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Heat Exchangers: Balancing Your Home's Heat & Air Quality



By [Gemma Alexander](#)

DEC 8, 2021 [home heating, HVAC systems](#)



When you're trying to live more sustainably, you are often faced with trade-offs. The [clothes washer](#) that uses the least water uses more electricity; your old car burns fossil fuels but [electric vehicle](#)s use toxic batteries; large [refrigerators](#)



What Do You Think?



Would you give or accept a lab-grown diamond as an engagement ring?

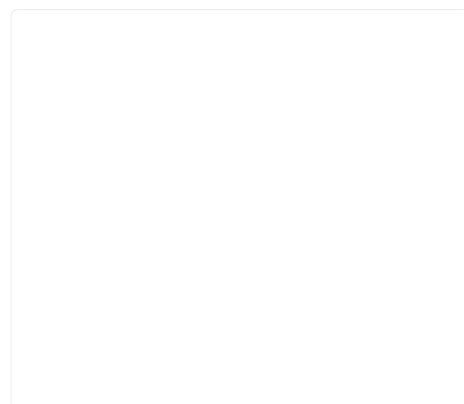
Yes

Maybe

No

No opinion

NEXT



operate more efficiently but encourage [food waste](#). It's hard to find the balance point between two choices. Fortunately, heat exchangers maintain the balance between energy efficiency and indoor air quality (IAQ).

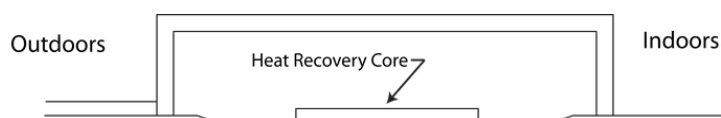
Competing Values

It might seem counterintuitive to use a machine to bring fresh air into your house when you can open a window. But when temperatures are low (or very high), keeping a home sealed up is important for maintaining [comfortable temperatures](#). Older homes let air seep out through the walls, attics, [chimneys](#), and [windows](#), but the air that replaced it had to be heated. Even in modern homes, [heating and cooling](#) present nearly a fifth of American's carbon footprint. But the [insulation](#) and other strategies that make your home [energy efficient](#) also trap air and moisture inside the home.

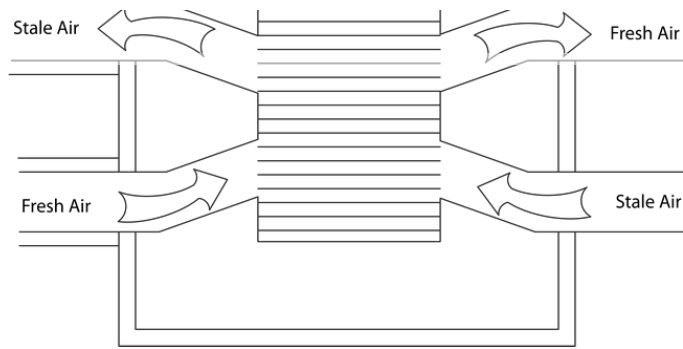
Some insulation [contributes directly](#) to indoor air pollution, but in most cases, insulation just keeps pollutants from escaping. The most effective way to improve [indoor air quality](#) is to reduce or [eliminate individual sources](#) of pollution. But for indoor pollutants that you can't control, it's necessary to bring fresh air into the house. The American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) sets [the standard](#) for residential ventilation at a minimum of .35 air changes per hour and not less than 15 cubic feet per minute (cfm) per person. Even a drafty house may fall below the ventilation standard under certain conditions.

What Are Heat Exchangers?

Different from a [furnace heat exchanger](#), air-to-air heat exchangers are simple devices that keep heat in your home while moving stale air out of it, allowing you to keep your energy efficiency and your indoor air quality, too. Attached to your existing HVAC system, an air-to-air heat exchanger brings two air streams of different temperatures into thermal contact so that [heat is transferred](#) from the outgoing inside air to the incoming outside air as part of your home's existing mechanical ventilation system. Heat exchangers can recover [up to 85% of the heat](#) in the outgoing air and they filter particulates from the incoming air.



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Typical features of an air-to-air heat exchanger. Image [source](#)

Most air-to-air exchangers installed in northern climates are heat recovery ventilators (HRVs). These units recover heat from indoor air as it is flushed out of the building. Energy recovery ventilators (ERVs) are heat exchangers that also transfer moisture. Historically, they worked best in hotter climates with higher humidity. Recent advances in technology have made them useful for a broader range of climates.

Heat Exchanger or Heat Pump?

Heat exchangers simply improve ventilation. [Air source heat pumps](#) actually heat and cool your home. They can replace your home's heating and cooling systems; they can heat specific zones in the home, or they can work in tandem with your existing heating system. Homeowners commonly add them to existing HVAC systems, using the fuel-burning furnace as a backup during more extreme weather.

[Using two heat exchangers](#) (one on the outside of the unit and one on the interior), an air source heat pump transfers heat rather than combusting fuel. Heat pumps can deliver up to [three times more BTUs](#) than they consume, while the most efficient gas boiler cannot quite produce as much heat energy as it consumes. Early versions of the technology had some problems. But recent advances have improved their reliability and expanded the climatic range of their usefulness. Although it's hard to imagine drawing heat from outdoor winter air, new heat pumps can heat homes [more efficiently](#) than oil, even in the Northeast U.S.

Do You Need One?

You probably already know if your home needs insulation.

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Your heating bill will be high, and your house will feel drafty. A [home energy audit](#) will help you prioritize your upgrades. Once you have sufficiently sealed your home, a heat exchanger will help maintain indoor air quality.

It is not always immediately obvious if your house has poor ventilation. Most indoor air pollutants do not produce odors. But in tight homes, window condensation and other moisture problems, like [mold](#), are usually the most noticeable signs of poor ventilation. If your home was built [after the year 2000](#), it is probably tightly sealed enough that you need a heat exchanger for adequate ventilation.

Unless you have an efficient, new home heating system, consider replacing your furnace with a heat pump instead of adding a heat exchanger for ventilation. And if you live in a hot climate, a heat pump is always a good idea, because any method that [keeps you cool](#) is environmentally better than using an air conditioner.

[Edit](#)



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[5 Alternative Christmas Tree Ideas](#)



By [Gemma Alexander](#)

Gemma Alexander has an M.S. in urban horticulture and a backyard filled with native plants. After working in a genetics laboratory and at a landfill, she now writes about the environment, the arts and family. See more of her writing [here](#).

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