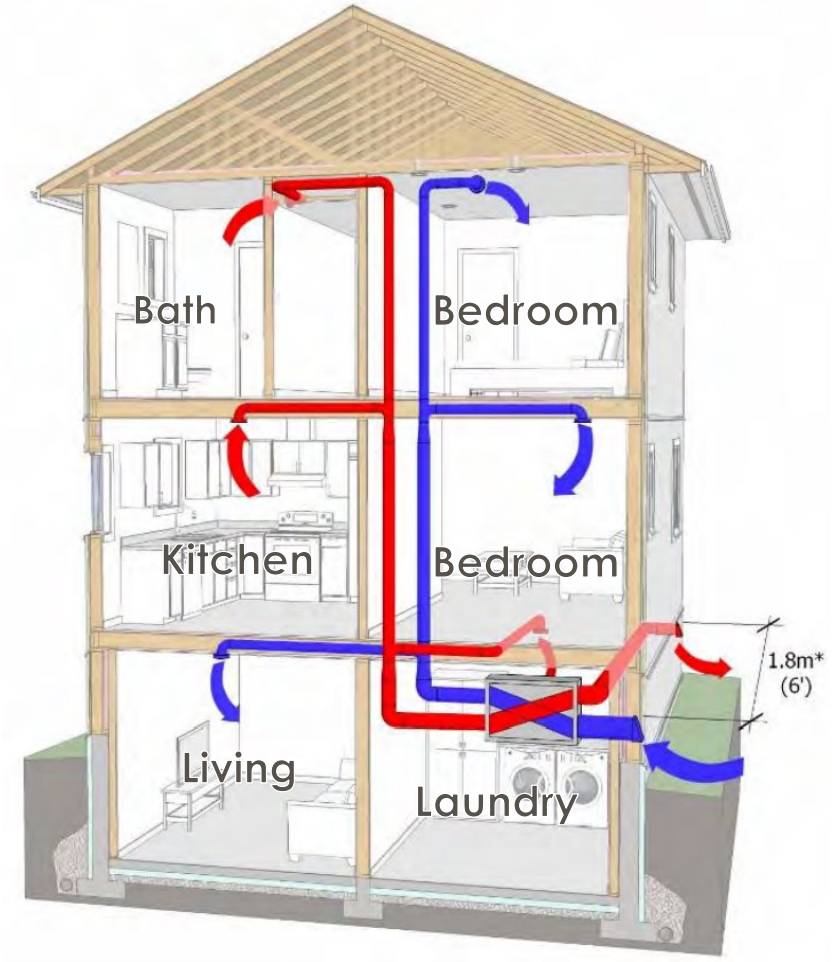
- **ENERGY STAR Fans**
  - Efficient: ≤ 2.8 cfm/W
  - Quiet: ≤ 2.0 Sones
- **Options**
  - Adjustable speed
  - Delay timer
  - Humidistat
  - Occupancy sensor
  - LED light kits
- **Beware bargain basement fans!**
  - They are cheap and may fail prematurely.

QUESTION BREAK

BALANCED VENTILATION

BALANCED VENTILATION – DESIGN PRINCIPLES

- **Supply to living spaces**
  - Bedrooms, living rooms
- **Exhaust from wet areas**
  - Kitchen, bath, laundry, etc.
- **Notes on kitchen exhaust**
  - HRV/ERV cannot be directly connected to range hood
  - Solutions:
    - Directly ducted or recirculating range hood
    - Kitchen area exhaust tied to HRV



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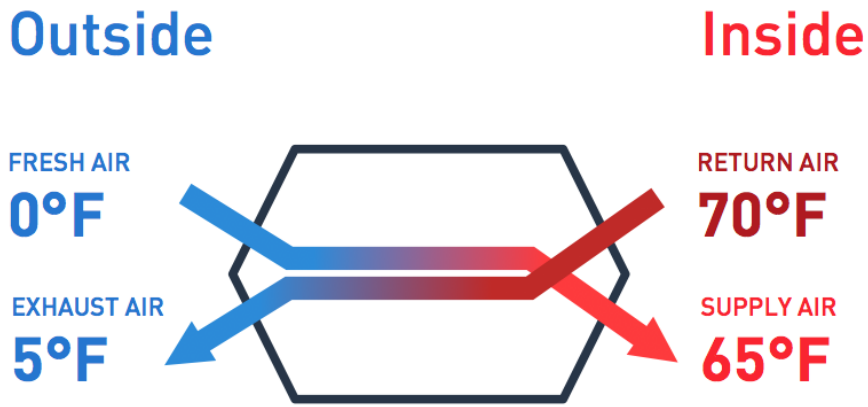
BALANCED VENTILATION – HRV/ERV

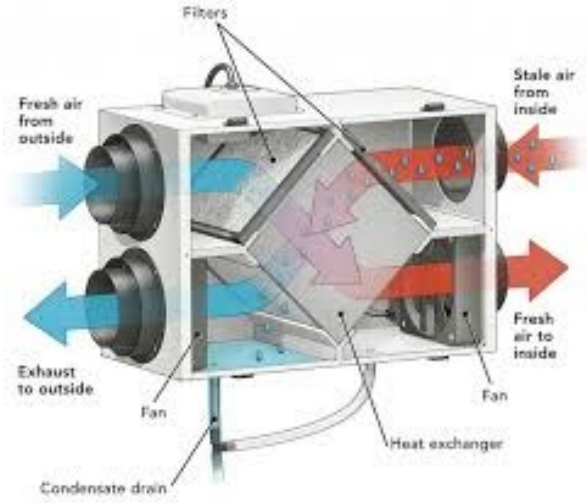
- **Single Unit Provides Supply & Exhaust**
  - Flowrates balanced or slightly pressurizing units
  - MERV 8 or 13 filtration on supply air
  - Heat or enthalpy (moisture) recovery core
- **Advantages**
  - Best available distribution, filtration, and balance
  - Reduces heating costs
  - Improved comfort – warmer winter supply air
  - Continuous operation ensures adequate ventilation even w/o tenant understanding
- **Disadvantages**
  - Higher first cost – equipment, ducting, testing
  - Filters must be maintained/changed regularly

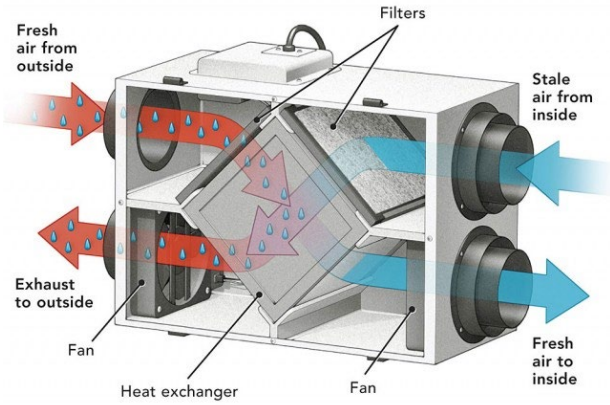


HRV Diagram: Hammer & Hand

BALANCED VENTILATION – HRV VS. ERV

	HRV	ERV
Full Name	Heat Recovery Ventilator	Enthalpy (or Energy) Recovery Ventilator
Type of Heat Exchange	Sensible heat	Sensible heat Latent heat
Ideal Application	Buildings with high internal moisture gains	Climates with very cold winters or very humid summers
Condensate drain?	Yes	No





Images: Building America

SELECT UNITS W/ BYPASS FOR FREE COOLING

- **HRV/ERV with BYPASS can skip heat exchanger**
  - Good for shoulder seasons and cool summer nights
  - Prevents overheating
  - Reduces A/C usage & energy consumption; like an economizer
- **Many cheaper units do not come with this feature.**
- **Omit bypass at your own risk!**

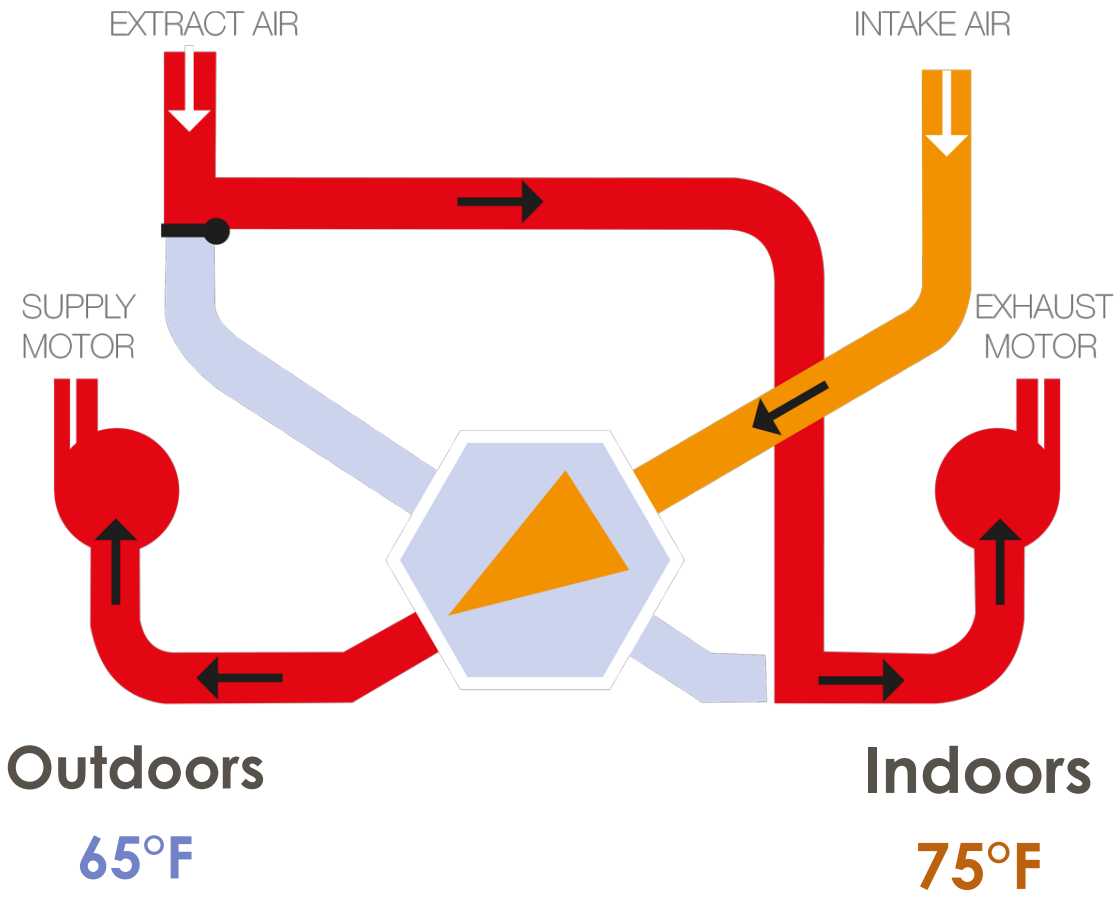
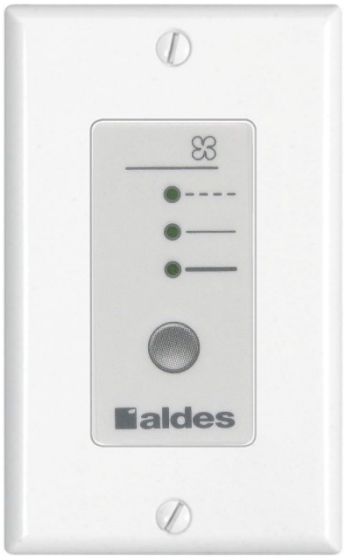


Image: Zehnder America

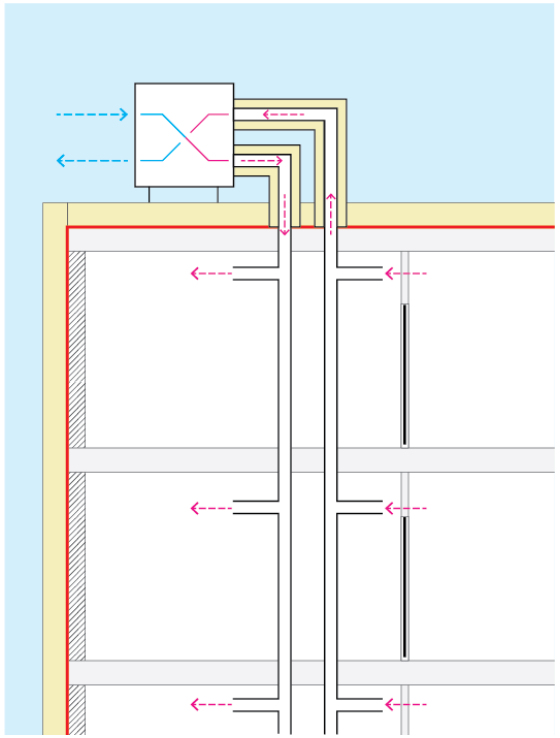
HRV/ERV CONTROLS

- **Run continuously on low**
  - Ensures adequate ventilation
  - No tenant understanding required
- **Boost mode**
  - Temporary boost flow rate for showering, cooking
  - Can be controlled on manual switch, CO2 sensor, or relative humidity sensor
- **Party mode**
  - Higher flow rate for longer period of time



MULTIFAMILY HRV/ERV – CENTRAL VS. UNIT

CENTRAL



CENTRAL

- One HRV/ERV serves multiple units (stack or wing)
- Fire/smoke dampers can add cost
- Easier equipment & filter maintenance

UNIT

- One HRV/ERV per unit
- May be lower first cost than central
- Must enter units to maintain equipment & filters

UNIT

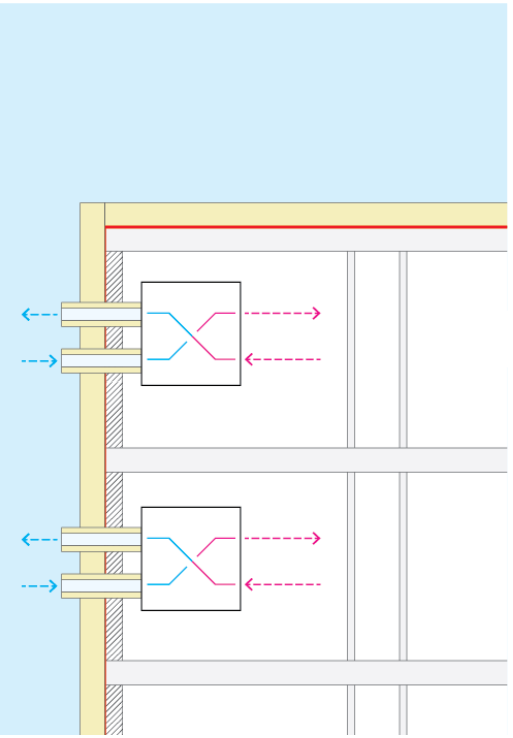


Image: BLDGType: Candela Lofts

OVERALL WINNERS

1st

Ducted HRV/ERV wins in all categories but first cost.

Could HRV/ERV allow project to save costs by downsizing heating/cooling systems?

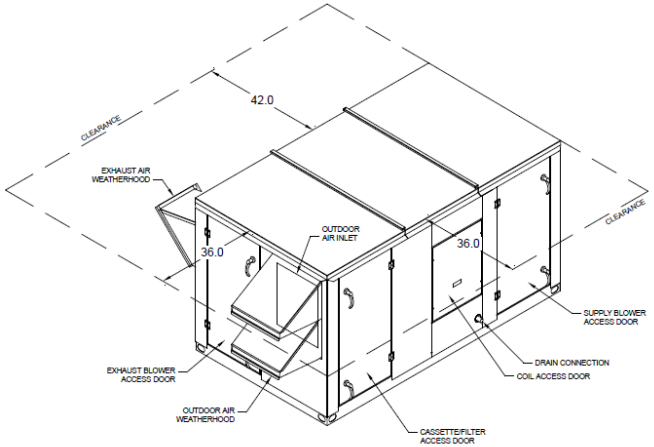
2nd

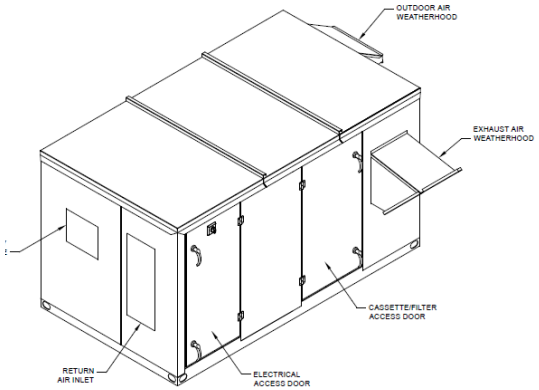
Other balanced systems, or ENERGY STAR exhaust with continuously operating fans are second best.

VENTILATION CASE STUDIES

CANAL COMMONS: CENTRAL ERV INSTALLATION

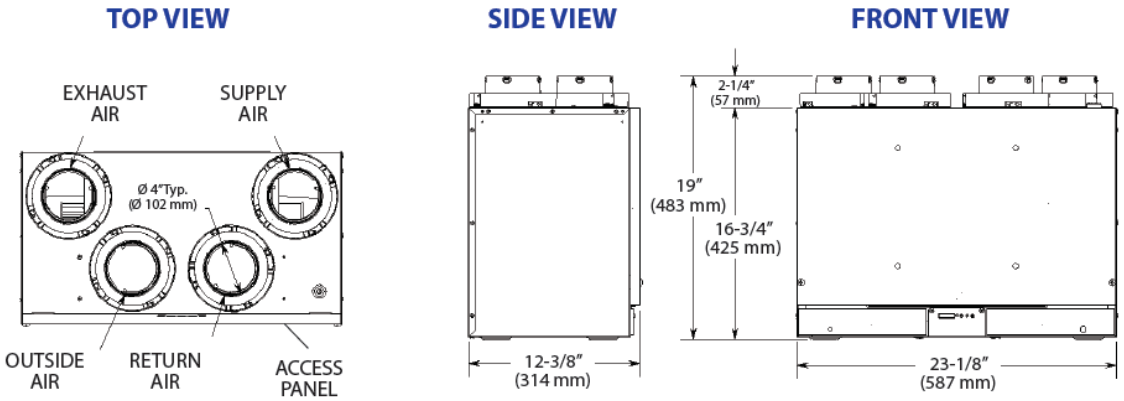
- **Developer: Pacific Crest Affordable Housing**
- **48 unit New Construction project in Bend, OR**
  - Installing a Greenheck ERV
    - Central unit serving whole building
  - 70% sensible recovery efficiency
- **Impacts:**
  - Estimated ~12,500 kWh in savings
  - Delivers fresh, filtered and tempered air to units and common areas





THE MARY ANN: IN-UNIT HRV INSTALLATION

- **Developer: REACH CDC**
- **54 unit new construction project in Beaverton, OR**
  - Aldes H-110 HRV
    - In-unit HRV, mounted above ceiling
    - Exhaust from bathroom, exits through wall
- **Impacts:**
  - ~21,000 kWh in savings
  - Building tightness goals (1.3 ACH50) benefit from improved ventilation
  - Odor control



THANK YOU FOR ATTENDING

Oregon Housing and Community Services
Multifamily Energy Program

www.oregonmultifamilyenergy.com

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