Ask Jon Eakes

Overview: To HRV-ERV or not to HRV-ERV

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I am always amazed at house construction where so often things are half built or more while people are running around beginning to think about "extras" that should never be though of as "extras" but as part of the essential system. So time for one of my lectures -- (you asked for it).Heating is one thing, ventilation is another and air conditioning a third - while combustion air for the furnace is a fourth. These can each be taken care of separately, or on occasion we try to take care of them in some sort of combination. But most often the whole system is not thought through before construction and we tack on and tack on as things come up -- which makes them expensive, duplicative and often poor performers.The air intake that you have presently to the furnace could be either - fresh air into the household air -- or make-up air for the furnace combustion. If it is attached to the return air plenum of the furnace, it is for breathing in the house. If it dumps into the furnace room or directly into the firebox, it is for the chimney. In much of Canada these things are generally thoroughly mixed up with little understanding as to the difference between the two.First, your furnace does need air. If it is a sealed combustion unit -- it has that all arranged with outdoor air and no air from indoors. Otherwise you will need a combustion air duct into the furnace room. That has no direct effect on exhaust fans, heat recovery ventilators, room fresh air or air conditioning, although part of it's reason for being is to prevent any of the others from causing problems with chimney back drafting. Drafty old open basements did not need this but I assume you are building better than that -- and besides the building code now requires it.Second we often put in a couple of major exhaust devices that throw air directly outdoors, whether we have a fancy ventilation system or not: the clothes dryer, and often the kitchen exhaust fan. The kitchen range hood is often correctly vented directly outdoors because it is a large fan, rarely used and designed to solve an immediate short term problem -- burnt steaks -- and it gets greasy.If you do not have a full air exchange system, we then put exhaust fans in the bathrooms -- but we do not generally put exhaust fans in bathrooms if we have a full air exchange system as their primary point of draw is the bathrooms. If you want an exhaust only system, the best is the powerful but quiet in-line fans -- like those made by the Aeroflo company. These allow you to have one fan, located preferably in the basement to prevent conduit condensation, that can draw from a number of locations to exhaust polluted air.Now -- how do we get air into the house. All modern well built houses that prevent moisture infiltration into the walls and ceilings are tight enough to require air being brought into the house because there simply is not enough leakage through the walls to supply that. The rim joist, the window frames and the electrical boxes are no longer supplying cold air drafts to the house. If they are still drafting they are not being built to code. The idea that only R-2000 houses need fresh air is totally out of date. Any house that is sealed enough to not experience structural rot will need ventilation, but many architects and builders still don't want to admit it. A passive duct to the return air plenum of the furnace is a common solution but field experience is raising more and more questions as to whether it really is sufficient in a modern well built house. That is why any house that someone actually wants to live in, keep dogs in, have a home office in, and grow old gracefully in, needs a specific method for replacing stale air with fresh air.There is a decision fork here. You can have air exchange units (air in and out) both with and without heat recovery.In the mild climates of Toronto and Vancouver it could go either way. Heat recovery does still have a good payback in Toronto, about one year, and then is makes you money from there on out. In the lower mainland of BC, heat recovery may not be worth it, it is not cold enough. The point to note is that we are not calculating cost recovery on the entire ventilation system, but only on the differential between no heat recovery and heat recovery. The ventilation system itself is essential. In either case, there are two air flow streams, and usually two fans, that balance so that the air coming in equals the air going out and there is no depressuration on the chimney, or creation of cold air drafts. The primary advantage is that you get fresh air 24 hours a day in a slow continuous quiet and comfortable way. Other systems will

bleed in a bit of fresh air when fans happen to be on.You also have a decision fork of running the fresh air from the air exchanger into the furnace cold air plenum, or directly into rooms.When we have forced air furnaces we almost always run it into the return plenum, but that requires that the furnace motor runs continuously on slow speed. For cost efficiency that requires at least a two speed motor, or better yet an ECM (Electronically Communitated Motor), that is very energy efficient. This saves on ductwork, but increases electrical costs. It also makes an air handling compromise, moving ventilation air through heating ducts. It works, but it is a compromise. Purists will move heat through large ductwork which comes up through the floor, move ventilation through small ductwork which shoots fresh air parallel to the ceiling -- leaving each to do its job independently. Going directly to the ceiling requires tempering the incoming cold air, and hence in most of Canada you will not want to do that if you do not have a heat recovery core. With efficient heat recovery cores, pre-heating that winter air is rarely necessary.Install it yourself?Yes you could install these machines yourself or have any general contractor install it -- but there are some good arguments for having a certified ventilation installer do the job. Effective air flow through ducts is highly dependent on the smoothness of the inside of the duct (flex duct is much less efficient that rigid metal duct) and elbows and other bends have significant effects on air flow -- so layout is actually critical. The best performance is achieved when the total flow into the house is equal to the total flow out of the house but since the input and output ducts are totally different, measurement and balancing of the air flows after installation is important. HRAI.ca certifies installers in Canada.RecommendationsAre you thoroughly confused? My recommendations for you? Get an HRV or an ERV (click here for details on the difference) -- and the only decision you have to make is to install it with the furnace or independent of the furnace -- and that may depend a lot on the design layout of the house and ducting possibilities. Ask the ventilation installer to bid it both ways. Please don't forget that ventilation installation prior to drywall and after drywall are two entirely different price brackets and I have never understood how in the world architects could leave this decision to after everything is in the way -- maybe to avoid doing it at all? You even need pre planning as to how to arrange the physical space for the furnace, the HRV/ERV and the plumbing pipes so that the runways of each is maximized -- this is the most commonly messed up aspect of installing mechanical systems.

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