

Fundamentals of a Healthier Home – Capitalizing on EPA’s Indoor airPLUS Label

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Indoor Air Quality (IAQ)

Agenda

- Indoor airPLUS Basics
- Building and Verifying Indoor airPLUS Homes
- Selling Indoor airPLUS
- Marketing and Technical Resources



Welcome to Texas!



Living Room #1

someone explains this decision

hole from that one time someone went in the attic.

seriously y'all are real unoriginal with y'all's lighting fixtures.

why is there "moulding" here??

alcoholism on display

these curtains are an example of why people make fun of America

"Tuscan" suite from Rooms2Go c. 2004



Living Room #2



bronze

TEXAS TEXAS TEXAS TEXAS TEXAS TEXAS TEXAS TEXAS TEXAS

FAMILY FUN
BOX

there was no attempt
to make this column look
even remotely useful.

texas

texas

"if you listen real closely
you can still her 'er moo."
- the owner, probably

wood? bronze? we may
never know

Kitchen



WHY ARE THERE SO MANY LIGHTS??

WHY ARE THERE RECESSED LIGHTS

PENDANTS AND A CHANDELIER?!?!

was this house previously owned
by the guys at Enron??

BRONZE
BRONZE
BRONZE

going for that 90s "put crap
on top of your cabinets look"

STAINLESS

STEEL

SPOILERS
PLEASE
IGNORE THANKS

apparently walking
over to the other sink
was too much
effort

the built-in
pizza wheel was a
short lived trend

Dining Room #1

ok but why is there recessed lighting AND a chandelier?

why is the ceiling not the same color as the walls?

"ok you know antiqued bronze right?"

"yeah"

"so make our WHOLE house look like that"

"u got it fam"

what kind of strange people enjoy watching themselves eat??

"luxury"
"micro-fiber"

apparently too busy looking at themselves to buy a rug of an appropriate size.



Dining Room #2

ok but why is there recessed lighting AND a chandelier?

why is the ceiling not the same color as the walls?

"ok you know antiqued bronze right?"

"yeah"

"so make our WHOLE house look like that"

"u got it fam"

what kind of strange people enjoy watching themselves eat??

"luxury"
"micro-fiber"

apparently too busy looking at themselves to buy a rug of an appropriate size.



Media Room



ALL HAIL THE FUNBOX
ALL HAIL AMERICA

Indoor Air Quality?



Look how we used to build!



Look how we used to build!



Why is IAQ Important to You and Your Buyer?

- The average person inhales 15,000 quarts of air daily.
- People in the U.S. spend about 90% of their time indoors.
- EPA studies indicate indoor levels of pollutants may be up to 10 times higher than outdoor levels.
- There is not yet a governing standard or metric for indoor air quality.
 - Many limits for pollutants in outdoor air (based on Clean Air Act), but not for indoor pollutants.
 - **But there are known indoor pollutants, health risks, and prescriptive measures to avoid them.**



Why is IAQ Important to You and Your Buyer?

In terms of health care costs, building retrofits which improved the indoor environment of a building resulted in reductions of:

- communicable respiratory diseases of 9-20%;
- allergies and asthma of 18-25%; and
- non-specific health and discomfort effects of 20-50%.¹

¹Fisk, William J. (2000). Health and Productivity Gains from Better Indoor Environments and their Implications for the U.S. Department of Energy. Accessed Sept. 24, 2012

via <http://energy.lbl.gov/ie/viaq/pubs/lbni-47458.pdf>



Why is IAQ Important to You and Your Buyer?

As of January 2015, the market for houses with “green” certifications bring 10 to 14 percent more than for comparable homes without them according to recent studies.¹

Q: Do you think it would cost 10% more to build to Indoor airPLUS?

¹Alan J. Heavens, "[Green' home certifications are bringing more greenbacks](#)," The Philadelphia Inquirer, Jan. 19, 2015.



Why is IAQ Important to You and Your Buyer?

A recent study shows 55% of firms rate greater health and well-being as their top social reasons for building green, up from only 29% in 2008.

If you're not focused on IAQ and building this way now, your competitors are likely ahead of you.

²²World Green Building Trends: Business Benefits Driving New and Retrofit Market Opportunities in over 60 Countries, McGraw-Hill. 2013



Differentiate your company

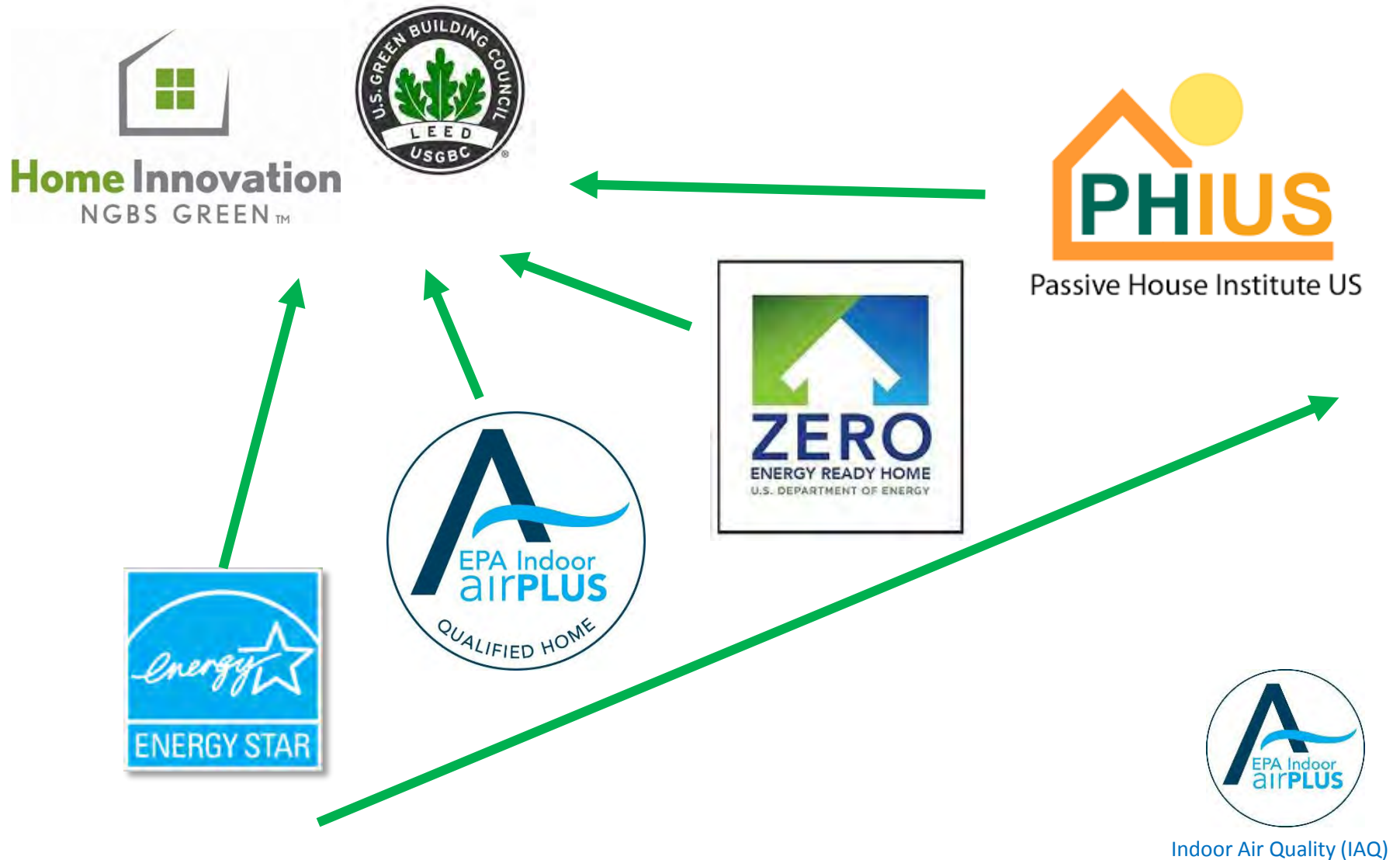


More than 25 million people, including 7.1 million children, have asthma and there is a 20-50% increased risk of asthma in damp houses.

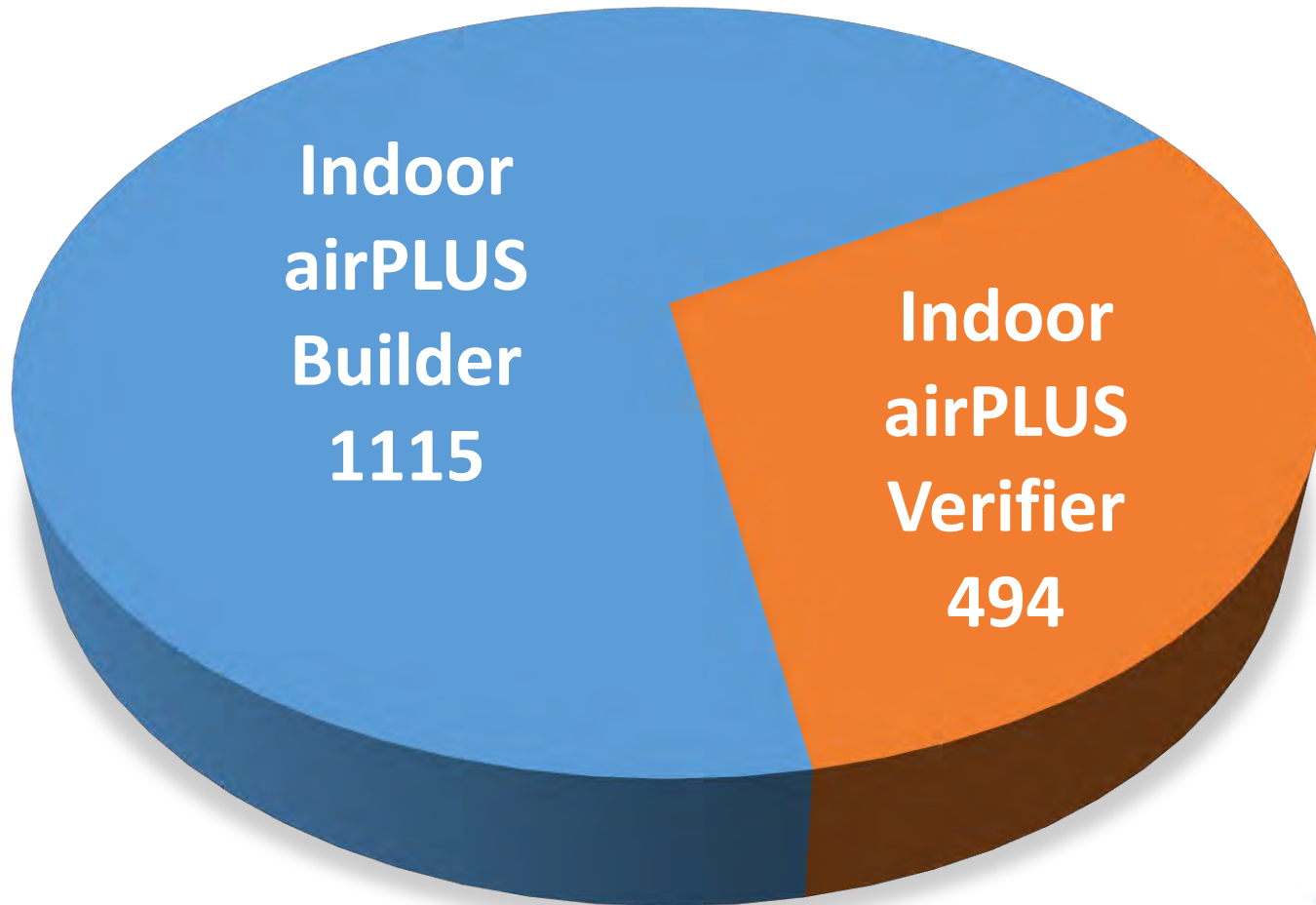


Indoor Air Quality (IAQ)

Stepping Stones in High Performance Building



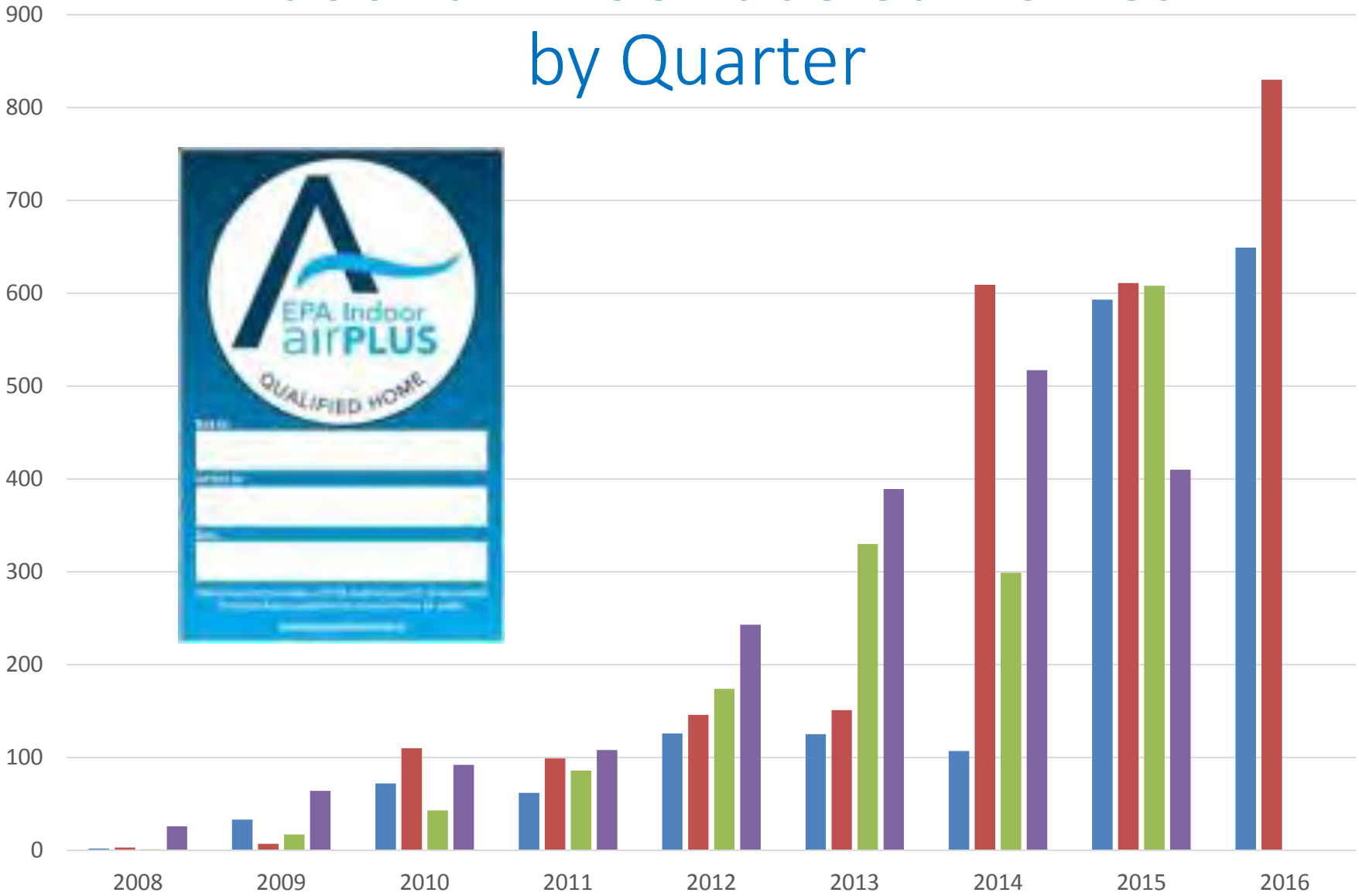
Indoor airPLUS Partnership



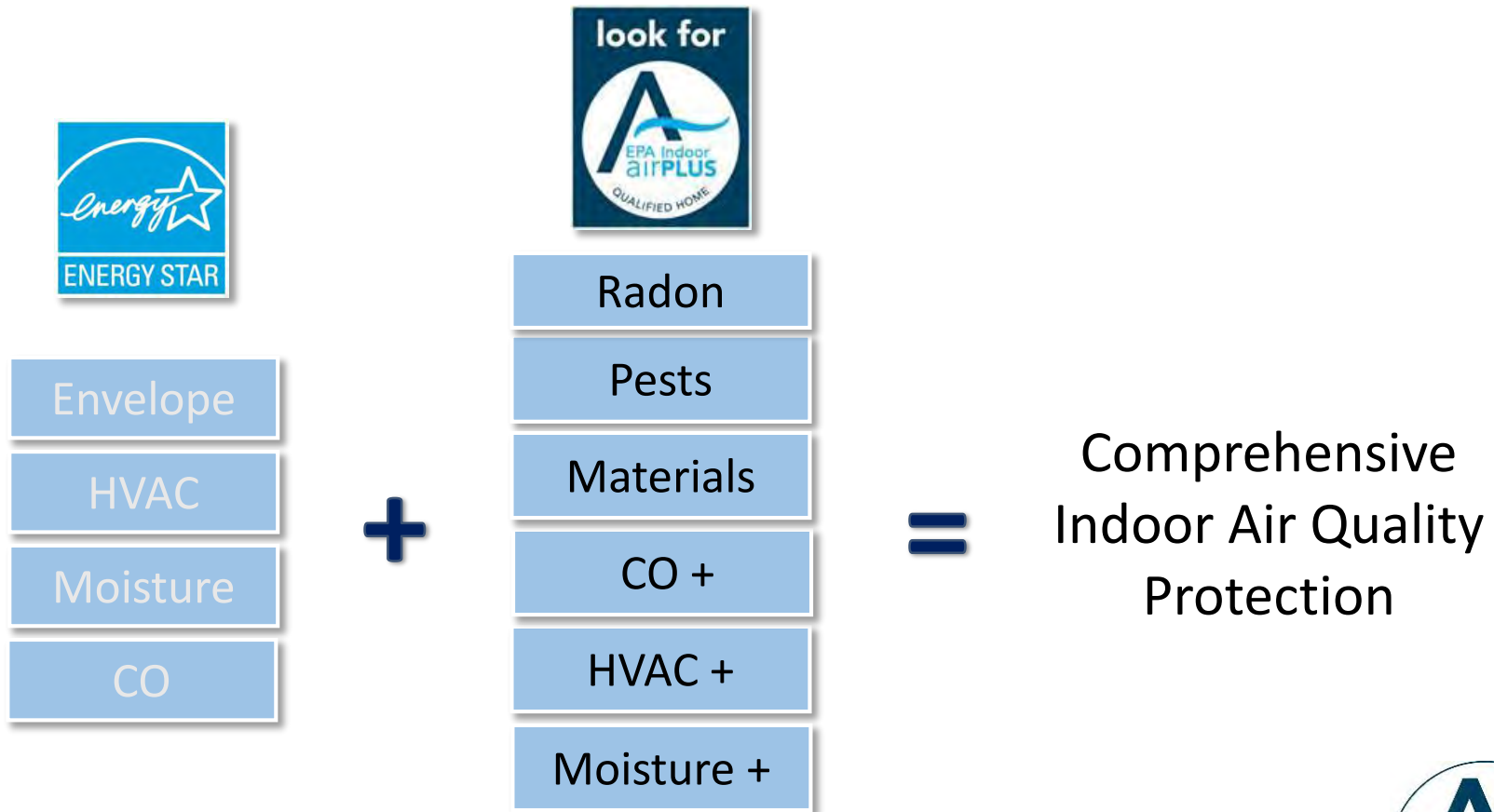
Builder partnerships have increased 300% in last 3 years.



Indoor airPLUS Labeled Homes by Quarter



ENERGY STAR + Indoor airPLUS

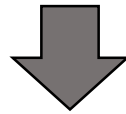


Indoor airPLUS adds additional health protections to your ENERGY STAR value proposition

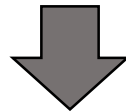


Reducing Health Risks

1. Source Control
(eliminate or manage)



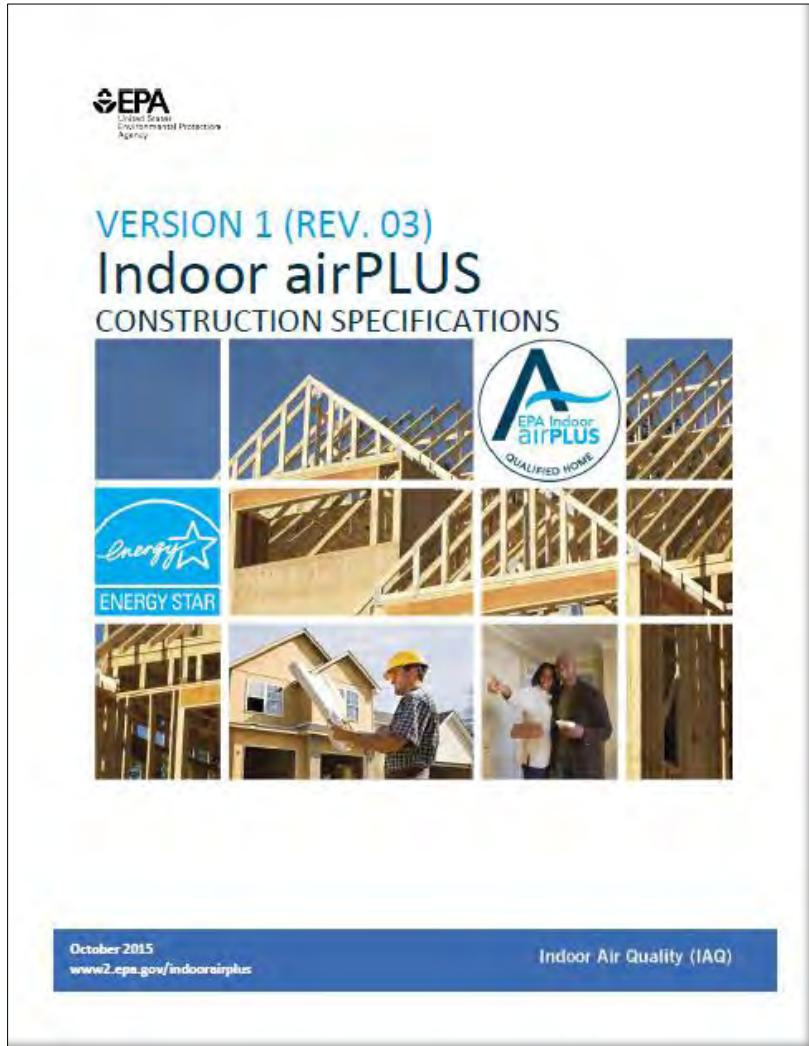
2. Ventilation
(dilution)



3. Filtration



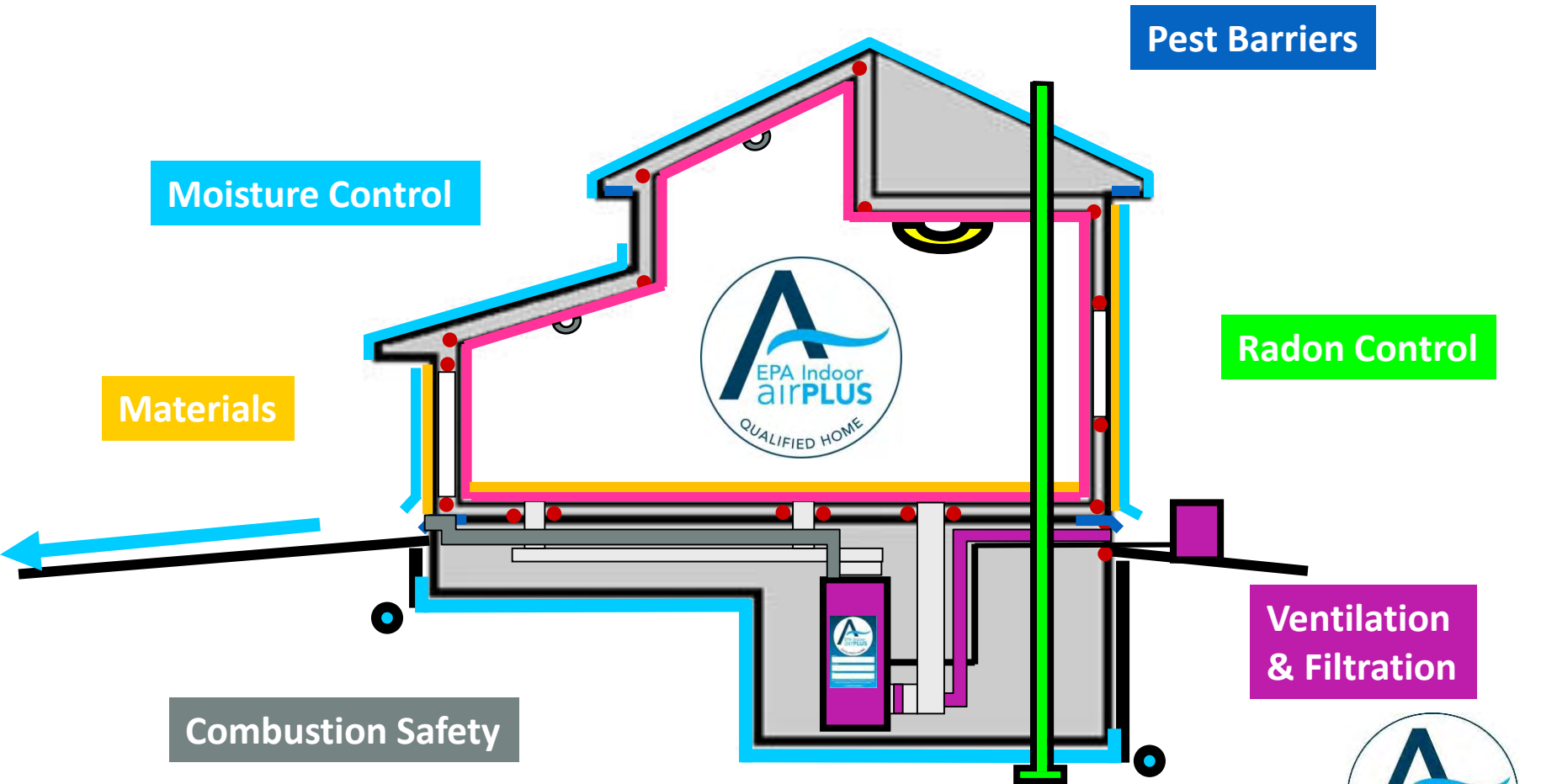
Revision 3



- Released October 2015.
- Further alignment with ENERGY STAR Rev. 8.
- Clarified multiple requirements.
- Provided additional advisories (e.g adhesives & sealants).
- Updated list of compliant products for Section 6 and developed a new resource, [*How to Find Indoor airPLUS Compliant Low Emission Products.*](#)



Indoor airPLUS



1. Moisture Control



- Moisture is a leading cause of health, comfort and durability concerns in homes.
- 19% of U.S. households have at least one person with asthma.
- There is a 20-50% increased risk of asthma in damp houses.
- The economic cost of asthma amounts to more than \$56 billion annually.
- Mold grows where there is moisture.
- Molds produce allergens, irritants, and in some cases, potentially toxic substances.



1.1 Site and Foundation Drainage



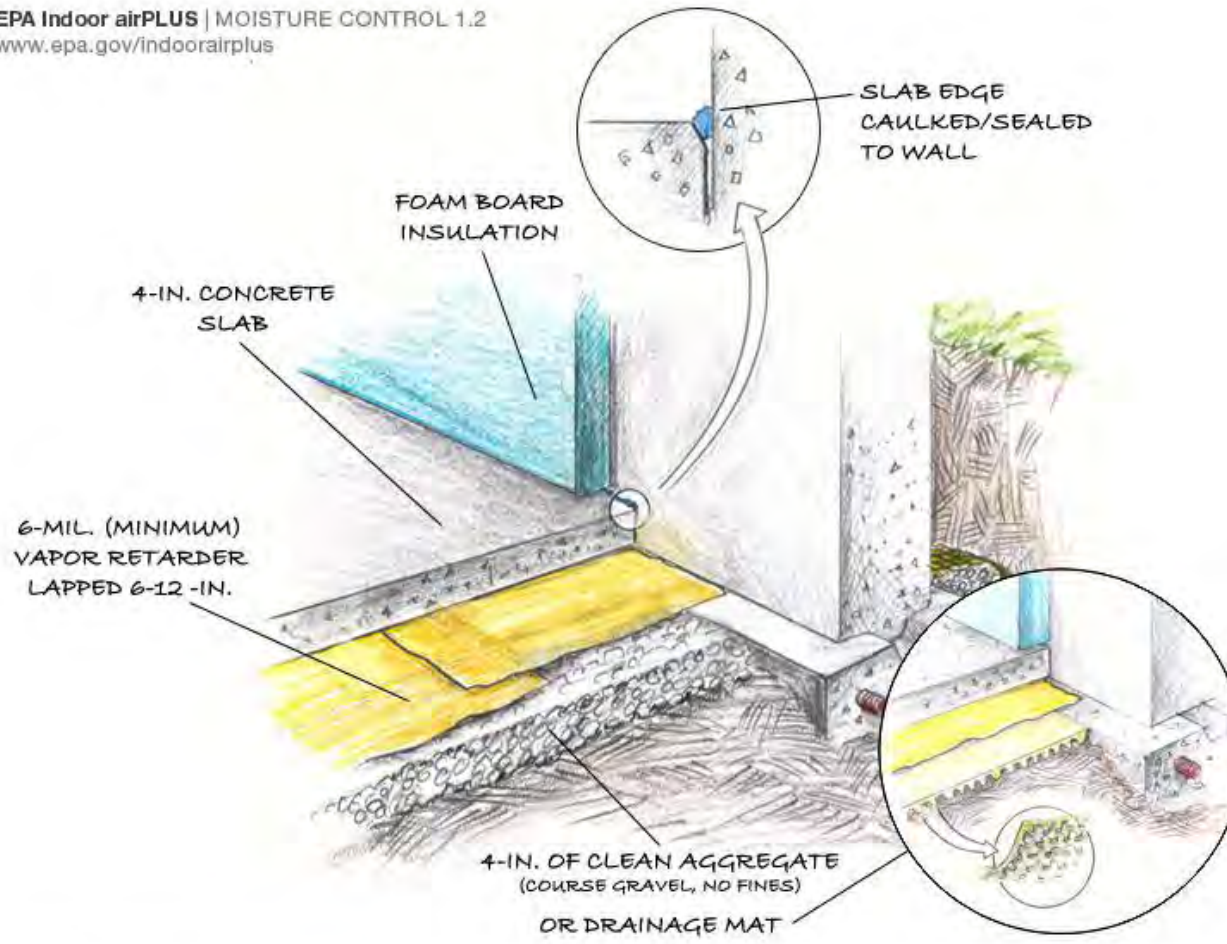
- ✓ *Slope hard surfaces and final grade away from the foundation.*
- ✓ *Install drain tiles at the footings of basement and crawlspace walls.*

- Install a drain or sump pump in basement and crawlspace floors.



1.2 Capillary Break Installation

EPA Indoor airPLUS | MOISTURE CONTROL 1.2
www.epa.gov/indoorairplus



BASEMENT SLAB W/ CAPILLARY BREAK - GRAVEL AND GEOTEXTILE MAT (INSET)



1.3 & 1.4 Below-grade Foundation Walls



- ✓ *Waterproof crawlspace and basement perimeter walls.*
- ✓ *All floors above unconditioned spaces shall be insulated.*



- Insulate crawlspace and basement perimeter walls.
- Seal crawlspace and basement perimeter walls.
- Provide conditioned air by either
 - A dedicated supply (1 cfm per 50 square feet) OR
 - Crawl space exhaust (only in non-Radon zone 1)

Alternative path coming in Revision 4 – Mechanical dehumidification of crawl in lieu of insulation and conditioned air.



1.5, 1.6, & 1.7 Wall Drainage System



- ✓ *Install a drainage plane behind exterior wall cladding.*
- ✓ *Install flashing at the bottom of exterior walls.*
- ✓ *Fully flash all window and door openings.*
- ✓ *Direct roof water away from house using gutters or an underground catchment system.*



- For homes that meet ENERGY STAR exceptions for gutters and downspouts, provide protection for water splash damage by one of the following:
 - Extend the foundation walls 16 in. above grade.
 - Provide a drip line that is 16 in. from the foundation.
 - Install cladding that can tolerate wetting and a drainage plane that extends 16 in. above grade.



1.11 Moisture-Resistant Materials



- ✓ *Install moisture-resistant backing material behind tub and shower enclosures.*
- ✓ *Install a corrosion-resistant drain pan.*



- Install only water-resistant hard-surface flooring in kitchens, bathrooms, entryways, laundry areas, and utility rooms.
- Insulate water supply pipes in exterior walls with pipe wrap.



1. Moisture Control and Water Management

Benefits

Water damage reduction

Flood mitigation

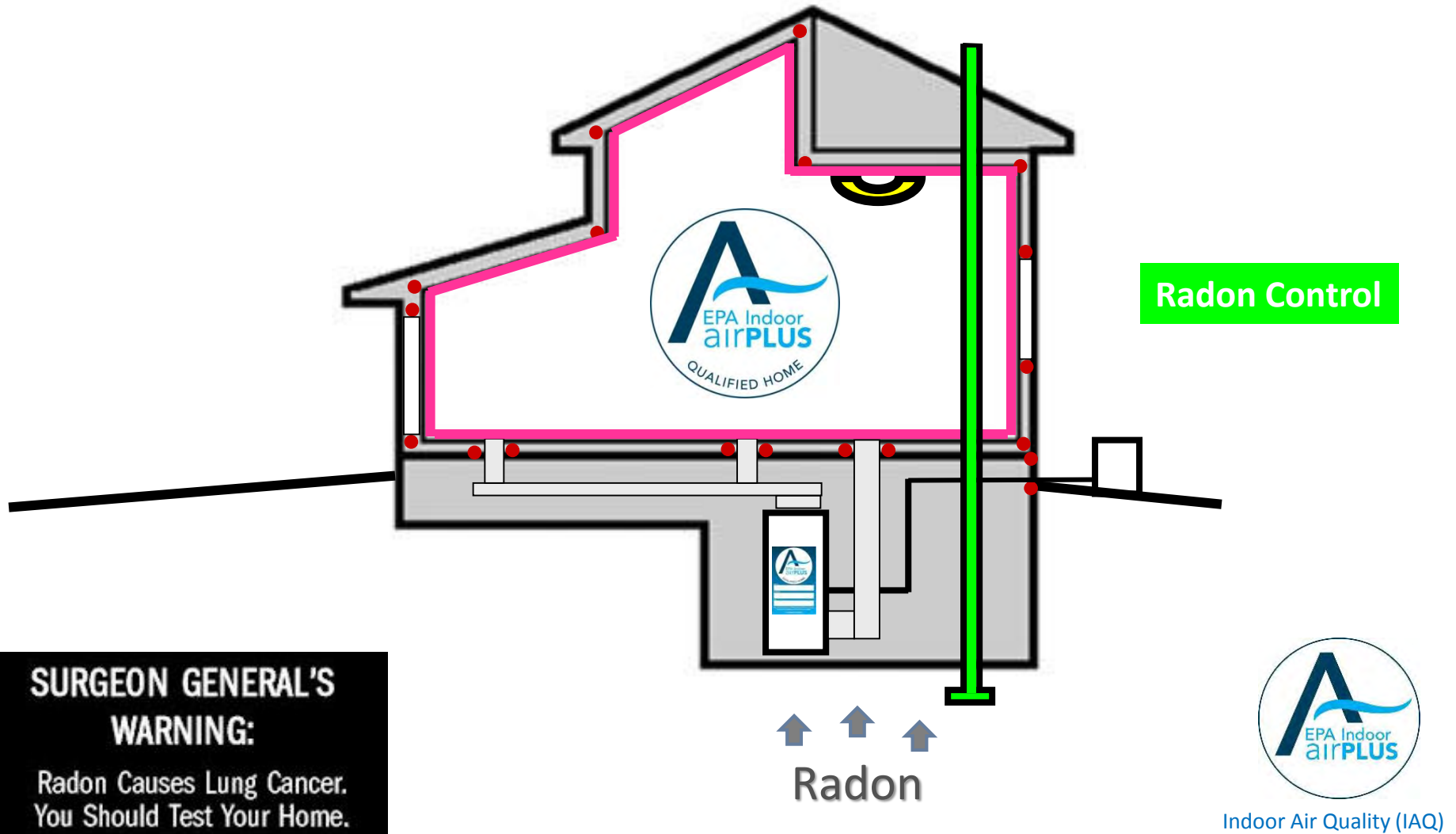
Structural durability

Reduces potential for mold growth –
even in places you can't see.

Fewer maintenance issues from
peeling paint and moldy grout



2. Radon



2.1 Radon Control



✓ *Air seal all sump covers.*

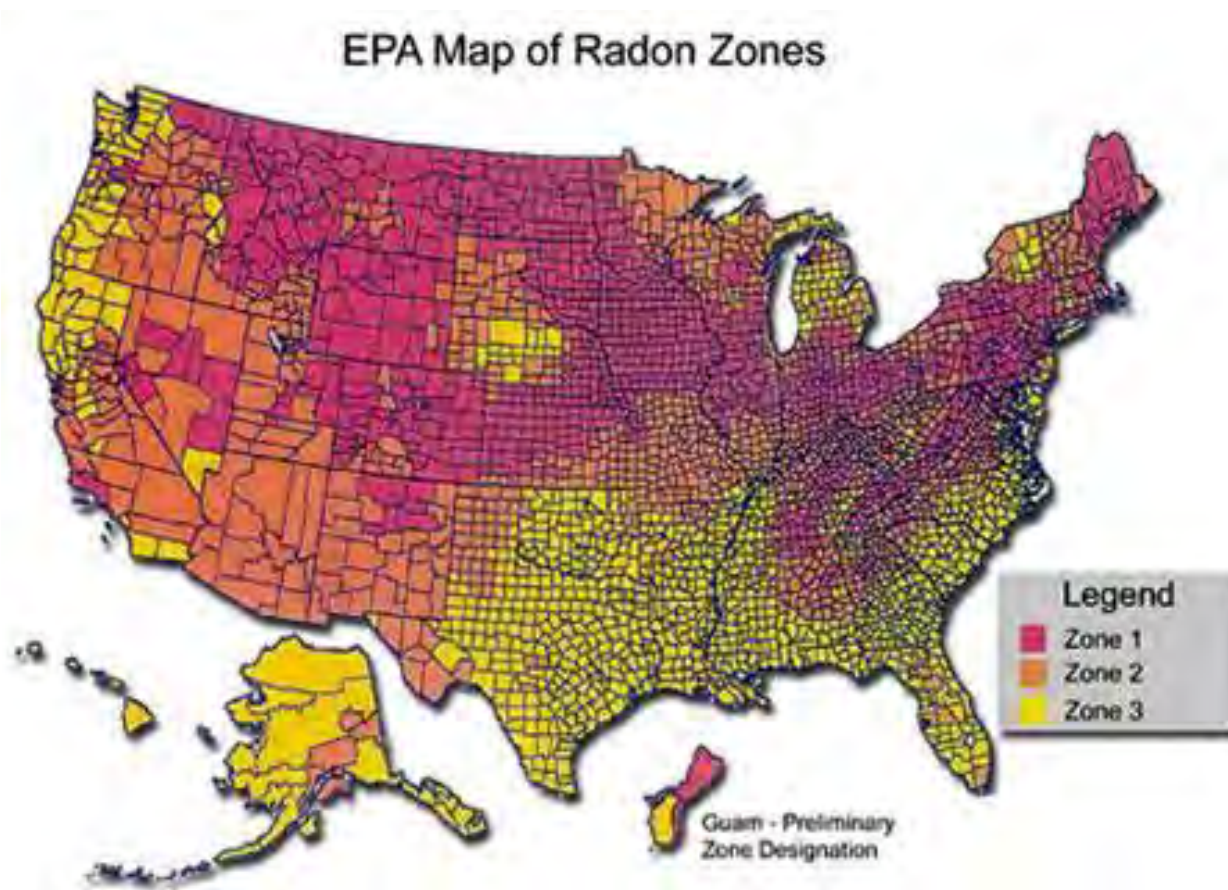


- Construct homes built in EPA Radon Zone 1 with radon-resistant features.
- Advisory:
 - Passive Systems recommended in Zones 2-3.
 - Educate homeowners.

For more on radon-resistant construction, see:
<https://www.epa.gov/radon/radon-resistant-construction-basics-and-techniques>



2.1 Radon Control

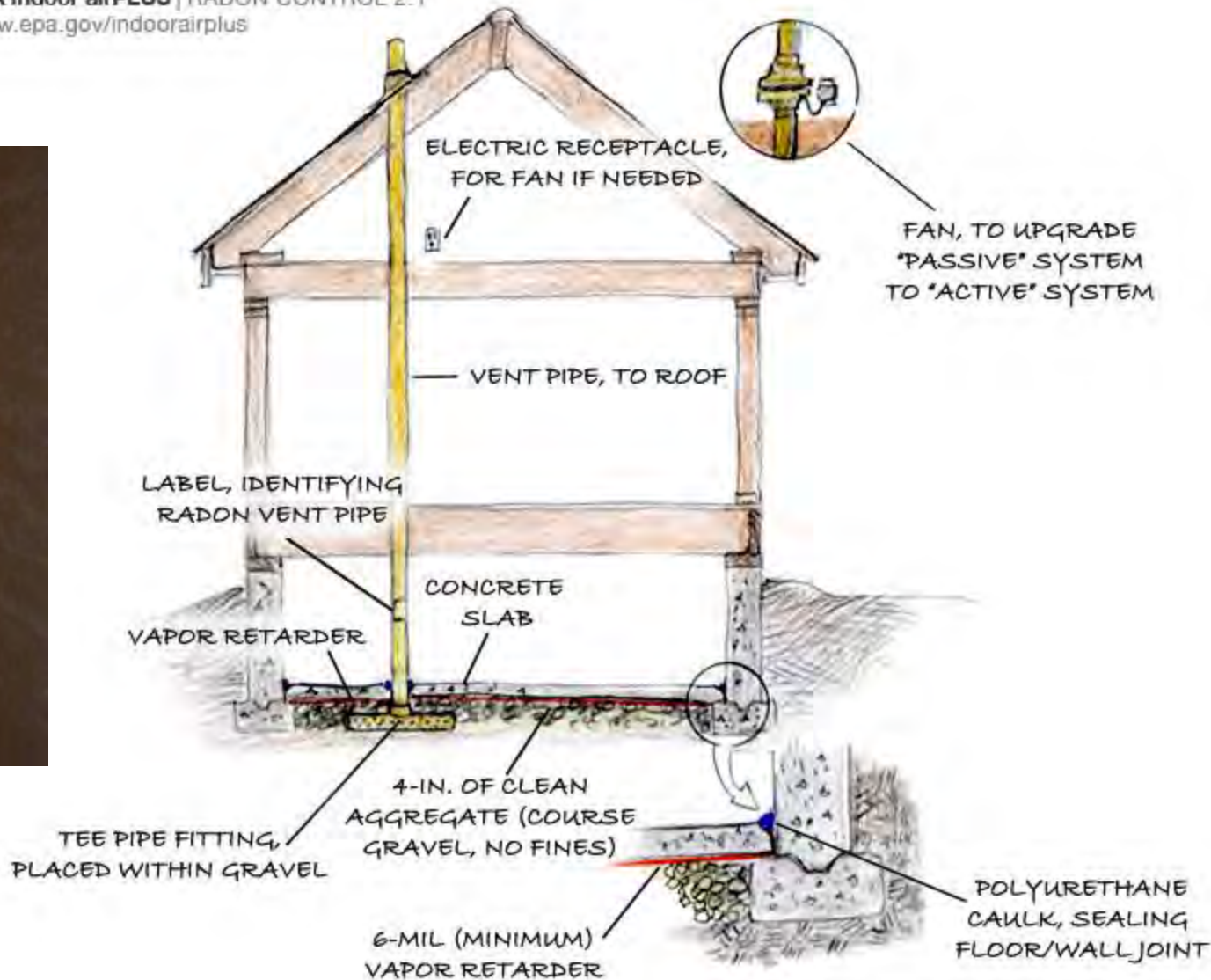


Note: These maps indicate average risk by county. However, high levels of radon can be found in any home. See: www.epa.gov/radon/zonemap.html or for an interactive map, see: <http://www.wxplushealth.org/geoexplorer>.



2.1 Radon Control

EPA Indoor airPLUS | RADON CONTROL 2.1
www.epa.gov/indoorairplus

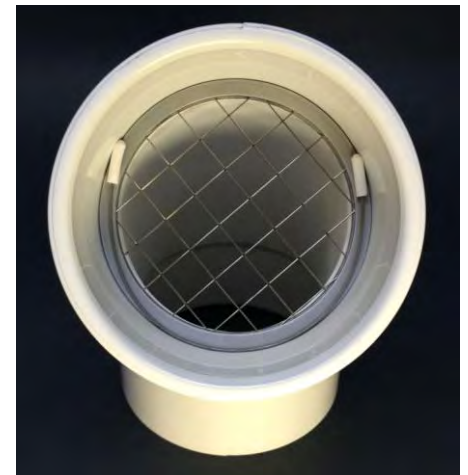


3.2 Rodent/Bird Screens



- Provide corrosion-proof rodent/bird screens for all opening that cannot be sealed or caulked.

Note: Does not apply to dryer vents



3.2 Rodent/Bird Screens



Photo courtesy Ross Britton, US Ecologic



3. Pest Barriers



Homeowner Benefits

Prevention of potential damage from pests

Less vacuuming and dusting

Reduced pest-related allergens, asthma triggers and diseases



4. HVAC Systems



- Indoor relative humidity greater than 60% can encourage mold growth and attract organisms such as dust mites or other pests.
- HVAC components in wall cavities and garages can expose occupants to mold, carbon monoxide, hydrocarbons, nitrogen oxides, radon, pesticides and other contaminants.
- Ordinary residential panel filters collect less than 20 percent of the particles between 3 and 10 microns. A MERV 8 filter collects more than 70% of the particles in this range.



4.1 HVAC Sizing and Design



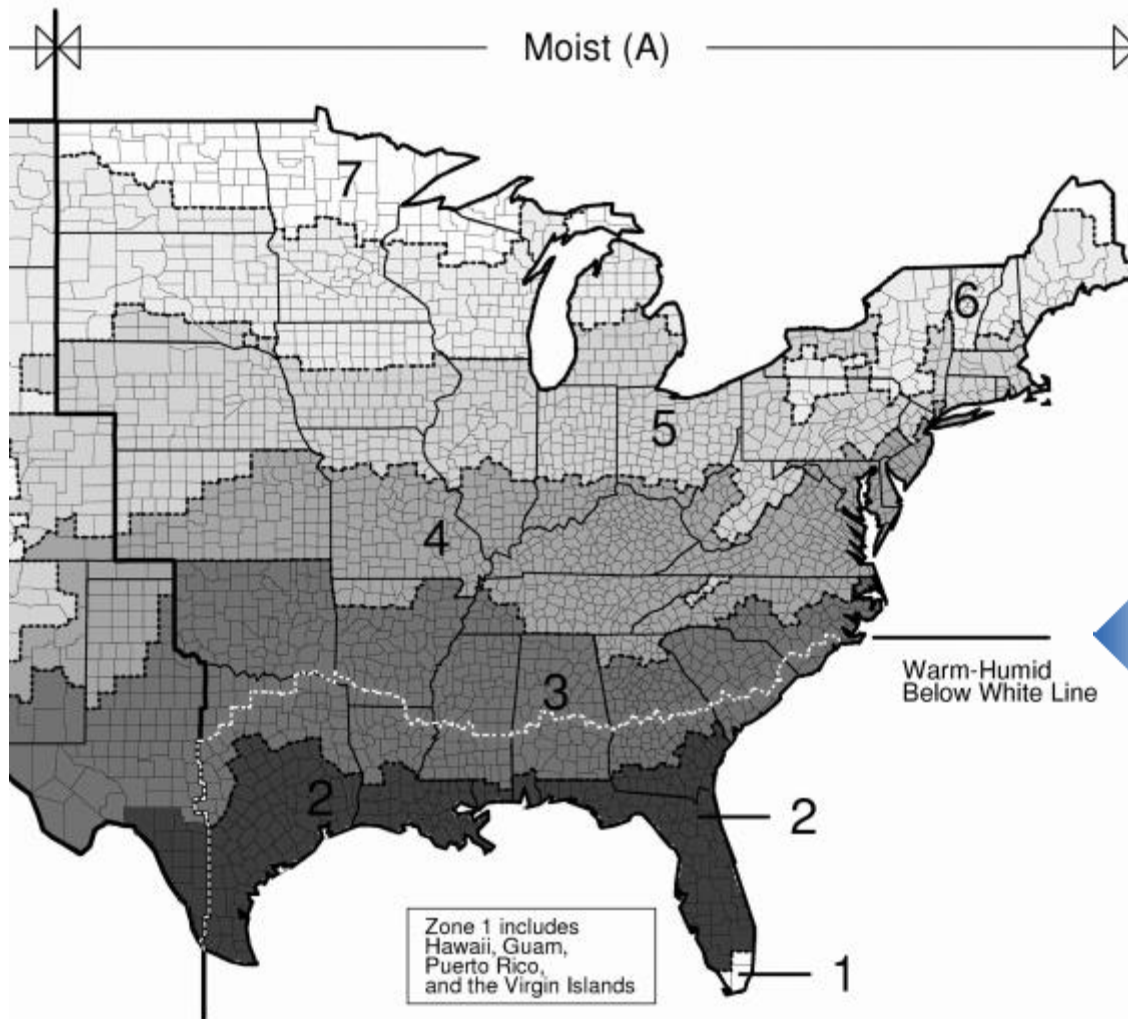
- ✓ *Properly size all heating and cooling equipment using ACCA Manual J, ASHRAE Handbooks, or equivalent software.*



- “Warm-Humid” climates: equipment shall be installed with sufficient latent capacity to maintain indoor relative humidity (RH) at or below 60 percent.



4.1 HVAC Sizing and Design



Homes in “Warm-Humid” climates use additional controls or dehumidification systems to maintain $RH \leq 60\%$



4.1 HVAC Sizing and Design



Best practice:
humidity
sensing
thermostat

Photo courtesy Ross Britton, US Ecologic



Indoor Air Quality (IAQ)

4.2 Duct System Design and Installation



- ✓ *Design all duct systems according to ACCA Manual D, ASHRAE Handbooks, or equivalent software.*
- ✓ *Ensure that all duct systems are airtight and properly balanced.*



- Do not use building cavities as part of the forced air supply or return systems.
- Cover duct openings throughout construction or vacuum out ducts prior to installing registers.



4.2 Duct System Design and Installation

COVERING DUCT OPENINGS
DURING CONSTRUCTION



Photo courtesy Ross Britton,
US Ecologic

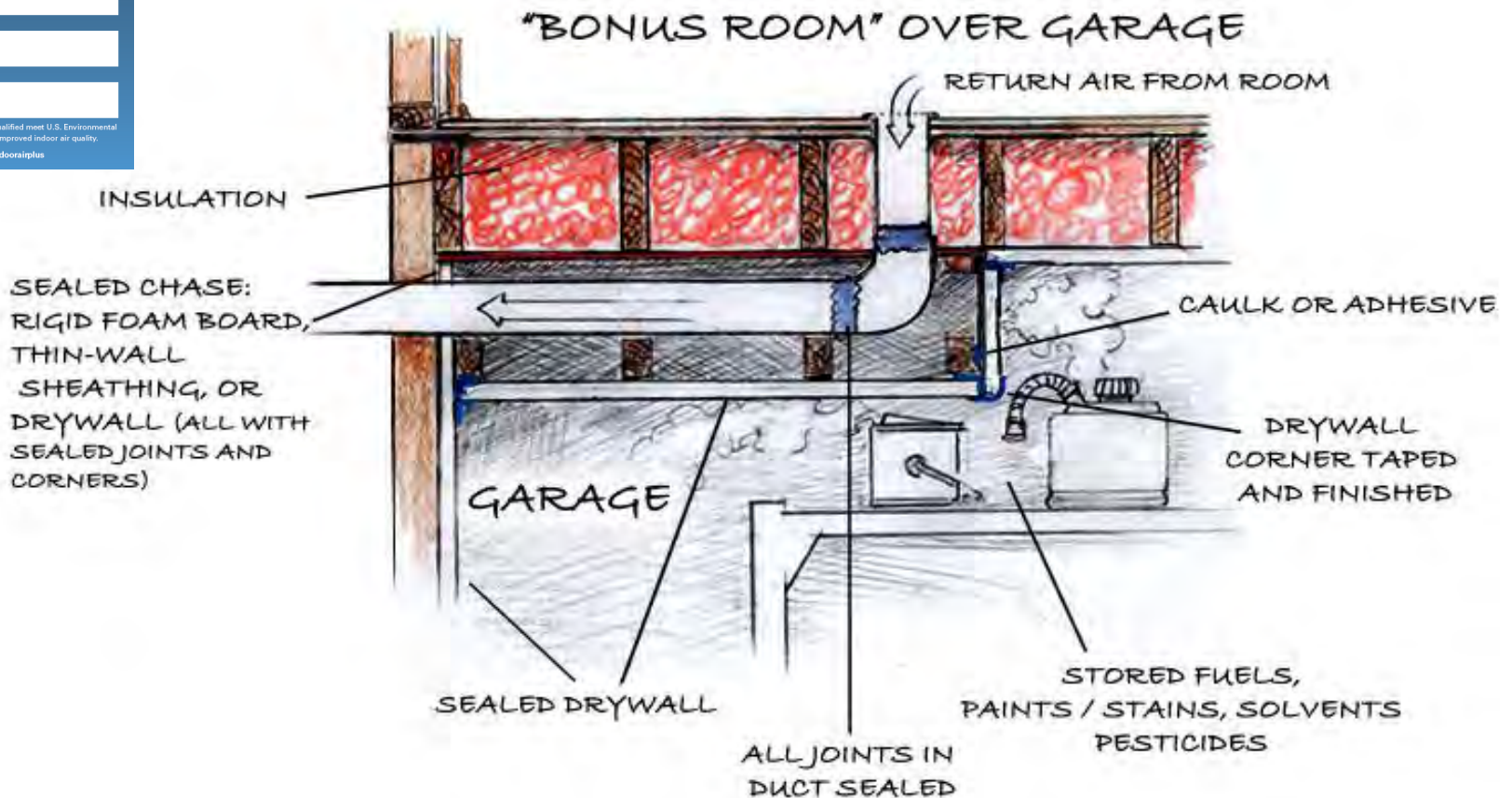


4.3 Location of Air Handler and Ducts



- Do not locate air-handling equipment or ductwork in garages.

Note: Ducts may be located in building cavities adjacent to the garage if they are separated with a continuous air barrier.



4.6 Local Exhaust for Known Pollutant Sources



- ✓ *Provide local mechanical exhaust ventilation to the outdoors in bathrooms and kitchens.*



- Vent conventional clothes dryers to the outdoors.
- Electric condensing dryers must be plumbed to a drain.



4.6 Local Exhaust for Known Pollutant Sources



Photos courtesy Ross Britton, US Ecologic



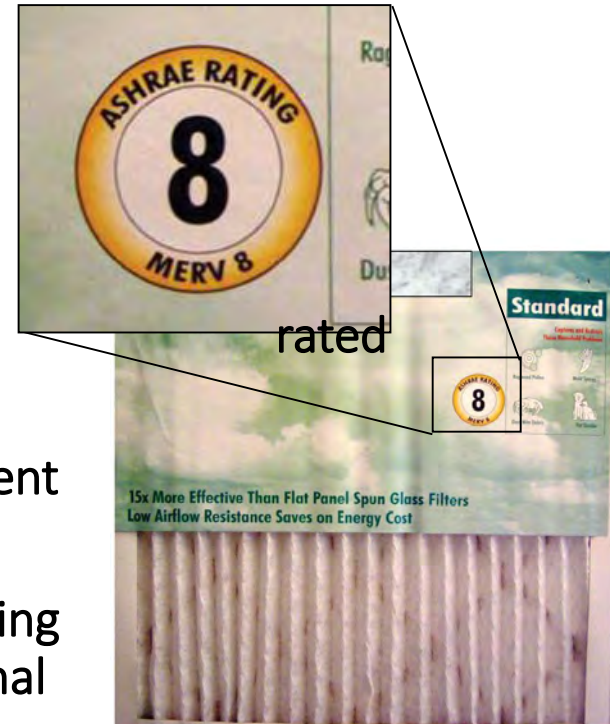
Indoor Air Quality (IAQ)

4.7 Filtration



- ✓ Equip all filter access panels with gasket material or comparable sealing mechanism to prevent bypass air.

- Install only HVAC filters that are MERV 8 or higher.
- Do not install any air-cleaning equipment designed to produce ozone.
- Use a filter in the air handling unit during construction and a clean filter upon final inspection.



4.7 Filtration for Central Forced-Air HVAC Systems

- Filters come in multiple sizes.
- Filters are typically 1", 2", or 4" in depth.
- Previously, the primary purpose for filtration was to just protect the HVAC system, not indoor air quality.



5. Combustion Pollutants



- Accidental carbon monoxide (CO) poisoning kills an average of 439 persons annually.

(CDC; MMWR; 12/21/2007)

- Carbon monoxide, an odorless, colorless gas, which can cause sudden illness and death, is produced any time a fossil fuel is burned.



5.1 Combustion Equipment



- ✓ *Mechanically draft or direct vent all gas- and oil-fired furnaces, boilers and water heaters.*
- ✓ *Fireplaces that are not mechanically drafted must meet exhaust flow or pressure differential.*



- Do not install any unvented combustion space-heating appliances.
- Ensure that all fireplaces and other fuel-burning appliances are vented to the outdoors and supplied with ventilation air.
- Meet emissions standards and restrictions for all fuel-burning appliances located in conditioned spaces.



5.2 Carbon Monoxide Alarms



- All homes with combustion appliance(s) or an attached garage shall have a carbon monoxide (CO) alarm installed in a central location in the immediate vicinity of each separate sleeping zone.



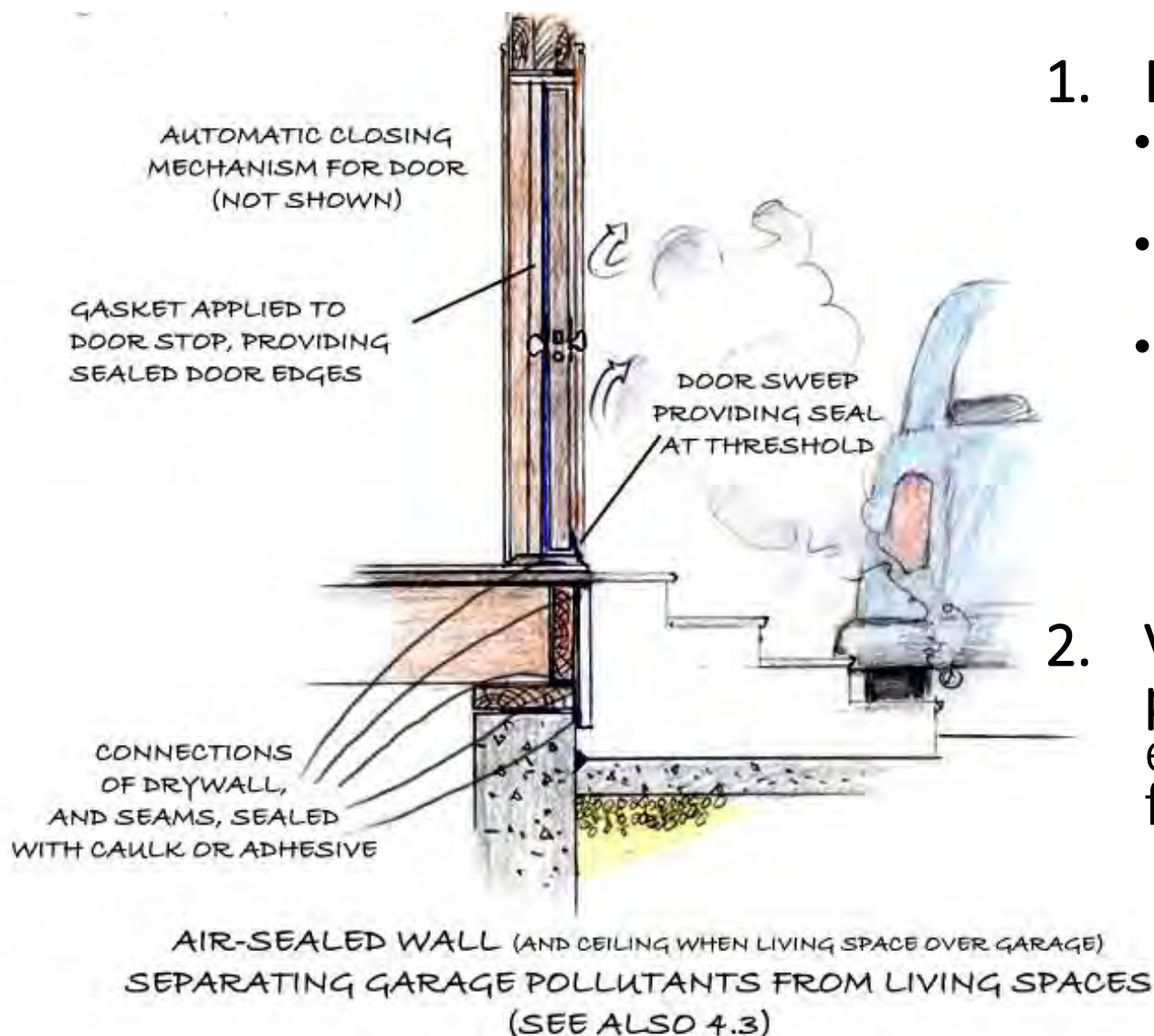
CO ALARM



COMBINED CO & SMOKE ALARM



5.4 Attached Garages



1. Isolation from interior

- Common walls and ceilings are **air-sealed**.
- **No HVAC equipment or ducts** in garage.
- **Weather stripping and an automatic door closer** is installed on connecting doors between living space and garage.

2. Ventilation OR pressure testing ensures separation from living space.





Continuous rigid air barrier at rough-in, installed at the kneewall between the garage and the entry--two different ceiling heights.

Barrier installed at the chase formed by the entryway arch framework.





Photo courtesy Ross Britton, US Ecologic

Self-closing door mechanisms

- Just on door between garage and living space
- Self-closing/spring hinge is sufficient
- Many low cost options available



Self-closing door mechanisms



- Just on door between garage and living space
- Self-closing/spring hinge is sufficient
- Many low cost options available

Photo courtesy Ross Britton, US Ecologic



Indoor Air Quality (IAQ)

5. Combustion Pollutants



Benefits

Reduced exposure to carbon monoxide.

Pollutants in attached garages isolated from living space.

Round-the-clock peace of mind.



6. Low Emission Materials



Potential Issues:

- Indoor levels of many chemical pollutants can be **2-5 times higher than outdoor levels**.
- Volatile Organic Compounds (**VOCs**) include a variety of chemicals, some of which may have short- and long-term adverse health effects, including eye, nose and throat irritation, headaches, loss of coordination, nausea, damage to liver, kidney, and central nervous system.



VOC and product labeling basics

- Complex and evolving field
- VOCs have been regulated under the Clean Air Act (CAA) for decades
- BUT CAA is only concerned about VOCs that react with sunlight to form ground level ozone in outdoor air
 - Indoor air was not considered in the Clean Air Act
 - Some VOCs are exempt from CAA but may still be of concern indoors, e.g., perchloroethylene, methylene chloride, acetone
- Ramifications:
 - Early standards for low emission products only concerned with not exceeding the regulatory VOC limits
 - Led to a CONTENT-based system of evaluating VOC s in products based on the weight or volume of *regulated* VOCs that go into the product
 - No attention to what VOCs are actually emitted into indoor air



What are the Material Requirements?

6.1 – Composite Wood

Structural panels, cabinetry, shelving, trim, doors, stair treads, flooring, etc.

6.2 - Interior Paints and Finishes

Site-applied coatings only, but not simply “low-VOC”.

Indoor airPLUS – Section 6 *Low-emission Materials*

6.3 – Carpet and Carpet Adhesives

CRI Green Label

6.4 – Adhesives and Sealants

Recommended but not yet required.

6.5 – Hard Surface Flooring

Advisory coming soon.

How to Find Indoor airPLUS Compliant Low Emission Products

How to Find Indoor airPLUS Compliant Low-Emission Products

The Low-Emission Materials requirements contained in Section 6 of the Indoor airPLUS Construction Specifications address composite wood products, interior paints and finishes, and carpets and carpet adhesives used in the construction of Indoor airPLUS qualified homes. Products meeting the referenced standards are generally widely available in the market. This document is intended to help builders, designers, and Raters identify and locate compliant products.

Basic Information:

1. Your product supplier and/or product manufacturers are likely to be the best source of information about low emission products.
2. Many of the certifications and labels identified below meet multiple and/or overlapping standards. A single listed label or certification for a specific product is sufficient to comply with Indoor airPLUS requirements.
3. The certification marks displayed in the table below are **EXAMPLES only**. Other certifications that meet the underlying referenced standards may also be compliant with the Indoor airPLUS requirements. In addition, the listed programs and standards may have different or additional labels, and other certification marks may be used by the programs listed below. For more background on these standards and labels, see "Additional Information on Referenced Standards and Programs" on pages 7-10.
4. Use caution in selecting "green" product labels. Other labels may claim to be healthier or more eco-friendly, but they may not comply with the Indoor airPLUS Construction Specifications.

To request that other compliant certifications or programs be added to this resource or for additional questions about these or other Indoor airPLUS Construction Specifications, please contact Indoor_airPLUS@epa.gov. For complete information about Indoor airPLUS, visit the Indoor airPLUS website at www2.epa.gov/indoorairplus.

Examples of Product Labels:

- APA (Associated Wood Paneling and Manufacturers Association):** Labels for Composite Wood Products (OSB) and Plywood, indicating compliance with PS1 or PS2 standards.
- Green Seal:** Certification mark for products meeting Green Seal standards.
- Green Guard:** Certification mark for products meeting Green Guard standards.
- MPI (Master Painters Institute):** MPI Green Performance labels for paints and coatings.
- HVA (Healthy Valley Air):** Certification mark for products meeting HVA standards.

- Guidance on identifying compliant low-emission products and 3rd party labels.
- <https://www.epa.gov/indoorairplus/indoor-airplus-compliant-low-emission-products>
- RESNET 2016 in-depth presentation: [Plain Speak on How to Find the Right Products](#)



6.1 Composite Wood



- Use certified low-formaldehyde products for all composite wood materials installed in the home including, but not limited to: **structural panels, cabinetry, shelving, trim, doors, stair treads, flooring, etc.**



- Specific standards or certifications apply to these product types:
 - Structural Plywood
 - Hardwood Plywood
 - Particleboard & MDF
 - Cabinetry



6.1 Composite Wood - HWPW



The Home Depot Advantage:
Hardwood Plywood



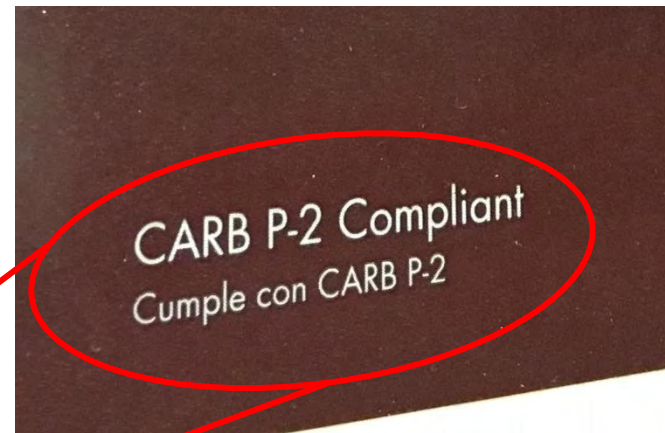
SANDEPLYWOOD.COM[®]

CARB Phase 2 Certified	<input checked="" type="checkbox"/>
Graded to IWPA Standards	<input checked="" type="checkbox"/>
Calibrated for consistent thickness	<input checked="" type="checkbox"/>
Excellent core construction	<input checked="" type="checkbox"/>
Surface ideal for staining, painting or laminating	<input checked="" type="checkbox"/>
Stable and flat panel for ease of working	<input checked="" type="checkbox"/>
Comes from sustainably managed forests	<input checked="" type="checkbox"/>
One piece face and back	<input checked="" type="checkbox"/>
Exclusively available at The Home Depot	<input checked="" type="checkbox"/>



Indoor Air Quality (IAQ)

6.1 Composite Wood - Particleboard



6.1 Composite Wood - MDF



Cabinetry

Requirement: Use Cabinetry made with component materials (plywood, particleboard, MDF) that are certified to comply with the appropriate standards above; OR registered brands or products produced in plants certified under the Kitchen Cabinet Manufacturers Association's (KCMA) Environmental Stewardship Certification Program (ESP 05-12); OR GREENGUARD or GREENGUARD Gold Certification for Cabinetry.



6.1 Composite Wood – Cabinetry

Note: Do not confuse the 2 KCMA labels. Look for the green ESP label, not the standard KCMA label.

Meet at least one standard below	How to find compliant products
<p><i>Cabinet components must comply with the appropriate standard above</i></p>	<p>Look for:</p> <ul style="list-style-type: none"> • ANSI A208.1 or ANSI A208.2, OR • the ECC label, OR • GREENGUARD or GREENGUARD GOLD.
<p><i>KCMA's Environmental Stewardship Program (ESP 05-12)</i></p>	<p>Look for the KCMA-ESP label on cabinets (often sink bases), product packaging, and/or spec sheets.</p> <p>For a list of KCMA certified manufacturers that produce compliant cabinets, visit: http://www.kcma.org/Members/ESP_Certified_Manufacturers</p> <p><i>Note: Manufacturers listed in the link above can be used as a resource, but partners should request confirmation from the manufacturer or supplier that the product lines they are using are indeed compliant.</i></p>
<p><i>GREENGUARD or GREENGUARD Gold Certification for Cabinetry</i></p>	<p>For a list of GREENGUARD or GREENGUARD Gold certified cabinetry, visit: http://productguide.ulenvironment.com/SearchResults.aspx?CategoryID=47</p>






Indoor Air Quality (IAQ)



6.1 Composite Wood – Cabinetry

6.2 Interior Paints and Finishes

Requirement: At least 90 percent of the interior surface area covered by site-applied paints and coatings shall use low-VOC or no-VOC products certified by one of the following third-party standards or certifications:

Meet at least one of the standards below	How to find compliant products
<p>GREENGUARD or GREENGUARD GOLD Certification for Paints and Coatings</p>	<p>Look for GREENGUARD labels on products, packaging, or spec sheets:</p> <p>Search for GREENGUARD and GREENGUARD Gold certified paint and coating products at: http://productguide.ulenvironment.com/SearchResults.aspx?CategoryID=15&SubCategoryID=28</p> 
<p>Scientific Certification Systems (SCS) Standard EC-10.2-2007 or Indoor Advantage Gold</p>	<p>Look for the Indoor Advantage Gold label on products, packaging, or spec sheets.</p> <p>OR find Scientific Certification Systems certified products at: http://www.scsglobalservices.com/certified-green-products-guide?scscertified=1</p> 
<p>CA Section 01350 (CDPH Standard Method V1.1-2010)</p>	<p>Look for low-emitting products found in the CHPS database.</p> <p>CA 01350 Certified products can be found in the Collaborative for High Performance Schools searchable high performance product database under the category "Interior Finish and Trim" with attribute "Low Emitting Material": http://www.chps.net/dev/Drupal/node/445</p> 



6.2 Interior Paints and Finishes

<p>Green Seal Standard GS-11</p>	<p>Look for the Green Seal label on products, packaging, or spec sheets:</p> <p>Green Seal Standard GS -11 products:</p> <p>http://www.greenseal.org/FindGreenSealProductsandServices.aspx?vid=ViewProductDetail&cid=0&sid=6</p> 
<p>Green Wise and Green Wise Gold products</p>	<p>Look for the Green Wise labels on products, packaging, or spec sheets.</p> <p>Find Green Wise and Green Wise Gold products: http://greenwisepaint.com/products/interior-top-coat</p>  
<p>Master Painters Institute (MPI) Green Performance® Standards X-Green, GPS-1 or GPS-2.</p>	<p>Look for the MPI labels on products, packaging, or spec sheets:</p> <p>Find MPI approved products: http://www.paintinfo.com/mpi/approved/Specification_index.shtml</p>  



6.2 Interior Paints and Finishes



6.3 Carpets and Carpet Adhesives



- Use carpets and carpet adhesives labeled with the Carpet and Rug Institute (CRI) Green Label Plus testing program criteria.
- Use carpet cushion products certified to meet the CRI Green Label Plus or Green Label testing program criteria.



6.3 Carpet and Carpet Cushion



6.3 Carpet and Carpet Cushion

EMPIRE TODAY
CARPET & FLOORING

Warranties

- 20 yr. PRODUCT WARRANTY
- Lifetime Installation WARRANTY
- Low Price GUARANTEE
- Be Happy PROMISE
- LIFETIME STAIN RESISTANT

Special Features

- PUP
- 2X STAIN & SOIL RESISTANCE SYSTEM
- RECYCLABLE
- CR1 PLUS (highlighted with a red circle)

Product Features	
Style	Shining Star
Color	Chestnut
Roll Width	12'
Fiber	100% Nylon Filament
Face Weight	45 oz.
Twist	5.15
Pattern Repeat	None

PAR Rating

0 1 2 3 4 5

3.5

Shaw FLOORS

7.1 HVAC and Duct Verification



- ✓ *Verify that HVAC systems and ductwork are installed according to their design.*



- Inspect ductwork to verify it is dry and substantially free of dust or debris. If duct openings were not covered during construction, thoroughly vacuum out each opening.
- Inspect air-handling equipment and verify that the filter is new, clean and meets specified MERV rating.



7.2 Ventilation after Material Installation



- Ventilate the home with outside air at the highest rate and duration practical, meeting ventilation requirements for air flow and humidity control (see Item 4.5):
 - During and shortly after installing products that are known sources of contaminants, AND
 - During the period between finishing and occupancy.



7.3 Buyer Information Kit

- Provide buyers with information and documentation of the home's IAQ protections, including:
 - HVAC, duct, and ventilation system design documentation.
 - Operations and maintenance instruction manuals for all installed equipment and systems addressed by Indoor airPLUS and ENERGY STAR requirements.
 - Indoor airPLUS label and certificate.



That's it. You are now ready to build and label Indoor airPLUS homes!

EPA Indoor airPLUS Version 1 (Rev. 03) Verification Checklist

Section	Requirements (Refer to full Indoor airPLUS Construction Specifications for details)	Must		May		N/A
		Correct	Verified	Verified	Verified	
<p>Note: The Rev. 03 checklist has been modified to reflect only the additional Indoor airPLUS requirements and their corresponding section numbers that must be met after completing the ENERGY STAR requirements. ENERGY STAR remains a prerequisite for Indoor airPLUS qualification.</p>						
Indoor Air Quality	ENERGY STAR Version 3 Program Requirements must be followed and the home shall be ENERGY STAR certified in conjunction with Indoor airPLUS qualification.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Moisture Control	1.1 Drain or sump pump installed in basements and crawlspaces (Exception: free-draining walls in EPA Rater Zone 1, check table also installed)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.2 Layer of aggregate or sand (2 in.) with geotextile matting installed below slabs (Exceptions: see spec) AND radon techniques used in EPA Rater Zone 1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.4 Basements/crawlspaces insulated, sealed and conditioned (Exceptions: see spec)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.7 Protection from water spillage/damage from gutters (Exceptions: see spec)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	1.11 Waterproofing flooring in kitchens, baths, entry, laundry and utility rooms, AND piping in exterior walls insulated with pipe wrap.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Pest Control	2.1 Radon-resistant features installed in Rater Zone 1 homes in accordance with Construction Specification 2.1.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	3.2 Carbon-monoxide resistant screens installed at all openings that cannot be fully sealed (Exception: dryer vent).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
HVAC Systems	4.1 Equipment selected to keep relative humidity < 60% in "Warm-Humid" climates (Exception: see spec)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	4.2 Duct systems permitted from construction before AND no building cavities used as air supply or return.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	4.3 No air-handling equipment or ductwork installed in garage AND certificate air barrier in adjacent assemblies.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	4.4 Carrier doors vented to the outdoors or plumbed to a drain according to manufacturer's instructions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	4.7 Central forced-air HVAC system(s) have minimum MERV 2 filter AND no coarse granular or bagged filter media (Exception: filter installed to prevent soil from construction dust. Emissions standards met for furnishing and space-heating appliances).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Combustion Appliances	5.1 CO alarms installed in each sleeping zone (e.g., common hallway) according to NFPA 720.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	5.3 Multifamily buildings: Smoking restrictions implemented AND ETS transfer pathways minimized.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	5.4 Attached garages: Door closer installed on all connecting doors AND in homes with exhaust-only whole-house ventilation SYSTEM a 75 cfm exhaust fan installed in garage OR a pressure test conducted to verify the effectiveness of the garage-to-house air barrier. See spec for details.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Materials	6.1 All composite wood products certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	6.2 Interior paints and finishes certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	6.5 Carpet, carpet adhesives, and carpet cushion certified low-emission. See spec.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Final	7.1 HVAC system and ductwork verified to be dry and clean AND new filter installed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	7.2 Home ventilated before occupancy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	7.3 Equipment manuals, Indoor airPLUS label, and certificate provided for buyer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Rater Company: _____ Builder Company: _____
 Rater Signature: _____ Builder Signature: _____
 Date: _____ Date: _____

October 2015

One additional checklist verified by the Rater



Place the Indoor airPLUS label adjacent to the ENERGY STAR label



What Does Indoor airPLUS Cost?

- No fee to participate in the EPA program.
- Raters may charge a verification fee.
- Cost of additional Indoor airPLUS features will vary based on:
 - Local code requirements and typical building practices
 - Type of foundation (e.g., below grade foundation or slab on grade)
 - Climate Zone (e.g., some exceptions in dry climates)
 - Radon Zone (passive system required in Radon Zone 1)
 - Availability of suppliers and cost of materials
- Cost of additional features could be a few hundred dollars in dry, non-Radon Zone 1 areas or up to a few thousand dollars in moist climates in Radon Zone 1.



Selling Indoor airPLUS



Indoor Air Quality (IAQ)

Indoor airPLUS Sales Training Kit



Learning Objectives

Module 1

1. Differentiate between:
 - a. Average New Homes
 - b. ENERGY STAR® certified homes
 - c. Indoor airPLUS qualified homes
2. Describe the features and benefits
3. Identify an ideal Indoor airPLUS client



Module 2

4. Create value propositions
5. Apply value propositions



Communicating Value to the Homebuyer

Average New Home

Minimum Code

ENERGY STAR Certified Home



Enduring Quality

Peace of Mind

Wall-to-wall Comfort

Proven Value

Indoor airPLUS Qualified Home



Enduring Quality

Peace of Mind

Wall-to-wall Comfort

Proven Value

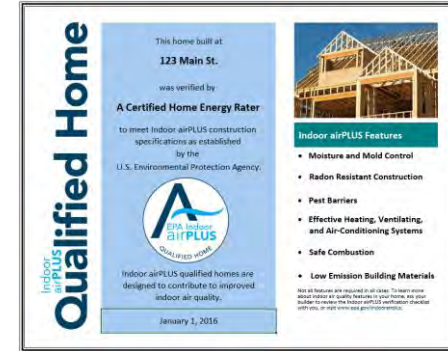
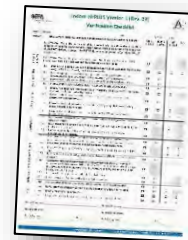
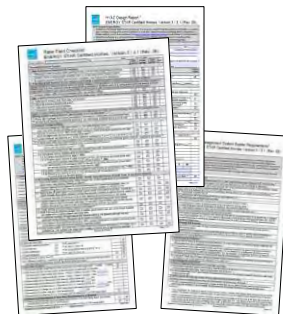
Health

Safety



Comprehensive Indoor Air Quality Protection

Builders are recognizing that buyers care about health and are looking for this benefit in a new home.



Indoor Air Quality (IAQ)

Resources and Tools

Marketing and Technical Support for Partners



- Builder and consumer resources
- Partner locator
- Website widgets
- Construction requirements
- Technical guidance



www.epa.gov/indoorairplus



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EPA Indoor airPLUS



The U.S. Environmental Protection Agency (EPA) Indoor airPLUS checklist provides links to technical guides that align with measures included in the EPA Indoor airPLUS program requirements. The numbers and titles included in this checklist follow the same order and numbering as those in the EPA Indoor airPLUS Verification Checklist. At this time, only measures associated with the DOE Zero Energy Ready Home program are displayed in the accordions below. Completing these requirements fulfills the "Indoor Air Quality" section of the DOE Zero Energy Ready Home Program. To view the full program requirements see EPA's [Construction Specifications](#) document. Portions of the programmatic footnotes have been added to the Scope tabs in the guides. For additional DOE Zero Energy Ready Home program requirements and information, visit the [DOE Zero Energy Ready Home Website](#).

[▶ ENERGY STAR for Homes Baseline](#)[▶ Moisture Control](#)[▶ Radon](#)[▶ Pests](#)[▶ HVAC Systems](#)

Technical Resources and Tools

<https://basc.pnnl.gov/checklists/epa-indoor-airplus>



Indoor Air Quality (IAQ)

Indoor airPLUS Leader Awards



The Indoor airPLUS Leader Awards were created to recognize and reward Indoor airPLUS Program partners who construct and verify Indoor airPLUS homes designed and built for improved indoor air quality.

This annual award recognizes market leading organizations who promote safer, healthier and more comfortable indoor environments by participating with Indoor airPLUS and offering enhanced indoor air quality protections for their new homebuyers.

http://www.epa.gov/indoorairplus/leader_awards.html





FULTON HOMES



Indoor airPLUS Leader Awards 2016 Builder Winners

<http://www2.epa.gov/indoorairplus/indoor-airplus-leader-award-winners>





Indoor airPLUS



A new opportunity for leading builders to create better environments inside and out

Learn more at:

www.epa.gov/indoorairplus

**OR contact the Indoor
airPLUS Team at**

indoor_airPLUS@epa.gov