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# How to Improve Indoor Air Quality (IAQ)

**7** BENEFITS OF USING  
A HEAT RECOVERY  
VENTILATOR (HRV) OR  
AN ENERGY RECOVERY  
VENTILATOR (ERV)



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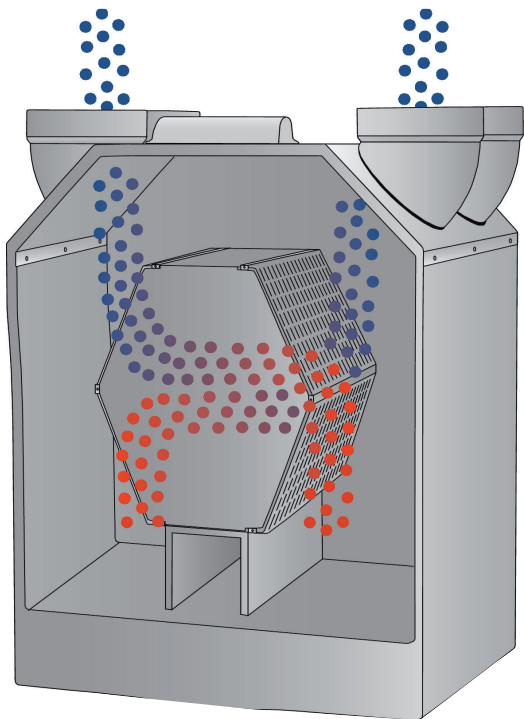


# Introduction to Heat Recovery Ventilators (HRV) and Energy Recovery Ventilators (ERV)

## ***Why should I care about indoor air quality (IAQ)?***

**Indoor air quality in homes, buildings, and schools is a silent-yet-critical component in the overall health and well-being of the individuals who inhabit them. In fact, the Environmental Protection Agency (EPA) states that poor indoor air quality is among the top global environmental health risks.**

**On average, indoor air pollutants in poorly ventilated buildings may be two to five times higher than outdoor pollutants. Poor indoor air quality can be a breeding ground for harmful particles such as mold, dust, pollen, dust mites, pet dander and more. Consistent exposure to these pollutants can lead to health conditions including nasal congestion, headaches, allergy triggers and chronic respiratory disease.**



## **What steps are important to improve indoor air quality?**

First, it's important to examine the different pollutant sources that can contribute to poor air quality. Once these sources are identified and eliminated when possible, it's important to make sure that the building will feature an efficient mechanism for making sure that the air is fresh, clean and properly ventilated. Heat recovery ventilation and energy recovery ventilation systems dilute the concentration of potentially harmful pollutants by continuously replacing the equivalent of several times the total air volume of the building envelope per day. The constant flow of fresh, filtered and pre-conditioned air will help maintain high indoor air quality and a comfortable indoor environment.

## **What are heat recovery ventilation or energy recovery ventilation systems?**

Heat recovery ventilation is a balanced mechanical ventilation system that continuously extracts stale air from the building and simultaneously, supplies the building with preconditioned, fresh and filtered air from the outside.

Before releasing the fresh air into the building, most of the energy from the exhausted air is used to precondition the incoming air through the heat exchanger. Most of the comfortable room temperature energy is recovered without the two air streams mixing.

This allows for a continuous stream of fresh air that maintains a steady, comfortable temperature while using little energy in comparison to standard heating and cooling systems. HRVs transfer heat or cool, whereas ERVs also transfer moisture. Climatic conditions and geographic location of the building will determine which system is selected for a specific application.

## **Why are HRV and ERV systems the future?**

Today's buildings have become increasingly tighter and more insulated due to building codes and energy-efficiency awareness. This provides certain benefits, such as the reduction of heat loss, infiltration of pollutants and energy bill savings. Since homes are becoming increasingly tight, a proper ventilation strategy is a must. Even in existing homes, which are not necessarily extremely airtight, a balanced ventilation system can significantly improve energy efficiency and IAQ by limiting negative pressure (from exhaust only ventilation and stack effect) through walls or crawl spaces (contributing to poor IAQ, mold and allergens concentration). Without a balanced ventilation solution from an HRV or an ERV, this air would need to be heated or cooled to room temperature.

Instead, with controlled balanced ventilation, most of the fresh air will be directed and filtered through the HRV or ERV external air intake.

Read on to find out how using these systems can significantly improve the air quality in your home or building.

# 7 Ways HRVs and ERVs Improve Indoor Air Quality (IAQ)

## 1. GIVE YOU CONTROL OF YOUR OWN AIR

An HRV or ERV system works to exhaust air from moist rooms like bathrooms and kitchens, while introducing a balanced amount of fresh filtered air into habitable spaces like bedrooms and living rooms. With these mechanical ventilation systems, home and building owners have greater control of proper building ventilation, regardless of external factors like the weather or the time of year. The fresh air distribution system channels optimally tempered fresh air to individual rooms and vents extracted air to the outside.

Heat recovery ventilation helps overcome the shortfalls of an exhaust-only ventilation strategy. When you are using exhaust-only ventilation (bath fans), you are unnecessarily exhausting heating or cooling and you don't know where the make-up air is entering the building. The make-up air is often coming from pretty unattractive places: potentially under floors, between insulated walls, attics and other unattractive places to receive ventilation for the building.

Heat recovery ventilation also helps overcome the shortfalls of a natural ventilation strategy. A notable shortfall of natural ventilation is the difficulty in controlling the building's airflow. A fully functional natural ventilation system requires careful planning and attention to pressure differences in air entry and exit points. These pressure differences are what encourage old air to exit the building and new air to enter at appropriate amounts. The functionality and performance of a natural ventilation system also depends on the climate and weather, which may cause sub-par performance when regions experience changes in weather on a daily and seasonal basis.

## 2. PREVENT MOLD AND BACTERIA

When humidity levels are on the rise, dust mite populations and mold growth also increase. Studies show that these pathogens flourish in homes and buildings with high humidity, especially relative humidity levels above 70%.

Pathogens such as mold can cause serious health complications such as asthma, allergic reactions and respiratory infections. Common reactions to mold include itchy, watery eyes, sneezing, wheezing and respiratory complications. In some cases, building inhabitants may develop conditions such as hypersensitivity pneumonitis; a type of lung inflammation that can cause muscle aches, fever and weight loss.

The growth of bacteria and fungi are also fostered by dampness and mold in buildings. Exposure to these allergens can contribute to existing health conditions such as asthma or generate reactions within individuals.



By constantly exhausting indoor air and providing fresh ventilation, HRV and ERV systems help create an environment where mold, mildew and dangerous bacteria cannot grow.

## 3. DELIVER FRESH AIR WITHOUT OPEN WINDOWS

More simple methods for natural ventilation involve opening doors and windows around the house or building. While this is a common method for letting out old air and introducing new air, it's also a good method for introducing bugs, allergens, and other unwelcome guests. This can lead to an overall decrease in the indoor air quality and comfort for the building occupants.

Since an HRV system controls the flow of outside air into and out of a building, windows can remain closed. With closed windows, the risk of air pollutants, insects, dust, pollen and outside noise in the home is reduced and security is improved.

## 4. RELIEVE ALLERGIES

Some allergy sufferers have found relief from symptoms using an HRV. Unlike air purifiers that filter air in one room, the HRV system filters the intake air coming into the entire home before dispersing it.

These filters can remove many common allergens, including pollen, dust, and even pet hair. The HRV filters are most effective when cleaned or replaced periodically, so it is important to have a system where the filters are easy to access for optimum maintenance.

## 5. AVOID CARBON DIOXIDE DANGERS

In poorly ventilated homes, carbon dioxide is likely to build up over the 1000ppm (parts per million) threshold over which decrease in comfort level can be experienced. This stale air can contribute to a number of health issues for those who live or work in these buildings.

Stale air can cause sleepiness and lethargy in those who are consistently exposed to it. In more severe cases, inhabitants may experience symptoms such as asthma, headaches and mental fogging.

## 6. PROVIDE A FRESH SMELLING HOME

Another other category of indoor air pollutants is gaseous pollutants. Not only can these substances be unhealthy, but they can create unpleasant odors in a home or building environment. An HRV or an ERV helps dilute these pollutants.

There are hundreds of types of gaseous pollutants that have been found in indoor environments; some of these pollutants may include nitrogen dioxide and carbon monoxide. They can come from a number of sources such as combustion appliances or vehicle exhaust from outdoors or attached garages.

Sources of the more common airborne gaseous organic compounds may include:

- paints
- adhesives
- caulks and waxes
- household cleaners and deodorizers
- solvents
- hobby and craft materials
- cooking odors
- metabolic processes of humans, animals and plants
- tobacco smoke

## 7. SUPPLY HEAT RECOVERY OR COOL RECOVERY

Bath fans take conditioned air inside the house and exhaust it out without recapturing any of the heating or the cooling. Then the unfiltered make-up air enters the house at outdoor conditions through the cracks and openings in the house. This forces your heating or cooling system to work that much harder to keep the building at optimum temperatures.

As a much better energy-efficient alternative, HRVs are constantly recapturing most of the energy of the conditioned air. In fact, high

efficiency models are recapturing between 85-95% of this energy. The fresh and filtered incoming outdoor air is pre-heated or pre-cooled and mechanically ventilated throughout the house within several degrees of the room temperature. Heating or cooling costs are greatly reduced and uncomfortable drafts of unfiltered air are eliminated in the building.

A tight building envelope, eliminating harmful pollutants at the source, choosing low or no volatile organic compound (VOC) building material and a heat recovery ventilation or energy recovery ventilation system go together to create a comfortable, healthy and energy-efficient indoor environment.



For more information about  
what a Zehnder system can do  
for the indoor air quality of your  
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