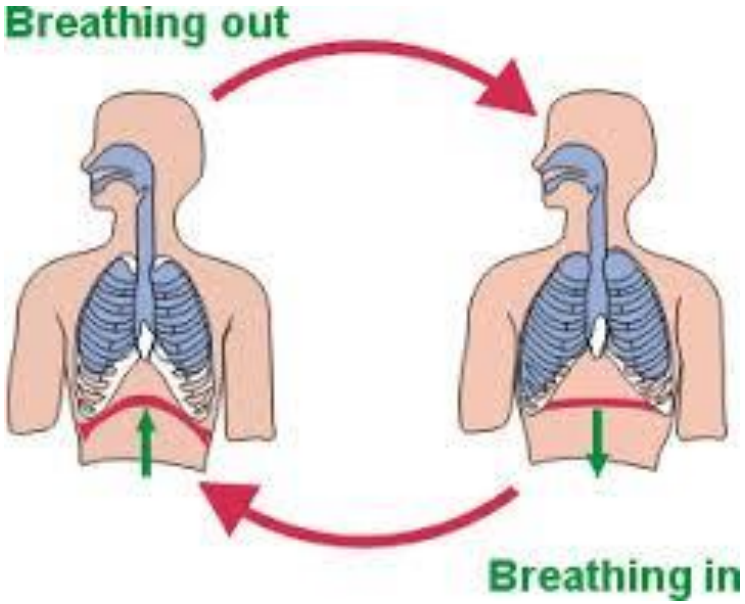
Indoor Air Quality:

It's more than just Radon!

Presented By: Andre Lacroix

- *Healthy Home Specialist*
- *Certified Indoor Environmentalist*
- *NRPP, National Radon Measurement Provider*
- *Indoor Air Quality Advocate*
- *VP Basement Health Association*
- *VP EZ Breathe Healthy Home Solutions*

Inhale…



We, as human beings, breathe 22,000 times per day!

We eat on average 5.5 lbs of food per day

We drink 3.4 cups of liquid per day

We breathe 3200 gallons of air per day

-California Air Resource Board

What is a “Healthy Home”

According to American Society of Heating Refrigeration and Air Conditioning Engineers, ASHRAE - A home in *“which there are no known contaminants at harmful concentrations as determined by authorities and with which a substantial majority 80% of more of the people exposed do not express dissatisfaction.”*

“I.A.Q.” = Indoor Air Quality

Term to describe “the physical and chemical characteristics of air inside buildings ***including airborne constituents*** with special concerns for the impact on occupant health and comfort”

- Temperature
- Moisture
- VOCs
- Allergens
- Particle Counts
- Bacteria
- Building Materials
- Type of Construction

- Exchange Rates
- Occupants
- HVAC
- Insulation
- Etc.

Consequences of Indoor Air pollution...

“Sick Home Syndrome”

Situations in which a structures occupants experience acute, adverse health effects and/or discomfort that appear to be linked to spending time within the structure and have no specific link to an illness, caused by poor air quality often linked to little or no ventilation.

– US Environmental Protection Agency

“Air in the average American home is a minimum of 5 times MORE polluted than outdoor air!”

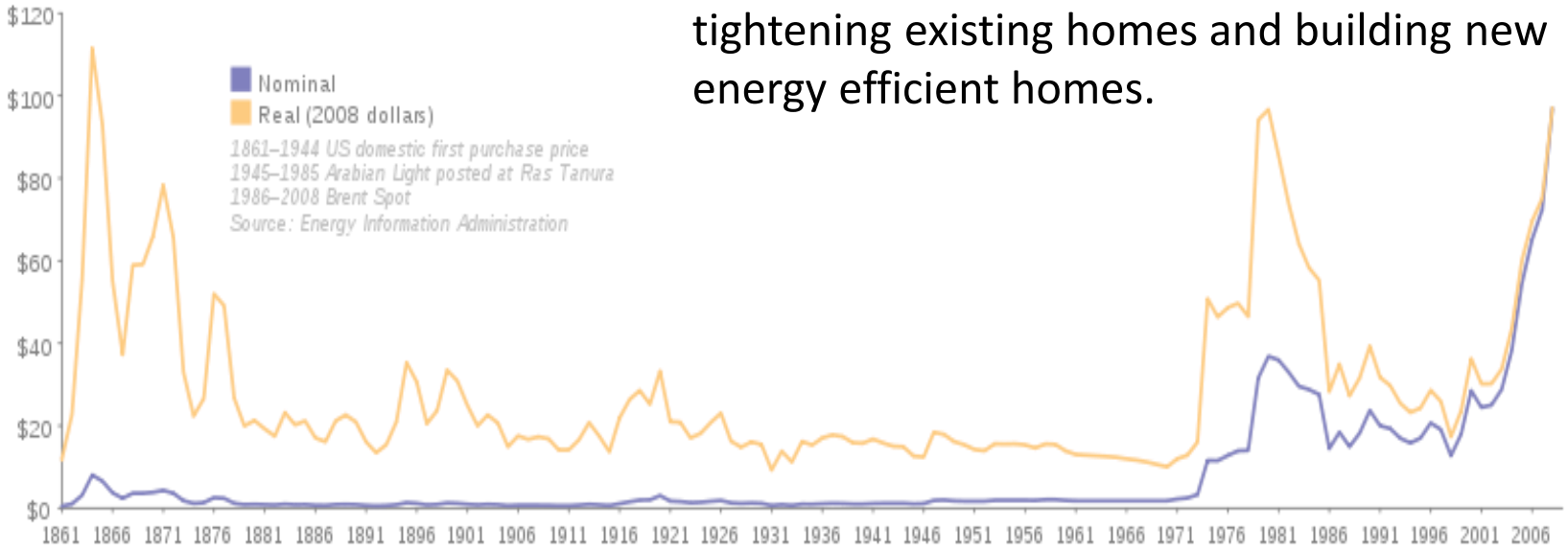
– US Environmental Protection Agency

What happened in the 1970s?

Concerns over high energy costs in the early 1970s lead to

ASHRAE Introduced Standard-62.1 Reduced the air flow from 15 cubic feet per minute (cfm) per person to 5 cfm.

Spawned an entire industry dedicated to tightening existing homes and building new energy efficient homes.



Effects of Modern Building Practices

Positive Effects:

- Increased Energy Efficiency
- Low Energy Costs
- Higher Resale Value

Effects of Modern Building Practices

Negative Effects:

- Stagnant Air
- Poor Air Quality
- Trapped Gases
- High Pollutants/Allergens
- Increased Humidity

What do the experts say?

"The air in the average American home ***is a minimum of 5x more polluted*** *than outdoor air."* *– The U.S. Environmental Protection Agency*

EPA United States Environmental Protection Agency

"14x more ***deaths are caused from poor indoor air quality*** *than outdoor air, accounting for 2.8 million deaths per year."*

- The World Health Organization

World Health Organization

"Many of the indoor pollutants may come from materials used in the construction of the structure or from objects, furnishings, and chemicals brought into the structure." *– Michael Fallarino*

Green Building NEWS

What do the experts say?

"There isn't any virtue in creating a tight structure if the quality of air in that structure is substantially lower than outdoor air."

– Michael Fallarino

Green Building NEWS

"Allergen levels in super insulated homes is 200% higher than in ordinary homes."

– EPA Air Quality Convention

EPA United States Environmental Protection Agency

"We have tipped the scale in favor of energy efficiency to the detriment of our indoor air quality, creating a toxic indoor environment."

– Stephanie Desmon,
Indoor Air Pollution Aggravates Childhood Asthma presentation,
IAQA conference, 2011

Indoor Air Quality ASSOCIATION INC.

State of our Indoor Air Quality

"A baby crawling on the floor inhales the equivalent of 4 cigarettes per day as a result of poor indoor air quality (out-gassing carpets, mold, mildews, mites and fungi."

- Scientific America

EPA Reports:

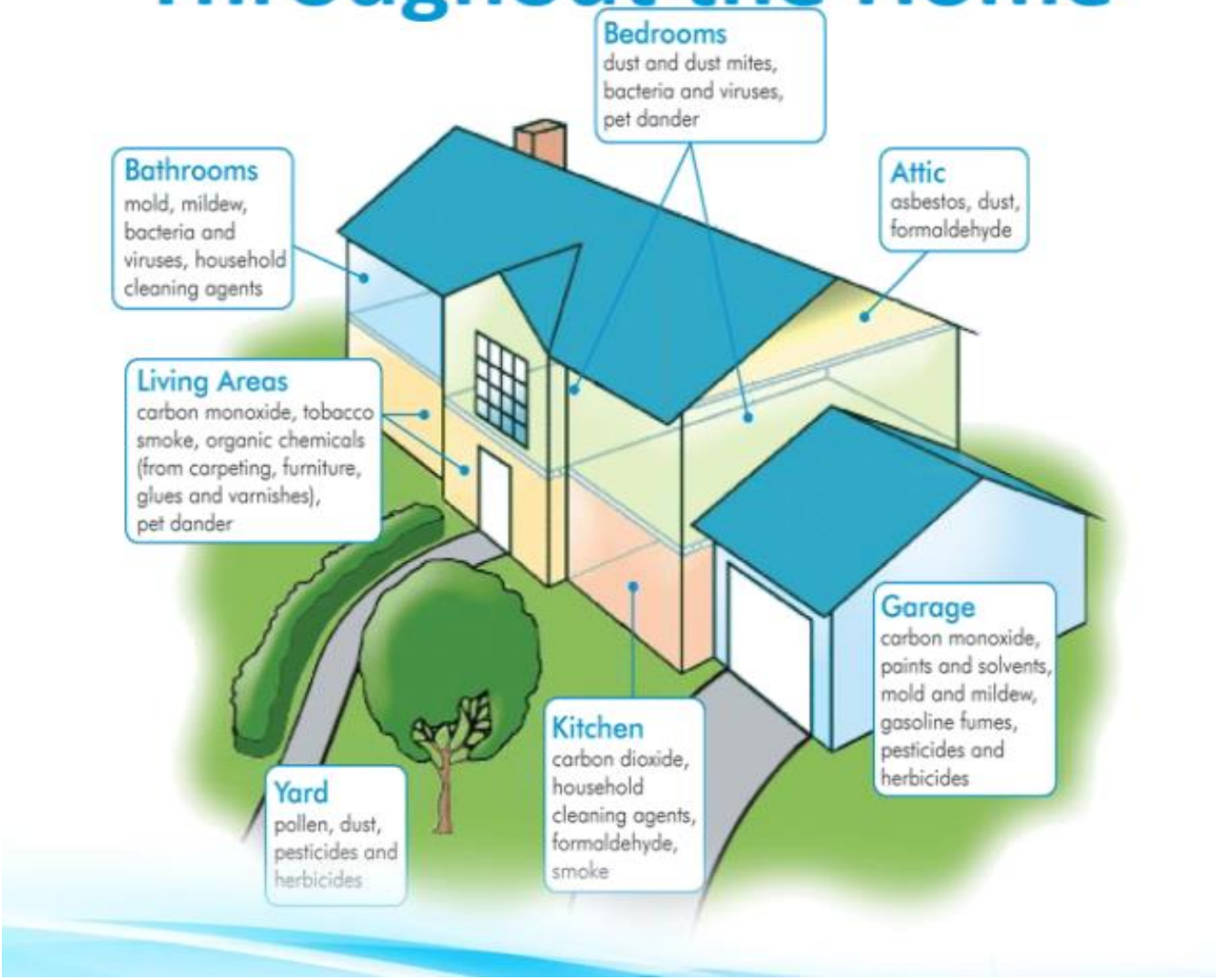
United States Environmental Protection Agency

"Indoor Air Quality is the EPA's #1 environmental health problem."

"American's spend 90% of their times indoors where the air is typically ***a minimum of 5 times, and up to 100 times, more polluted than outdoor air."***

"6 out of every 10 homes and buildings are sick, *meaning they are hazardous to your health to occupy as a result of airborne pollutants."*

Contaminants Are Found Throughout the Home



V.O.C. = Volatile Organic Compounds

"Todays homes contain over 1,500 hazardous compounds from approximately 3,000 man made products." *– U.S. Environmental Protection Agency*

- Organic chemicals both human made and naturally occurring
- Most scents & odors = VOC's
- VOC's are everywhere, they interact and produce new compounds
- Irritants to humans, health hazards
- We bring many of these into our homes

"Elevated levels often cannot be detected by smell, we may not know we are breathing them" *-US EPA*

VOC – Volatile Organic Compounds

VOC FACTS – WHAT WE KNOW:

10,000 – number of known VOCs (2014)

97 – number of VOCs found in homes categorized – "TOXIC"

Interact with one another and often produce other dangerous compounds

University of Washington Study – *Environmental Assessment Review*

- 100+ VOCs were identified, but none were listed on any product label.
- 10 VOCs designated 'toxic' and 'hazardous' by the EPA in six air common fresheners and laundry products.
- There is no law in the US requiring disclosure of all chemical ingredients in consumer products or fragrances.

Combatting Indoor Air Pollution-Popular Solutions?

Plug-ins, Candles, Air Fresheners - **Simply mask the problem**

Add more pollutants into environment!

"The air freshener industry has increased 500% in the past four years, These devices contain 100s of chemicals that are contributing to poor indoor air quality."

- Stephanie Desmon, IAQA conference, 2011

"12 out of 14 air fresheners tested contained phthalates – a risk to the human reproductive system"

-National Resource Defense Fund

Moisture

From where? From us…being us.

"3-4 gallons of moisture produced by occupants breathing and perspiring daily."

-Jaakub Zielinski, Jacek Przybylski
"Pheumologia", Polish Respiratory Society

Moisture

From where? Our behavior.

2.5 gallons of water vapor from our cooking, cleaning, washing, etc. is produced daily.

<u>200 CFM KITCHEN EXHAUST RANGE HOOD</u>

- 80% capture efficiency on back burners
- 20% capture efficiency on front burners

-LBNL study, 2014

"Much of the vapor produced on kitchen cook tops is not captured by the best of the best rated exhaust fans, instead it's introduced into living environment"

- Lawrence Berkeley National Labs

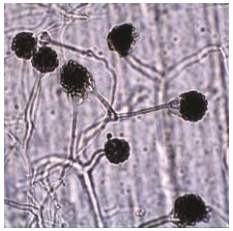
Moisture

From where? Basements and Crawlspaces are major sources of moisture

Research has documented as much as "15 -20 gallons of water vapor enter home/building through the floor or walls of basement / crawlspace per day"

- "Dry Basements and Crawl Spaces", April 2008 Powell, Morgan and Rogers, Danny, Kansas State University Agricultural Experiment Station and Cooperative Extension Service

Consequences of Trapped Moisture

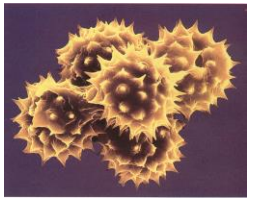


Indoor Air Quality Problems

MOLD

ALLERGENS

ODORS



Moisture in Basement & Crawlspace

DRY ROT/RUST

PESTS

STRUCTURAL DECAY

Foundation Problems

CO – Carbon Monoxide

Odorless, colorless tasteless gas that is lighter than air and can kill within minutes in "high concentrations"

1-2 ppm = normal spillage – *cooking, combustible appliances, etc.*

500 ppm = Produced in an open garage when a cold car is started and warmed up for 2 minutes

-*"Frontal headaches within 1-2 hours, life threatening after 3 hours"* *– Greiner, 1997*

1200ppm = IDLH immediately dangerous to life and health --ANSI

1600 ppm = Smoldering wood fires, malfunctioning furnaces, water heaters and kitchen ranges

-*"Headache, dizziness and nausea within 20 minutes – Death within 1 hour"* - -ANSI

UL rated CO alarms trigger @ 100 ppm CO for 90 minutes

CO LEVEL	
1-2ppm	normal spillage – *cooking, combustible appliances, etc.*
15-20ppm	Impaired performance in exercise time, shortened time to Angina response - *WHO*
40pmm	*Some* residential detectors may trigger low level alarm after several hours
50ppm	Max allowable for 8 hours work place exposure
75ppm	Significant decrease in O2 available to the myocardium
100ppm	**UL listed detectors must trigger within 90 minutes**
500ppm	Produced in an open garage when a cold car is started and warmed up for 2 minutes *"Frontal headaches within 1-2 hours, life threatening after 3 hours" -Greiner*
1200ppm	IDLH immediately dangerous to life and health --ANSI
1600ppm	Smoldering wood fires, malfunctioning furnaces, water heaters and kitchen ranges *"Headache, dizziness and nausea within 20 minutes – Death within 1 hour"* –ANSI

CO – Carbon Monoxide

Where does it come from?

Incomplete Combustion is a *major* source of Carbon Monoxide

Occurs in every combustible appliance – furnace, water heater, stove, fireplace

-Tom Corbett, Building Performance Workshop, 2014

Complete Combustion

Incomplete Combustion

<u>Causes CO:</u>

- Malfunctioning furnaces
- Malfunctioning water heaters
- Malfunctioning kitchen ranges

Can emit 1600 ppm CO or more

CO – Carbon Monoxide

Where does it come from? Car exhaust is a major source of CO

CAR STARTS IN GARAGE
CAR IS PARKED IN GARAGE

HIGH CO IN EXAUST
ON START UP

GARAGE CO = SEVERAL HUNDRED PPM

GARAGE DOOR CLOSES

GARAGE = HIGH CO RESEVOIR
FOR HOUSE INFILTRATION

CO ENTERS HOUSE
FROM GARAGE

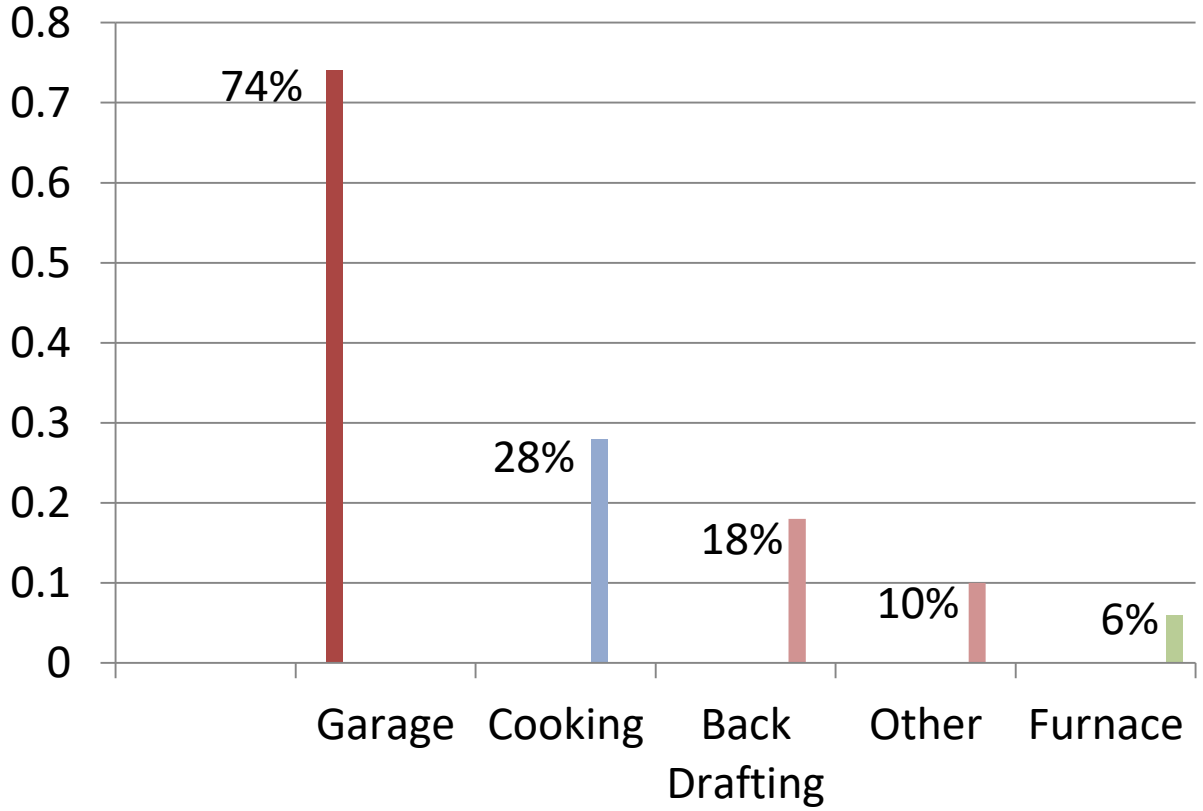
**AS GARAGE CO GOES DOWN,
HOUSE CO CONTINUES
TO RISE FOR HOURS!**

"74% of all carbon monoxide detectors that went off in the home were triggered by pollutants and toxins leaking into the home from the attached garage"

-University of Minnesota,
Department of Agriculture study, 2009, 2011

CO and Indoor Air Quality

Carbon Monoxide Source Investigations



"CO levels inside the house can peak within 4 minutes after the car starts, and continue at measurable levels for hours."

-Energy Design Update, 2000

Do you know?

What is a Natural, local, abundant & long lasting "Green" building material?

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Do you know…

What is a Natural, local abundant & long lasting "Green" building material? Asbestos!

What is a commonly used natural "Green" antimicrobial coating?

Do you know…

What is a Natural, local abundant & long lasting "Green" building material? Asbestos!

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What to look for?

Sometimes, it’s obvious…

Sometimes, it obvious…

Sometimes it's not…

Sometimes it's not…

Consequences of Polluted Indoor Air = Allergies and Asthma

"700% increase in people suffering from asthma and allergies,
500% increase in people suffering from cancer in past 15 years."

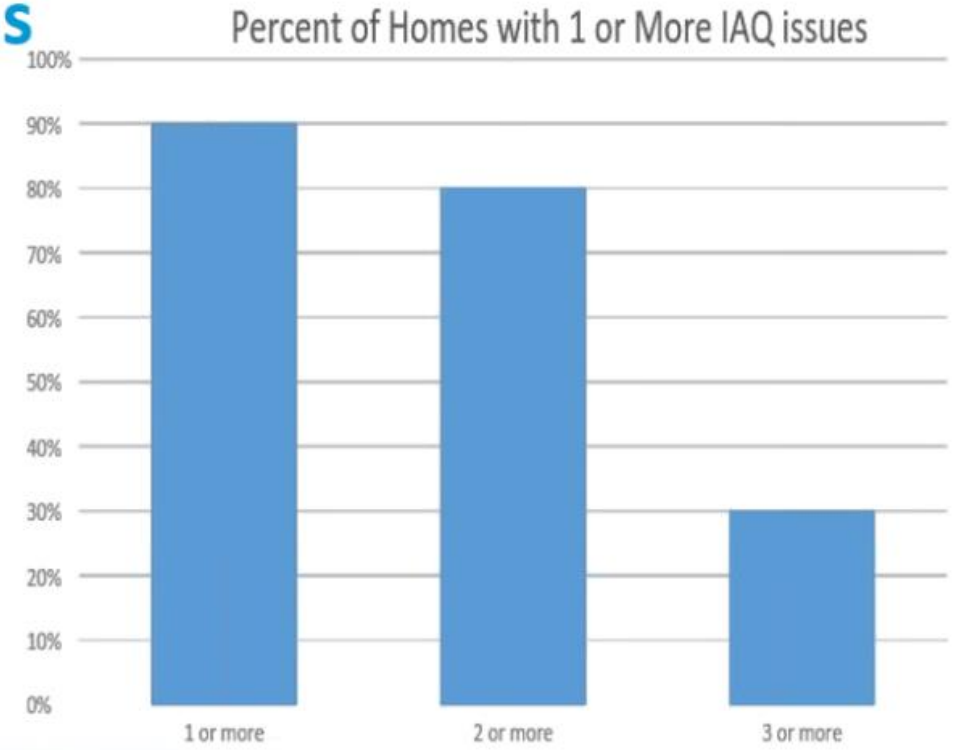
- Larry Sambrook, IAQ Network Speaker Series

"Perennial (year-long) allergens are 10- to 100-fold higher indoors than outside."
- William J. Calhoun, MD, chair department of medicine, University of Texas Medical Branch

"If you live in a home with chronically poor air quality, you can experience frequent headaches, long lasting colds and bronchitis as well as chronic asthma."
- E. Neil Schachter, MD, Medical Director, Mount Sinai Medical Center in New York

"Annual direct healthcare cost of asthma is approximately $51 billion" *- Journal of Allergy and Clinical Immunology, 2007*

The Opportunity:
80% of homes have two or more IAQ problems



EPA Recommendations to improve IAQ

Three major strategies to reduce indoor air pollution…

1. Source Control
2. Air Cleaning
3. Ventilation

Air Quality Solutions *not* just for HVAC guys anymore

"Indoor air quality market revenue to surge 80% to $5.6 billion by 2020"

- Environmental and Energy Management

AARST-NRPP
RADON PROFESSIONALS SAVING LIVES

The 2016 International Radon Symposium™

What *more* could you be doing to help your customers?

EDUCATE –Indoor Air Quality Association, EPA, Webinars

SHARE - Include indoor air quality in discussions with customers

"Poor indoor air quality occurs from a *lack of knowledge and understanding* of the nature and severity of these problems among designers, builders, building owners, employers, and building occupants." *- NIOSH*

SOLVE - Offer 'Indoor Air Quality' Solutions *included* in your service

EPA and American Lung Association recommend 3 major strategies to improve indoor air quality: ***Source Control, Air Cleaning, Ventilation***

Inhale.

again

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