Understanding and Improving Indoor Air Quality
August 2020
Today’s Agenda

Introductions

Why is air quality important to you?

Indoor air quality Issues

How can we improve air quality
  • Strategies for mitigation
  • Building improvements
  • General air quality tips
What does Indoor Air Quality mean to you?

New baby on the way...

I want a healthy home!

It’s damp and moldy

I can smell smoke from outside

I have allergies

I wonder if the house makes my child’s asthma worse

My home is always dusty

CITY OF PALO ALTO

HOME EFFICIENCY

GENIE
“Americans, on average, spend approximately 90 percent of their time indoors, where the concentrations of some pollutants are often 2 to 5 times higher than typical outdoor concentrations.”
Reducing IAQ Risks

Source Control
- Source reduction or elimination
- Keep unwanted pollutants out
- Source ventilation

Ventilation
- Bring in fresh air from outside

Filtration
- Clean the air via filters

Indoor Environment
- Stable temperatures and humidity
What impacts Indoor Air Quality?

- Humidity and Moisture
- VOCs
- Carbon Monoxide and Nox
- Lead Dust
- Radon Gas
- Asbestos
- Secondhand Smoke
- Particulate Matter
Humidity and Moisture
Moisture sources

- Rain and runoff (bulk water)
- Water leaks
- Showers, cooking, and laundry
- Fish tanks, plants, breathing
- Exposed earth in crawlspaces (vapor)
- Cold surfaces (condensation)
Humidity and moisture

- Best range for human health is between 40-60% RH
- High humidity allows for mold, dust mites, and bacteria to thrive
- Low humidity weakens the body to environmental conditions

Indirect Health Effects of Relative Humidity in Indoor Environments.
Carbon Monoxide & NOx
Carbon Monoxide producing equipment

- Gas burning appliances in the home
  - Furnace/boiler
  - Water heater
  - Kitchen stove/oven
  - Fireplace
  - Gas clothes dryer
Carbon Monoxide and Nitrous Oxide

Carbon Monoxide
- Odorless, colorless, and poisonous

Nitrous Oxide
- NOx is a respiratory irritant that inflames the lungs and can cause breathing problems, asthma, etc.
Lead Paint, VOCs, Asbestos, and Radon
Lead Paint

- Lead based paint
  - Sanding lead paint can make it air born
  - Causes nerve damage, particularly in children
- Should be mitigated if found in the home
  - Homes built before 1978 are more likely to have it
Volatile Organic Compounds

- Furniture
- Paints and solvents
- Wood preservatives
- Aerosol sprays
- Air fresheners
- Moth repellents
- Hobby supplies
- Cleaners and disinfectants
- Dry-cleaned clothing
- Pesticide
Asbestos

Found in older building materials
- Insulation/tape on old ductwork/steam piping
- Vermiculite insulation
- Flooring materials
- Siding
- Old ceiling tiles
- Old tile floors

Generally safe until disturbed

Mostly banned in 1970’s
- Used in some industrial and commercial applications
Radon

- Radioactive gas seeps out of the ground
- Increase risk of cancer
- Testing kits determine unsafe levels in your home
- Palo Alto falls in Zone 2 which recommends testing
Particulate Matter
Pollen/Particle Pollution

**Causes**
- Pollen, traffic, smog, natural gas, cooking, woodsmoke
- Seasonal fires and flowering plants
- Secondhand smoke contains chemicals from tobacco processing

**Affects**
- Can irritate lungs and increase asthma

**Solutions**
- Air sealing and air filters can help reduce issues
Strategies to improve IAQ

**Source Control**
- Source reduction or elimination
- Keep unwanted pollutants out
  - Air sealing
  - Duct sealing
- Source ventilation

**Ventilation**
- Bring in fresh air from outside

**Filtration**
- Clean the air via filters

**Indoor Environment**
- Maintain comfortable temperatures and relative humidity
**Improvements: Building Shell**

- Air seal
  - Sealing the home can help improve IAQ
  - Attic and crawlspace are important to address
  - Reduces moisture, particulates, and radon
  - Foam or dense pack wall insulation can help
  - Lowers heating and cooling costs
Improvements: Ventilation

- Passive ventilation
  - Natural ventilation of a home
- Active ventilation
  - Spot ventilation
    - Bath fan
    - Range hood
  - Balanced ventilation
    - ERV/HRV
Range Hoods

Spot ventilation
- Removes particulate matter and irritants from gas combustion

Considerations
- Does it vent outside?
- Are front burners covered?
- Use back burners for higher capture
- Sound and speed at medium settings
- Timer
Improvements: Heating Ventilation and Air Conditioning

- Seal your ducts
- Consider electrification using highly efficient variable speed heat pumps to heat and cool
- If sticking with gas, choose efficient sealed combustion equipment to minimize safety hazards
- Better filtration at the furnace can improve air quality, consult an HVAC professional
Improvements: Filtration options

- Forced air systems
  - 4-inch, MERV 13 air filters
  - Change regularly
- Portable units
  - EnergySTAR rating
  - Follow suggested room size
  - California Air Resources Board (CARB) certified for safety (not effectiveness)
- Filter types
  - HEPA for particles
  - Activated Carbon for gaseous pollutants, odor
Improvements: Domestic Water Heating

- **Electric**
  - Use a high efficiency heat pump water heater

- **Gas**
  - Use a sealed combustion unit like a tankless option

The City of Palo Alto offers a rebate for a heat pump water heater.
Improvements: Appliances

- Induction cooktop
- Electric oven
- Heat pump clothes dryer
What can you do now?

- Use and properly maintain your ventilation systems
- Install carbon monoxide (CO) alarms
  - Change the batteries in existing CO and smoke detectors
  - Replace after warranty expires for smoke and CO
- Test for radon
- Prevent mold by controlling moisture
- Learn about and reduce asthma triggers
- Keep your home and car smoke-free
- Store household chemicals out of the living space if possible
- Change your HVAC filter regularly, every three months with daily use
Summary

• Do the simple things to manage your indoor air quality

• Consider Improvements
  • Air sealing
  • Ventilation
  • Filtration
  • Upgrading equipment

• Contact the Home Efficiency Genie for free custom advice on indoor air quality, comfort and energy savings
Thank you for attending!

• Questions, comments?

• Home Efficiency Genie free phone advising
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