

Ask Jon Eakes

# ARE WHOLE-HOUSE EXHAUST FANS WORTHWHILE IN A COLD CLIMATE?

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There is no simple answer to this one. Let's narrow the field and talk only about exhaust fans that do not use things like the air-to-air heat exchangers for heat recuperation.

Government literature from the Prairie provinces do not recommend them if they must be installed in the attic (the standard US installation). The other provinces are less worried about holes in the ceiling. (search keyword "exhaust fans" for the title "CONFUSION: SHOULD VENT DUCTS GO THROUGH THE CEILING?")

Here are the pros and cons of whole-house exhaust fans:

Pro:

- They raise the neutral plane, as long as they're running.
- They remove humidity and pollution.
- They force air changes in the house.
- The cost less than \$50 a year to operate.

Con:

- Then can make uncomfortable cold-air drafts worse in leaky houses.
- If there is no controlled cold-air inlet low in the house, they suck air through the walls, creating air channels through the insulation (loose fill or batt) like water cutting through a sand dyke. These channels in turn provide easy routes for moisture into the wall when the fan shuts off.
- Their attic ventilation is subject to all the serious problems caused by power attic ventilators if they cause the attic pressure to drop lower than air pressure inside the house. (search keyword "attic" for the title "CONFUSION: POWER ATTIC VENTILATORS ARE NOT RECOMMENDED FOR WINTER USE. WHY?")
- Their back draft dampers prevent them from raising the neutral plane while not in operation.
- Because they are usually switched on and off by a humidistat, excessive pollution can build up between fan cycles. A slow, continuous operation is better, with demand override if necessary.
- Their ascending ducting can cause condensation and water dripping from the vents during very cold spells, despite insulation on the ducts.
- In a well sealed house they can compete with a furnace for air, potentially causing dangerous back-drafting. (search keyword "combustion air" for the title "DOES MY FURNACE GET ENOUGH AIR?")

Some whole house exhaust systems do not use electric fans but rather rely on wind driven turbines to make them look fancy. When there is no wind they act as a gravity driven dummy chimney. (search keyword "exhaust fans" for the title "HOW DO I GET MY PLANNED-HOLE-HIGH-IN-THE-HOUSE?") When the wind blows, they can draw as hard as the electric fan driven exhausts. Impressive -- except for the fact that when the wind blows the house tends to increase its ventilation rate anyway. So this turbine system work most when it is needed the least and at the same time can create all the same problems listed above. Put a rainshield in place of the turbine and it's not a bad system, except for the inflated price.

What can we conclude? Installed properly, central exhaust fans help many aspects of ventilation. However, I usually do not recommend them. Most of what they do can be accomplished less expensively by a gravity operating, planned-hole-high-in-the-house, good sealing and a low, controlled fresh-air inlet which by nature works slowly but continuously. Bathroom and perhaps kitchen exhaust fans can take care of the overload periods. A power ventilator's value in venting the attic by suction during the winter is highly debatable.

Exhaust fans can be advantageous if they do not go through the ceiling (or are exceptionally well sealed at the ceiling and inside the attic), have a controlled cold-air inlet, are properly balanced to keep pressure in the attic higher than in the house and have both a continuous and override speed operation.

Personally I much prefer the balanced air change systems.

**Keywords:**

Environmental, Exhaust Fans, Fans, Ventilation