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Performance with Energy Star®

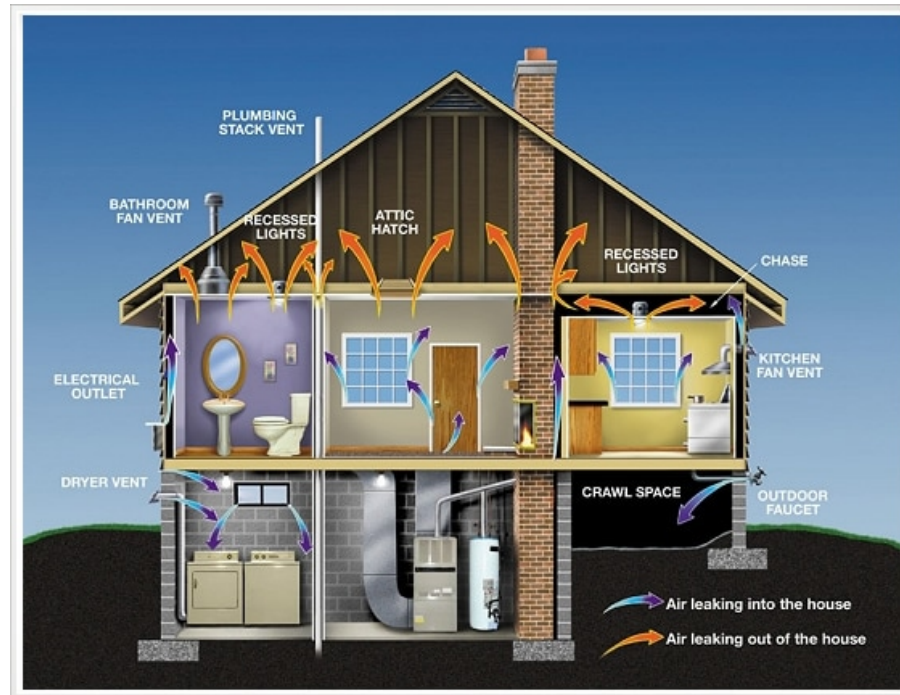


Indoor Air Quality (IAQ)

- There are four main factors that impact IAQ
 - Moisture - Moisture is the one factor of mold growth that can be managed
 - Particulates - Mixture of solid and/or liquid particles suspended in air that are 10 micrometers in diameter or smaller (these particles are inhalable)
 - Volatile Organic Compounds (VOCs) -Thousands of organic (carbon-containing) chemicals that are present mostly as gases at room temperature
 - Combustion by-products (Carbon Monoxide) - Carbon monoxide is an odorless, colorless and toxic gas resulting for incomplete combustion

Control

- The key to indoor air quality is control of the air we breath
 - Where is it coming from
 - Where is it going
 - What is in it



How do you get control of IAQ

- Build/retrofit to keep pollutants out
- Build/retrofit understanding pollutants will get in
- Build/retrofit to remove pollutants that do get in

Build/retrofit to keep pollutants out

- Moisture management
 - Keeping moisture out
- Particulates
 - Controlling air into and out of the building
- Low VOC
 - Material management
- Combustion appliances
 - Location – don't bring the fire inside
 - Sealed combustion

Moisture Management

- Common sense – Leak free roofs, walls, window and plumbing
- The new issue – Tighter houses, more insulation, new building products

Vaper barrier goes on the warm side of the wall.
Where is the warm side of the wall?



Build It Tight

Air sealing needs to be completed by trained technicians using pressure diagnostics



Unbelievable, I pump 14 tubes of caulk into a 3-inch gap in the siding and it's still not filled up!

Material Management

- Low VOC materials/furnishings
- Manage construction debris



Carbon Monoxide

- Don't put fires in the house
 - Locate combustion appliance out of the conditioned space
 - Use sealed combustion



Commissioning

- Never assume, test



Build/retrofit understanding pollutants will get in

- The only way to guarantee clean air – keep the people out of the home
- Education of tenant/owners on IAQ issue
 - Cleaning products
 - Plug-in air freshener
 - Candles
 - Air filters
- IAQ monitors

Cleaning Products

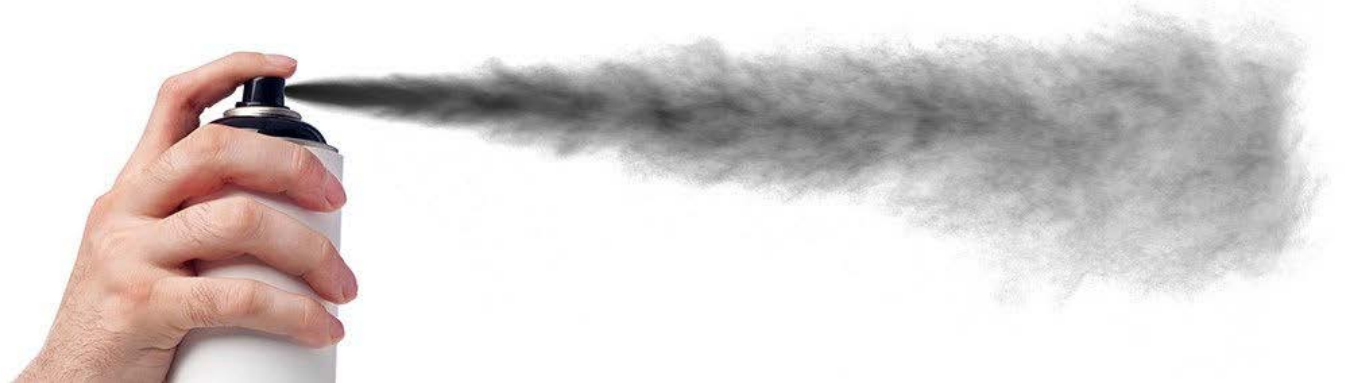
- Cleaning product can be a large source of VOCs
- Cleaning product have to balance two important goals, effectively clean (break down oils/dirt) while not adding pollutant to the air.

That pine or lemon smell,
that is the VOC



Air Freshener

- Air fresheners do not remove pollutants, they cover them up with other compounds
- A plug-in air freshener contained more than 20 different volatile organic compounds, with more than one-third classified as toxic or hazardous under federal laws. Even air fresheners called "organic," "green," or with "essential oils" emitted hazardous chemicals, including carcinogens



Particulates

Important indoor sources of PM include combustion, candles, and cooking. Dust is also regularly redeposited (thrown back into the air after it has settled) by vacuuming and other human activities.



Candles

- Most mass-produced scented candles can have a negative impact on Indoor Air Quality (IAQ). From the wax to the wick to the fragrance itself, the average scented candle can release harmful chemicals into the air
- Home builders have added waivers to their contracts related to candle use



Air Filters

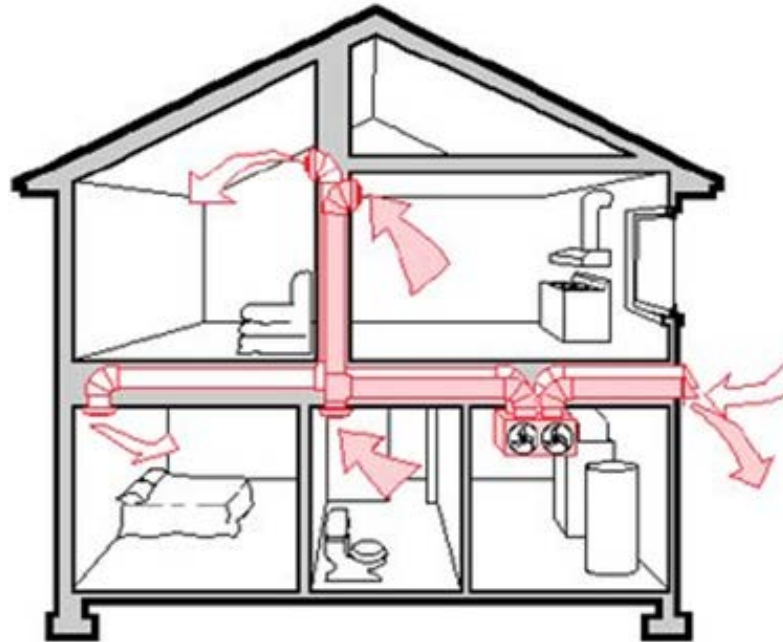
- One solution to IAQ has been the introduction of high efficiency air filters.
- They can help expect for one big problem, they restrict air flow for the HVAC system
- Most system today have problem with sufficient air flow with “cheap” filters, add one that restrict the system further and...
 - Reduced HVAC life
 - Increased energy consumption
- Before you install a high efficiency air filters make sure your system can handle it
- It is like trying to breath thru a coffee straw

IAQ monitors

- Sensors and devices for measuring and testing the air quality in buildings, including particulates, volatile organic compounds (VOC's), temperature, humidity, CO2 and others are now affordable (\$200 and less)
- Apps with minute by minute readouts with warnings if a pollutant exceeds a limit
- Some can be monitored remotely
- Google - *Energy Circle IAQ monitoring* for a great review of the devices on the market.

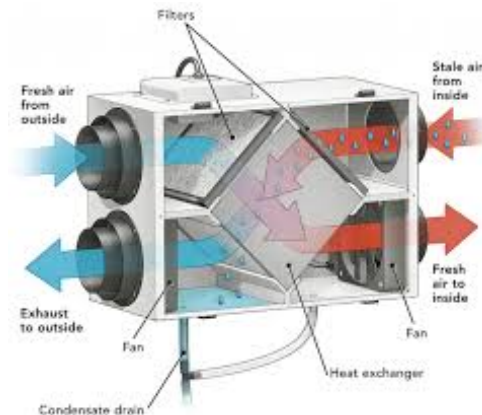
Build/retrofit to remove pollutants

Ventilation



Common Ventilation Types

- Exhaust - Bath fans, range hoods
 - Issue – do not know where the air is coming from or what is in it.
- Balanced – Separate ducted system with a heat exchanger
 - Know where is coming form, where it is going and what is in it



The Healthy Home Evaluator (HHE) certification

- The Healthy Home Evaluator (HHE) certification builds on the BPI Building Analyst (BA), Multifamily Building Analyst, Energy Auditor (EA), or Quality Control Inspector (QCI) certifications. The HHE was developed in partnership with the Green & Healthy Homes Initiative (GHHI). A Healthy Home Evaluator assesses home-based environmental health and safety hazards and provides a prioritized list of recommendations to address those hazards.