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Replacing older windows with today's rebate approved, insulated, Low E or high performance glass windows will save energy and lower heating and cooling costs. But is this the best use of your resources? Not always.

Think about this. Why is it that on a hot summer day without a breath of air moving your windows leak hot humid air into your home? Or on a cold night, with snow flakes dropping straight down and no wind, there is still constant cold air coming in around the windows?

The answer is stack pressure. Stack pressure is the reason that fireplace chimneys work at all - 'The rising warm air reduces the pressure in the base of the building, forcing cold air to infiltrate through either open doors, windows, or other openings and leakage.' Higher air pressure at ground level and lower pressure the higher you go above ground causes a pressure imbalance. Small openings in the upper level of your home around light fixtures, air vents, attic access and attic stairways provide the pathway for air to escape and be replaced. As air leaks out of the top of your home it causes negative pressure inside of it. Since the physical properties of nature always try to balance things, when air is lost from inside, new air enters the house from outside to replace it and balance the pressure. So for every cubic foot of air that escapes through the air and insulation gaps in the ceiling, another cubic foot of untreated outside air is coming in to replace it.

This process happens constantly in every house, even a Bain-Waring high performance home, though to a lesser degree. So when you replace older leaking windows with newer, better sealed ones your haven't stopped the effects of stack pressure, you have just changed where the untreated air is getting in. There will be more air coming in around doors and through the thousands of small openings in the exterior shell of your home near baseboards, around electric receptacles, through plumbing penetrations - in short, the easiest place that it can find to enter. Unless you can stop or slow down the rate of air leaving your home you will never stop raw outside air from entering your home and wasting the energy or money that you spend to heat, cool and dehumidify the air.

The single most important energy saving method in any home is to seal all of the openings in the ceiling of the upper most area in your home. This means around electrical boxes in the ceiling, recessed lights, HVAC vents, and even drywall cracks at the corners of walls and ceilings.

## **STACK PRESSURE THE GOOD, BAD and THE UGLY**

### **The Good**

You can use stack pressure to your advantage sometimes. The next time that something is burned in the kitchen and the smoke sets off the smoke detector, go to a window as close to the top of the stairs on the second floor and open it. Then open a window or door beyond the smoke on the first level. That is the quickest way to ventilate your house if needed. For a single level home open the top sash (if they both open) on one window and the bottom sash of the window on the other side of the smoke. Or a pull down attic stair or scuttle hole will work. On a windy day open a window on the sheltered side upstairs and only half open the window downstairs the wind will do the rest.

### **The Bad**

The bad smell that seems to come from the fireplace sometimes even though not in use is because the stack pressure from your house is more powerful than the fireplace draw. If you look carefully upstairs the next time that you smell it you may find windows or other openings not fully closed. Poorly sealed knee walls in rooms over garages often are a major source of backdrafting. A leaky air duct system is also often times the power behind the pressure imbalance and alone can cause the backdraft smell.

### **The Ugly**

All of the air that is being pulled out the top of your house must be replaced. Where that air comes from and how clean it is the Ugly part of stack pressure. For most folks the air comes in through the crawlspace, or outside openings and then right on in and through the home. Every day the home is flushed with that day's flavor of air. This could be hot and humid in the summer. Or it might be cold and rainy in November and cold and dry on other days. But every day it picks up some dust and other particles that then enter your home with out being filtered or de-humidified. The streak of dirt you may have on carpet near doors and baseboards is really just the dirt that the carpet can filter as the air rushes through the wall cavities. The added pressure of ducts leaking will even pull air down from your attic spaces along with some of the dust and insulation from above.

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