RenewAire®
Energy Recovery Ventilation

ERV GUIDE

BENEFITS OF INCREASED VENTILATION

- BETTER HEALTH
- IMPROVED COGNITIVE FUNCTION
- INCREASED PRODUCTIVITY

RENEWAIRE EVERYWHERE

EVERY GEOGRAPHY, EVERY CLIMATE, EVERY HOME, EVERY BUILDING AND EVERY APPLICATION

INDOOR **AIR QUALITY MATTERS**

DEFICIENT INDOOR AIR QUALITY IS A THREAT

As **buildings get tighter to seal weather out, they seal in contaminants**, causing deficient indoor air quality (IAQ). Typical contaminants include off-gassing from carpeting, furniture and building materials, excess humidity and mold, odors, cooking and cleaning fumes, CO2, hair and fibers, to name a few.

Deficient IAQ is a threat since it can harm occupant health and cognitive function, damage structures and hurt the bottom line. It's especially concerning since people spend about 90% of their time indoors, and indoor air can be two to five times—and up to 100 times—more polluted than outdoor air. The EPA ranks indoor air pollution as a top-five health risk.[1]

ADVERSE EFFECTS OF DEFICIENT IAQ

HEALTH PROBLEMS

Deficient IAQ can cause allergies, headaches, coughs, asthma, skin irritations and breathing difficulties, as well as cancer, liver disease, kidney damage and nervous-system failure.

COGNITIVE IMPAIRMENT

Harvard and Berkeley Lab found that CO2—a constituent of exhaled breath—negatively impacts thinking and decision-making at levels commonly found indoors.[2]

REDUCED PRODUCTIVITY

Berkeley Lab found that deficient IAQ can cost $200 billion in debilitated worker performance and $58 billion in lost sick time.[3]

RENEWAIRE VENTILATION SOLUTIONS IMPROVE HEALTH AND WELLNESS

[1] "Why Indoor Air Quality is Important to Schools," United States Environmental Protection Agency (EPA), https://www.epa.gov/iaq-schools/why-indoor-air-quality-important-schools.

[2] Joe Romm, "Exclusive: Elevated CO2 Levels Directly Affect Human Cognition, New Harvard Study Shows," Climate Progress, October 26, 2015, http://thinkprogress.org/climate/2015/10/26/3714853/carbon-dioxide-impair-brain/.

[3] Leon Alevantis, (Department of Health Services), Adam Berman (Capital E), Evan Mills (Lawrence Berkeley National Laboratory), Jeff Perlman (Capital E), "The Costs and Financial Benefits of Green Buildings," U.S. Green Building Council (USGBC), October 2003, https://noharm-uscanada.org/sites/default/files/documents-files/34/Building_Green_Costs_Benefits.pdf.

AMERICANS SPEND **90% OF THEIR TIME INDOORS**

Everyone is at risk of suffering from deficient IAQ. Due to weaker immune systems, children and seniors are the most vulnerable. Children are especially susceptible because proportionally they inhale more pollutants than adults and have narrower airways (World Health Organization).

REDUCE INDOOR AIR CONTAMINANTS

1. **Humidity:** Exhaled breath, water sources (faucets, showers, leaks, floods)
2. **Carbon Dioxide:** Constituent of exhaled breath
3. **Formaldehyde:** Off-gassed from adhesives, fabric treatments, stains, varnishes
4. **Odors:** Bathrooms, kitchens, dry-erase markers, occupant odors (perfume, soap/shampoo residue, clothing detergent, general odors), pets
5. **Tobacco smoke:** Smoking areas close to building entrance
6. **Phthalates:** Off-gassed from adhesives, vinyl flooring, wood finishes, plastic plumbing pipes, other building materials
7. **VOCs, toxic gases, vapors:** Off-gassed from furniture, carpets, paints, cleaners, solvents, glues, building materials
8. **Ozone:** Off-gassed from copiers, electrostatic air cleaners, other office equipment

IMPROVE INDOOR AIR QUALITY IN YOUR HOME

VENTILATION IS THE SOLUTION

The solution to pollution is dilution achieved via **balanced ventilation, which is the most effective way to achieve cleaner and healthier indoor air**. With enough controlled fresh and filtered outdoor air coming in to replace equal parts balanced design of stale indoor air, IAQ will be enhanced.

This can be done energy-efficiently, cost-effectively and sustainably with RenewAire's energy recovery ventilation solutions, which reuse otherwise-wasted total energy from the exhaust airstream to condition incoming outdoor air. The results are improved IAQ, greater ventilation efficiency and major energy cost savings.

VENTILATION STRATEGIES FOR YOUR HOME

CATEGORY	STRATEGY	AIRFLOW CFM	RESULTS
FAIR	Exhaust Only	100	Exhaust-only fans remove indoor air from bathrooms and kitchens, causing depressurization that then ventilates in uncontrolled outdoor air through cracks in the home. But disadvantages exist: with no filtration, outdoor contaminants are drawn indoors; with more airtight homes, it is difficult to improve IAQ this way; fans can lack energy efficiency, leading to higher costs.
GOOD	Balanced Ventilation	100	Balanced ventilation combines exhaust-only with make-up fans interlocked with an air handler. The system delivers controlled outdoor air into the home, but disadvantages exist: there is no energy recovery, it is decentralized making it more complex to install and hard to maintain, there is no return on investment.
BETTER	Balanced ERV Ventilation	100	RenewAire's balanced ERV ventilation with integrated supply and simultaneous exhaust improves IAQ and adds many benefits: • otherwise-wasted, exhaust-air total energy is reused to condition outdoor air coming in, which optimizes energy efficiency • filtration further enhances IAQ • the centralized system is reliable and easy to install and maintain • payback is quick and ROI is substantial • operating costs are cut and long-term annual savings are realized • a leading warranty means peace of mind
BEST (with exceptional IAQ)	Balance ERV Ventilation with 30% more airflow	130	RenewAire's balanced ERV ventilation with 30% more airflow goes above code minimums to provide exceptional IAQ, the increased airflow offers further dilution of indoor contaminants resulting in an even lower concentration of gases and particulates.

DID YOU KNOW

During sleep, people breathe more deeply, allowing more contaminants to enter their body. The results may include aggravated asthma and allergies, stuffy noses, headaches, scratchy throats, coughs, sleep interruptions and general sickness. Additionally, contaminants are off-gassed from foams, plastics and flame-retardants found in most new beds and mattresses.

ASHRAE 62.2

The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) 62.2 committee has established a residential ventilation standard for buildings three stories and less, known as the *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*. The goal of this standard and its continuous revisions are to not only **evaluate and recommend every building's minimum ventilation needs**, but also emphasize indoor air quality and its relationship with occupant health.

To calculate the minimum ventilation required for your home: .03 x sq. ft. + 7.5(bedroom +1). For example, a 2,200 sq. ft. home with 4 bedrooms requires a minimum of 104 CFM (accounts for infiltration).

SINGLE/MULTI-FAMILY ERVs

Increased airtightness of homes and human activity indoors cause deficient IAQ, resulting in health problems and cognitive impairment for occupants, especially children and the elderly. **Affordable and sustainable RenewAire ERVs** can be installed easily in homes of every type (new construction or renovation projects) to **enhance IAQ and save energy**, thus improving occupants' wellbeing. They improve IAQ by removing contaminants like off-gassing from carpeting, furniture and building materials, excess humidity and mold, and even dangerous bacteria and viruses.

SL PREMIUM SERIES

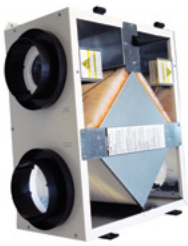
- Four-duct design
- Indoor
- 51-76 CFM continuous mode
- 76-94 CFM boost mode

BR SERIES

- Two-duct design
- Indoor
- 40-140 CFM

GR SERIES

- Contractor grade—four-duct design
- Indoor
- 40-110 CFM



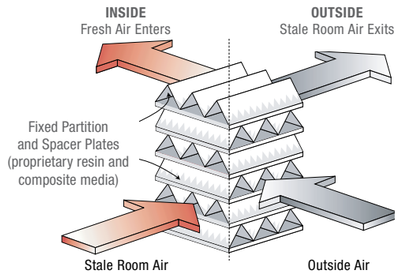
EV SERIES

- Four-duct design
- Indoor (EV450 also available as outdoor)
- 40-540 CFM

OPTIMIZE ENERGY EFFICIENCY IN EVERY SPACE

OPTIMIZING ENERGY EFFICIENCY

RenewAire residential ERVs are a sustainable ventilation solution. **Our static-plate, cross-flow core separates the outgoing, polluted indoor airstream from the incoming fresh airstream—while simultaneously transferring total energy** (heat and water vapor) between the two. Airstreams do not mix and pollutants are not transferred across partition plates. In the winter, that means that the cold, dry outside air is preheated and humidified by the outgoing warm interior air. And in the summer, the warm, humid outside air is precooled and dehumidified by the outgoing air-conditioned interior air.



ASHRAE 90.1 ENERGY STANDARD

"Energy Standard for Buildings Except Low-Rise Residential Buildings" is a benchmark for commercial building energy codes in the U.S. and across the world. ERVs are required in several instances based on climate zone and percent of outdoor air at full design airflow rate.

RenewAire in Action: HVAC LOAD REDUCTION & HEALTHY IAQ AT GCU

- HVAC loads reduced by 40%
- Annual HVAC costs reduced by 40% every year for the life of the ERVs
- Excel in small spaces due to downsized HVAC equipment
- Work within limiting parameters of existing HVAC infrastructure

Read our case study, RenewAire ERVs Reduce University's Annual HVAC Cost by 40% Compared to Conventional Equipment: http://bit.ly/2JpAft5

RENEWAIRE CORE TECHNOLOGY

CERTIFICATION

- Certified by the Air Conditioning, Heating and Refrigeration Institute (AHRI) for an industry-leading, low-to-zero Exhaust Air Transfer Ratio (EATR) at typical static pressure differentials
- Superior core flammability performance; passes UL-723 and UL-1812

MAINTENANCE

- RenewAire cores are easy to clean without removing them from the unit, and they never require washing

INNOVATIVE CONSTRUCTION

- Core exchanger material is cellulosic-based and doesn't contain or use halogenated flame retardants or PVCs
- Manufactured with a galvanized steel frame

RELIABILITY

- An industry-leading 10-year structural and performance warranty for the static-plate core, two-year warranty for commercial products and five-year warranty for residential products

EXCEPTIONAL PERFORMANCE

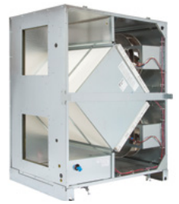
- Moderates heat and humidity via total energy recovery to maintain a comfortable indoor environment
- No need for frost protection or condensate pans
- Laminar airflow ensures that particulates do not accumulate in the core

REDUCED COSTS

- Optimized energy efficiency via core energy transfer decreases ventilation energy requirements, which can result in smaller air conditioning and heating needs

COMMERCIAL ERVs

The simplicity, flexibility, reliability and efficiency of the RenewAire HE and LE Series Commercial ERVs excel in every commercial application. The **packaged solutions** of the HE Series and the large capacity of the LE Series offer a **wide airflow range**, as well as static capacities. These innovative commercial ERVs can be applied in every type of building in every climate to **maximize energy efficiency, downsize HVAC equipment and reduce costs**.



HE SERIES

- Commercial ERVs—packaged solutions
- Indoor/outdoor
- 250-7,950 CFM

LE SERIES

- Commercial ERVs—large capacity
- Indoor/outdoor
- 1,500-11,000 CFM

APPLIED ERVs

The flexibility and efficiency of the RenewAire CA and PA Series Applied ERVs allow for **numerous applications, airflows and configurations**. The CA Series modular cabinets house up to four energy recovery cores and can be installed individually or be stacked up to five cabinets high. The PA Series modular arrays of 6, 8, 9, or 12 energy recovery cores can be installed side-by-side for 1,500–unlimited CFM. The combination of the CA and PA Series provides many options to optimize your ventilation strategy for larger applications.

CA SERIES

- Applied ERVs—modular cabinets
- Indoor/outdoor
- 500-4,400 CFM
- Stackable to 20,000 CFM

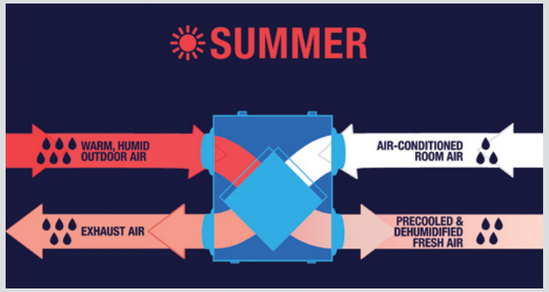
PA SERIES

- Applied ERVs—modular panels
- Indoor
- 1,500-unlimited CFM

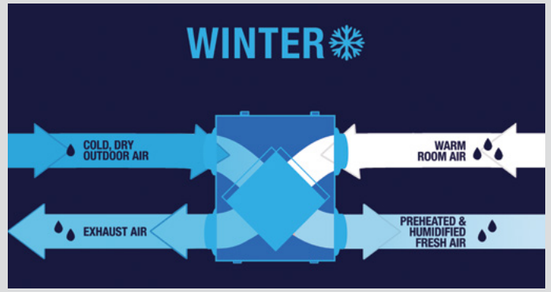
RENEWAIRE ERVs ARE THE SUSTAINABLE VENTILATION SOLUTION

RENEWAIRE ERVs TEMPER THE AIR

Our ERVs moderate the extremes of outdoor supply-air temperature and humidity year-round, providing a sustainable ventilation solution for every climate.



IN SUMMER, THE WARM, HUMID OUTSIDE AIR IS PRECOOLED AND DEHUMIDIFIED BY THE OUTGOING COOL INTERIOR AIR



IN WINTER, THE COLD, DRY OUTSIDE AIR IS PREHEATED AND HUMIDIFIED BY THE OUTGOING WARM INTERIOR AIR

DOAS SYSTEMS

Specific codes within various regions call for DOAS-type products to deliver 100% outside air to each occupied space. Additionally, many codes call for incorporating energy recovery. ASHRAE standard 90.1 and IECC require a minimum of 50% of total effectiveness for the energy recovery component. Even when not mandated, it is one of the **best ways to improve a building's energy efficiency**.

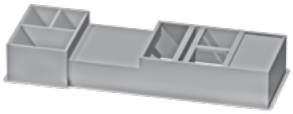
RD SERIES

- Commercial—Dedicated Outdoor Air System (DOAS)
- Indoor/outdoor
- 500-4,250 CFM

DN SERIES

- Commercial—Dedicated Outdoor Air System (DOAS)
- Indoor/outdoor
- 375-4,950 CFM

OPTIONS & ACCESSORIES



OPTIONS

- ECM motors
- Variable frequency drives
- Motorized isolation dampers
- Bypass economizers

ACCESSORIES

- Indirect Gas-Fired Duct Furnaces
- Electric Duct Heaters
- Combo curbs
- Filter alarms

GREEN BUILDING TRENDS

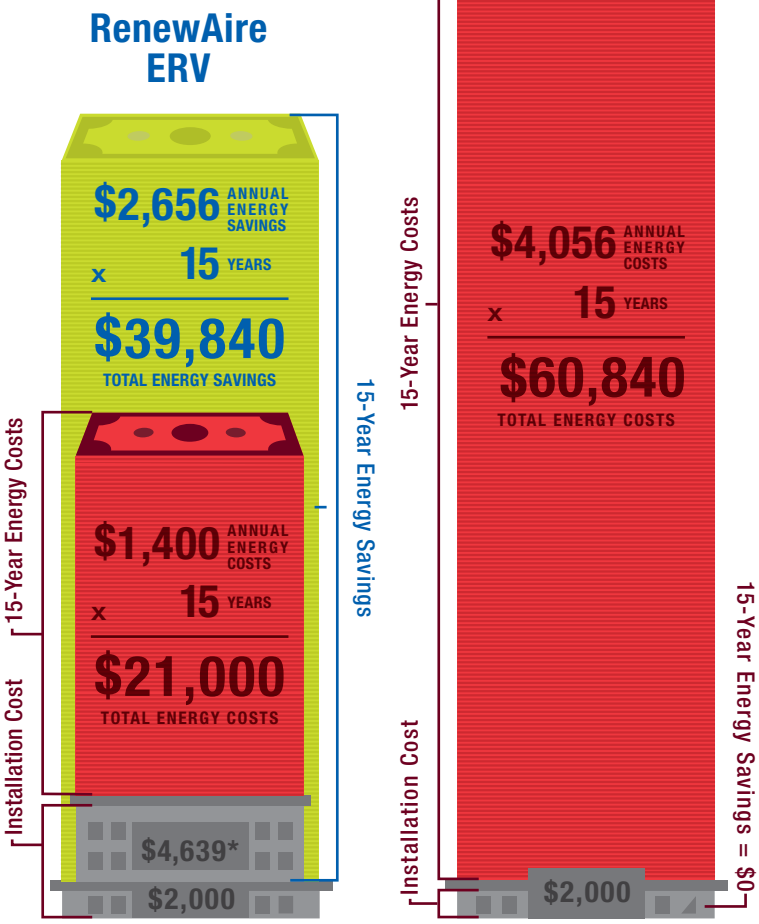
Trends in **high-performance green buildings** up the ante with stricter standards. Their guidelines not only place an emphasis on **energy reduction**, but also call for **increased ventilation** that aims to improve health, wellness, IAQ and indoor environmental quality (IEQ). Sustainable design initiatives like ASHRAE Standard 189.1, LEED® certification, the 2030 Challenge, the Living Building Challenge and the WELL Building Standard have grown in popularity among architects, contractors and building owners alike.

Our ventilation technologies create healthier and more comfortable indoor environments while optimizing energy efficiency by reusing otherwise-wasted total energy from exhaust air. The results are exceptional IAQ, IEQ and energy savings are critical components to **earning the distinction of being a "high-performance green building."**

RENEWAIRE ERV
FISCAL BENEFITS*

SHORT PAYBACK

Competitive pricing and **sizable HVAC energy savings** mean a short payback of only 1.75 years.



DOUBLE UP

on the ventilation rate to see a **productivity increase** of up to **$6,500/person per year.**[**]

59% HIGHER IRR

Applying RenewAire **ERV technology boosts returns**. The **Internal Rate of Return (IRR)** of the HE2XINH ERV is an incredible 59%!

INCREASED CASH FLOW

RenewAire ERVs lower **HVAC energy costs by up to 65%**. The HE2XINH ERV **saves $2,656 annually** on energy costs for the life of the system.

NET PRESENT VALUE

RenewAire **ERVs generate tremendous value**. At an additional investment of $4,639, the HE2XINH ERV's **Net Present Value is $31,371** over 15 years.

Read the full RenewAire NPV study: http://bit.ly/NPV_ERV

RENEWAIRE VENTILATION SOLUTIONS INCREASE MONETARY BENEFITS

* All data pertains to a RenewAire HE2XINH ERV when compared to conventional exhaust equipment at 1,500 CFM of OA in Minnesota using DX cooling and gas heat. Future energy costs calculated based on current energy costs. The $4639 additional investment toward installation cost accounts for the net total less cooling avoided costs and less utility rebate.

** Joseph G. Allen, "Research: Stale Office Air Is Making You Less Productive," Harvard Business Review, March 21, 2017, https://hbr.org/2017/03/research-stale-office-air-is-making-you-less-productive.