

# EPA's ENERGY STAR Indoor Air Package



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# 'GREEN' BEGINS WITH 'BLUE'



## Energy Efficiency

- Air Flow
- Thermal Flow
- Moisture Flow
- Equipment



## Indoor Environment

- Source Control
- Ventilation
- Filtration

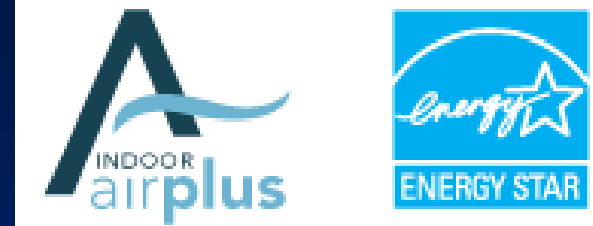


## Resource Efficiency

- Water
- Materials
- Waste
- Recycling
- Land
- Renewables



# Outline



- What is IAP
- How does it work?
- Why you should build homes that meet the IAP

# What is IAP?



- New EPA/Energy STAR label
- All or nothing: pass or no-pass
- Over 100 homes now built to IAP nationally: 50 in California
- No administrative costs other than rater certification: simultaneous with ESTAR
- Cost to build depends on where builder is w.r.t. high performance building
- Medium Bar: difficult for many builders
- ESTAR and IAP are incorporated into LEED-H and Green Point Rated green building standards.



# *How does IAP work?*



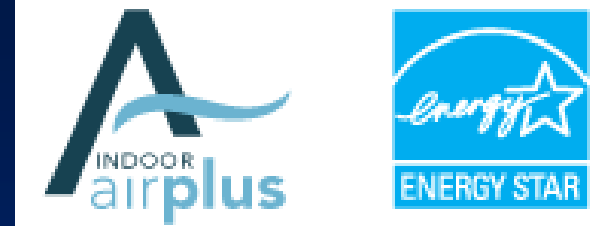
- **Builder designs & builds homes with additional features** (just like ENERGY STAR)
- **Third party (RESNET-accredited) verifies that specifications are met and signs verification checklist, as does the builder** (just like ENERGY STAR)
- **Builder provides one copy of the completed/signed checklist to homebuyer. Provider or Rater keeps a copy with HERS rating and ENERGY STAR documentation (i.e. Thermal Bypass Checklist) for the home** (just like ENERGY STAR)
- **Builder markets & sells qualified homes, with help** (just like ENERGY STAR)

# *Getting Started*



1. Review IAP checklist with builder during design phase, if possible. Discuss feasibility/needed modifications to meet checklist.
2. Make a list of design changes needed and include them in building design documents, subcontractor solicitations/guidance/cut sheets.
3. Send email with statement of intent to [werling.eric@epa.gov](mailto:werling.eric@epa.gov) - following directions for IAP notification while registering the project with Energy STAR at [www.energystar.gov](http://www.energystar.gov)
4. Follow directions on back of IAP checklist

# Outline



- What is IAP
- How does it work?
- Why you should build homes that meet the IAP

# Why you should build to Meet EPA's ENERGY STAR Indoor Air Package

- The Health benefits are VERY significant
- IAP is worth significant points in LEED-H and Green Point Rated
- The IAP label confers substantial market differentiation





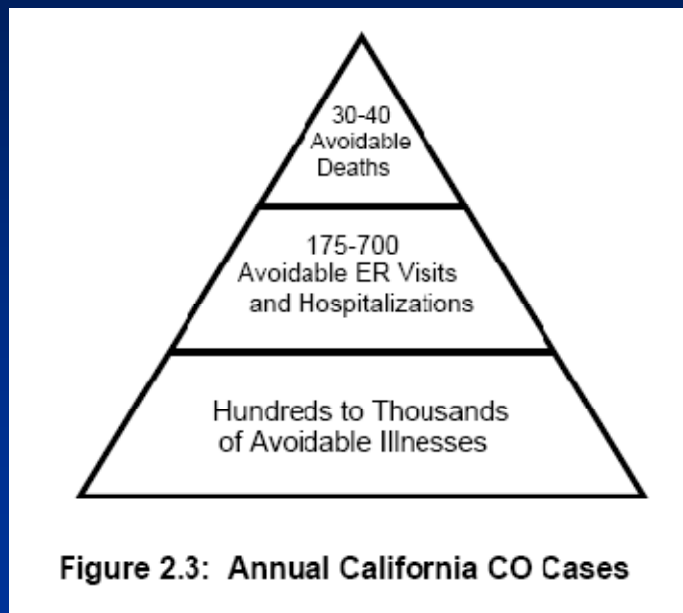
# Indoor Air Contaminants of Greatest Concern in Homes

Contaminant: End Point	Avg. Excess Premature Deaths/year
Radon: Lung Cancer	21,000 <sup>1</sup>
VOCs: Lung Cancer	1,300 <sup>2</sup>
ETS: Lung Cancer/Lung and Heart Disease	9,000-26,000 <sup>3</sup> <small>17% of U.S. Households have non-smokers living with smokers <sup>2</sup> 25 percent of children aged 3-11 years live with at least one smoker<sup>5</sup></small>
CO: Poisoning	600 <sup>4</sup>
Mold and Moisture: asthma and allergy	NA

**Sources:** <sup>1</sup> EPA 2003, <sup>2</sup> Loh et. al. 2007 and Am. Cancer Soc. 2007, <sup>3</sup> OEHHA 2005, EPA 1992, Public Health Agency of Canada 2002, <sup>4</sup> Raub *et al.*, 2000, <sup>5</sup> 2006 Surgeon General's Report.

# Carbon Monoxide

## Non-lethal effects

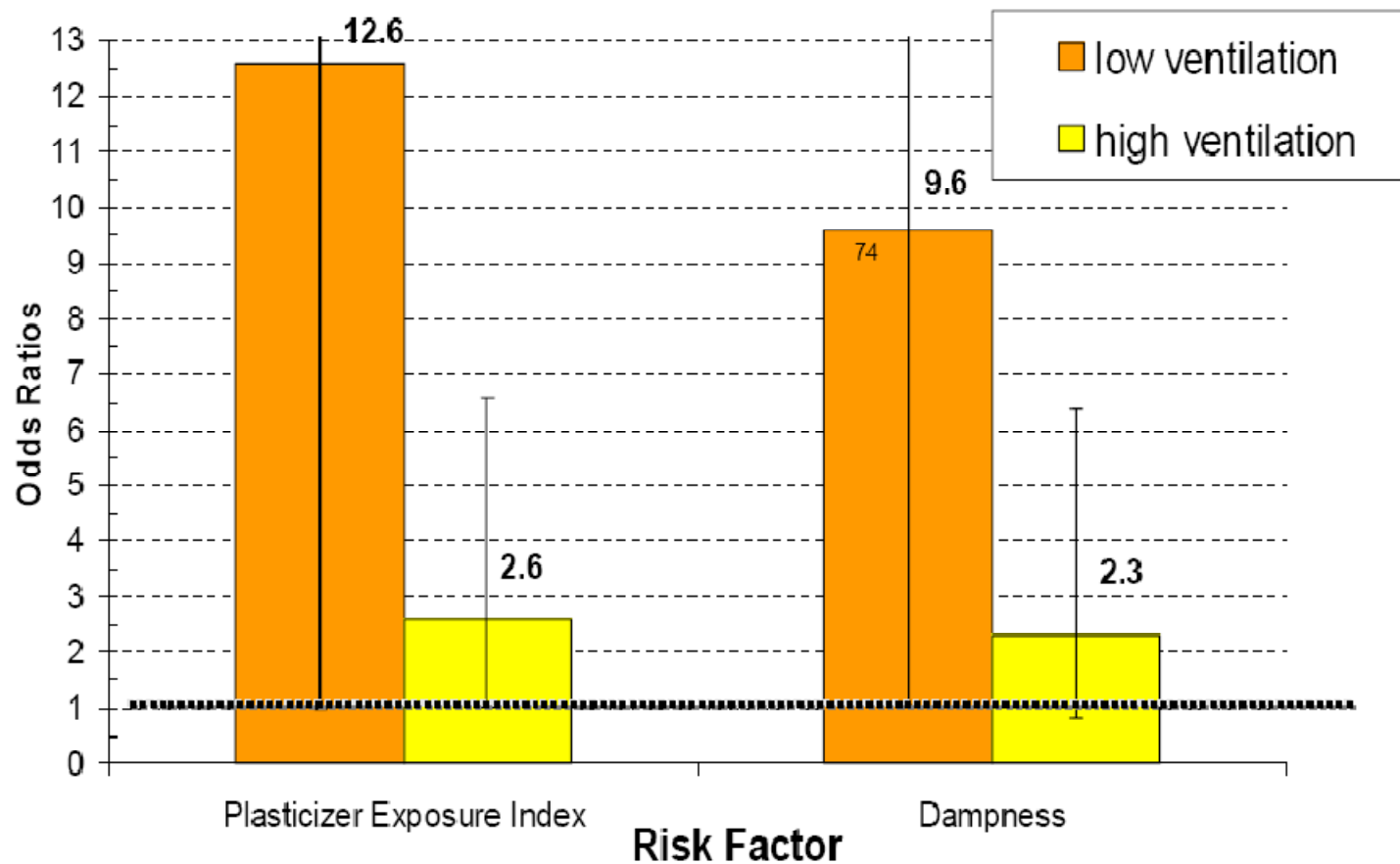


Effects: undiagnosed heart problems, headache, flu-like symptoms... chronic effects include lethargy, headaches, concentration problems, amnesia, dementia, psychosis, Parkinsonism, memory impairment, personality alterations, signs of parietal dysfunction, and other minor symptoms. For exposed mothers: low birth weight babies and pre-term births.

Source: California Air Resources Board, Indoor Air Pollution in Q&A  
<http://www.arb.ca.gov/research/indoor/ab1173/rpt0705.pdf>

# Importance of Ventilation

## Indoor Sources as Risks for Bronchial Obstruction in Infants, and Risk Modification by Residential Ventilation Rate (Oie et al. 1999)

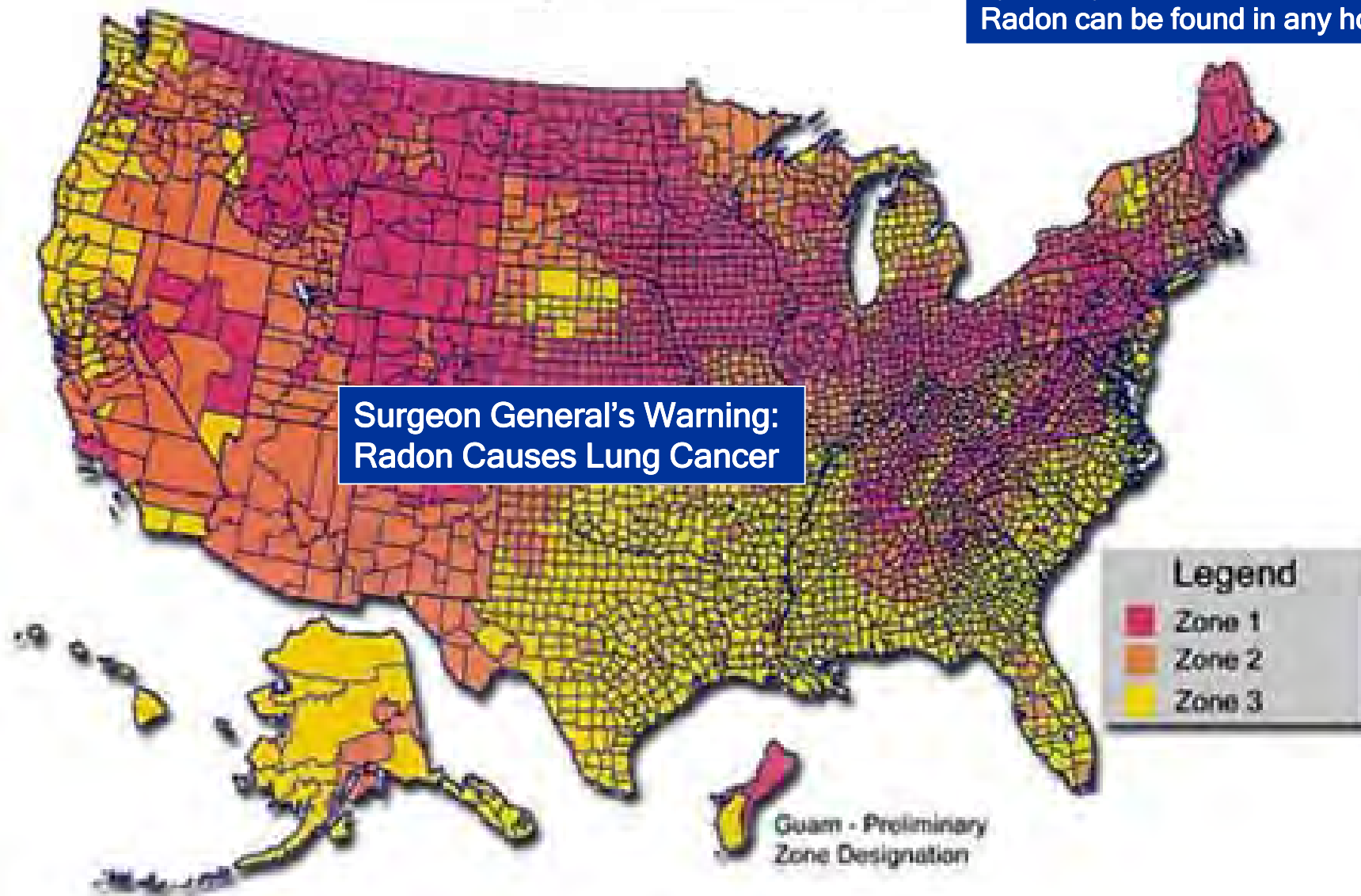


Oie, L., Nafstad, P., Botten, G., Magnus, P., and Jaakkola, J. K., (1999) Ventilation in homes and bronchial obstruction<sup>1</sup>h  
young children. *Epidemiology*, 10: 294-299.

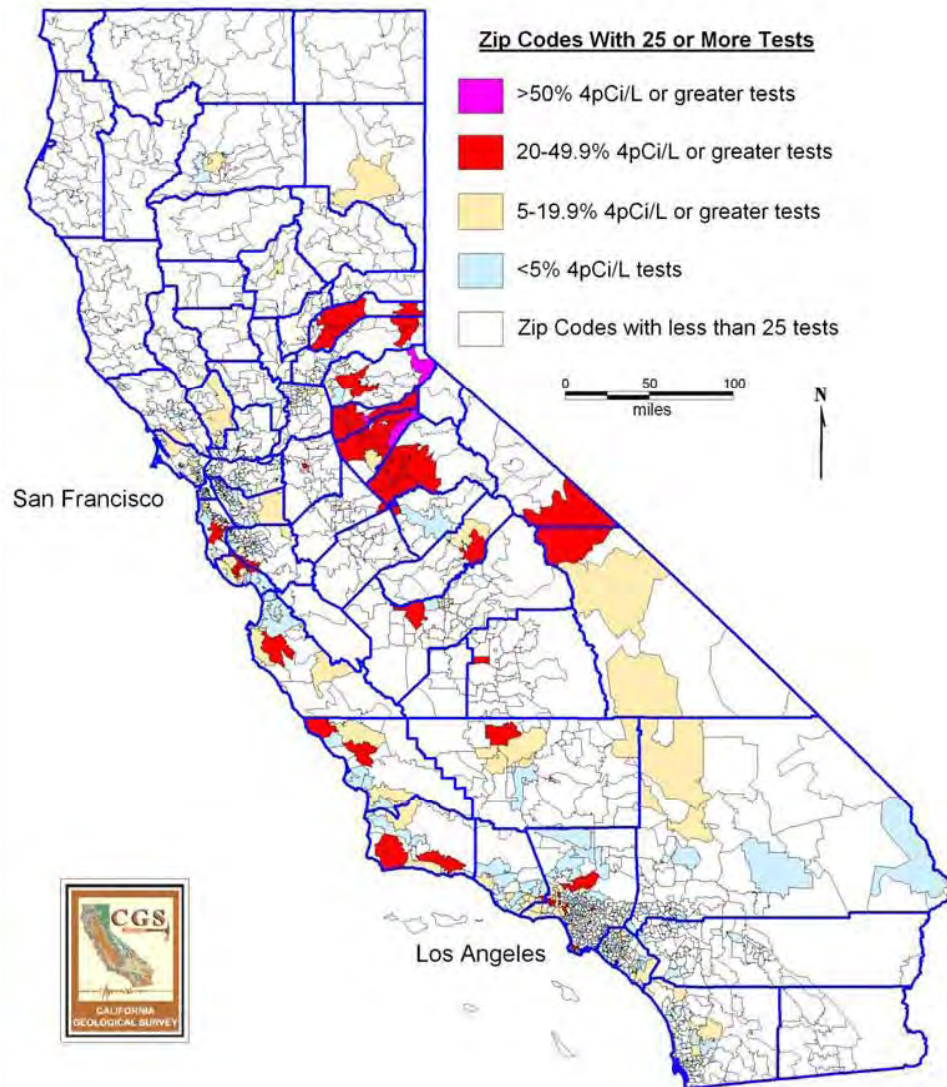
# Radon Zones Across the U.S.

EPA Map of Radon Zones

Note: these maps indicate average risk by county. However, High levels of Radon can be found in any home.



CDPH 2008 Zip Code Database--Percent 4pCi/L or Higher Indoor Measurements  
for Zip Code Areas with 25 or More Tests



CDPH Radon Program Zip Code Database--July 1, 2008

# Radon in California

1. Use this map
2. Determine your zone
3. Install in colored zones
4. Test home
5. Install fan if >2 pCi/L

Go to:

[www.cdph.ca.gov/healthinfo/environhealth/Pages/Radon.aspx](http://www.cdph.ca.gov/healthinfo/environhealth/Pages/Radon.aspx)

Click on "Radon Measurements by Zip Code" toward bottom of page



potential yet your house can have elevated radon while your neighbor's house has no radon.

Radon is odorless, invisible, and without taste, and cannot be detected with the human senses. The only way to detect it is to test for it. For information on home test kits, [click here](#).

Testing during real estate transactions must be conducted by a California certified radon [tester](#). If your tester is not on our list, he or she is not certified.

## How does it get into my house and what can I do?

Air pressure inside your home is usually lower than pressure in the soil around and under your home. Because the pressure is lower inside, radon is sucked into your house through cracks or holes in the slab or foundation ([more about how radon gets into your house](#)). If you have elevated radon levels you can fix your home. CDPH along with U.S. Environmental Protection Agency (US EPA) recommends that if you have moderate or high radon potential, we recommend using radon-resistant new construction techniques.

## Why do I care about radon?

Radon is the second leading cause of [lung cancer \(PDF\)](#) each year.

## For more information

Questions? Call the toll-free radon message line at 1-800-

California Department of Public Health  
ATTN: George Faggella, [George.Faggella@cdph.ca.gov](mailto:George.Faggella@cdph.ca.gov)  
Indoor Radon Program, MS 7405  
1616 Capitol Avenue, 2nd Floor  
P.O. Box 997413  
Sacramento, CA 95899-7413

### Certified Radon Services Providers

- [Certified Providers of Radon Services](#)
- [Learn How to Become Certified](#)

### Radon in California

- [Radon in California](#)
- [Radon Measurements by Zip Code \(PDF, New Window\)](#)
- [Orange County Radon Screening Program](#)
- [San Mateo County Radon Screening Program](#)

### Home Test Kits

- [\\$5 Home Test Kits](#)

California Indoor Radon Levels  
Sorted By Zip Code

Last Updated  
8/31/2009

This data base is a summary of **44506** radon tests.

To search for a Zip Code Click on the **binoculars** in the tool bar or go to **edit** then **find**.

The number of tests do not necessarily represent the number of houses tested.  
A single house may have had several tests conducted.  
The table contains both long-term and short-term indoor radon measurements.

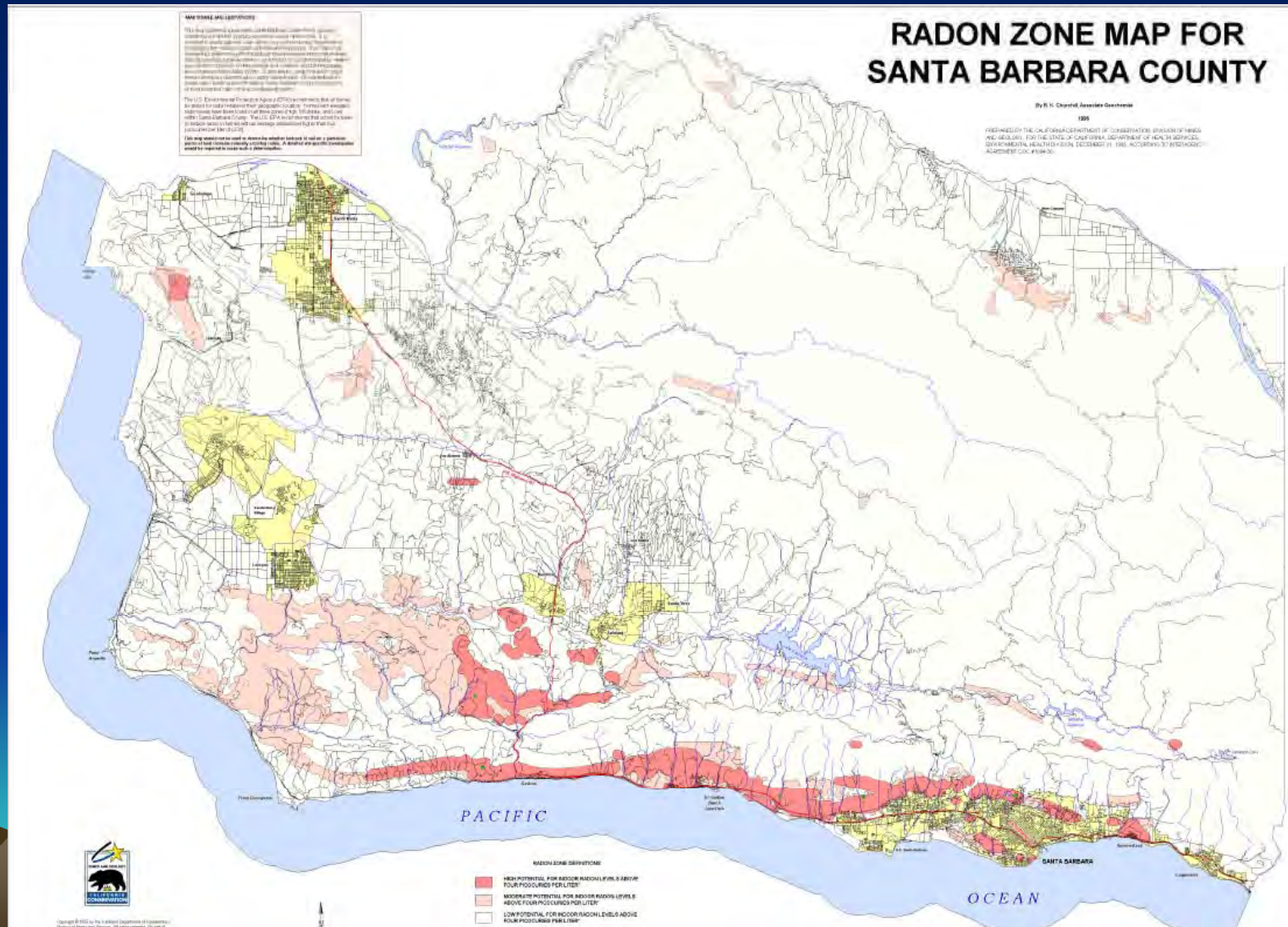
**The California Department of Health Services recommends that you take action to reduce radon levels in your house if they are 4pCi/L or greater. Refer to our web page for more information.**

Zip Code	County	City	Num. of Tests	Num. Tests $\geq 4$ pCi/L
90001	Los Angeles	Los Angeles	43	1
90002	Los Angeles	Los Angeles	3	0
90003	Los Angeles	Los Angeles	3	0
90004	Los Angeles	Los Angeles	54	0
90005	Los Angeles	Los Angeles	8	0
90006	Los Angeles	Los Angeles	13	0

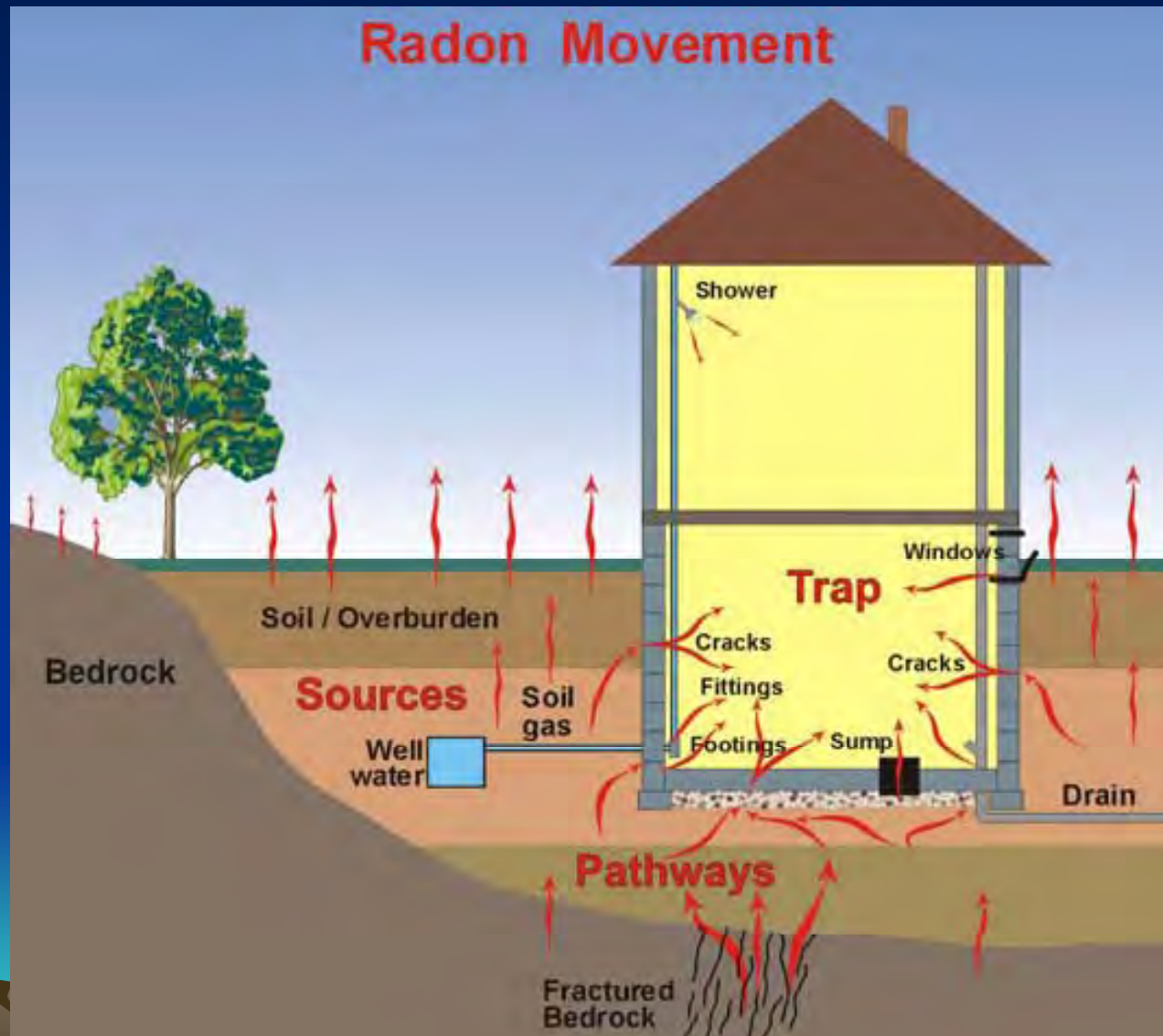
- [National Cancer Institute - Radon and Cancer](#)
- [US EPA's Radon Page](#)
- [US EPA's Citizen's Guide to Radon](#)
- [US EPA's Physician's Guide for Radon](#)
- [US EPA's Radon Publications](#)
- [US Ecologic Survey's Publications on Radon](#)

For CA: <http://www.cdph.ca.gov/healthinfo/envirohealth/Pages/Radon.aspx>  
Click on "Radon"

# What Radon Distribution Really Looks Like



# How Radon Gets into a Home

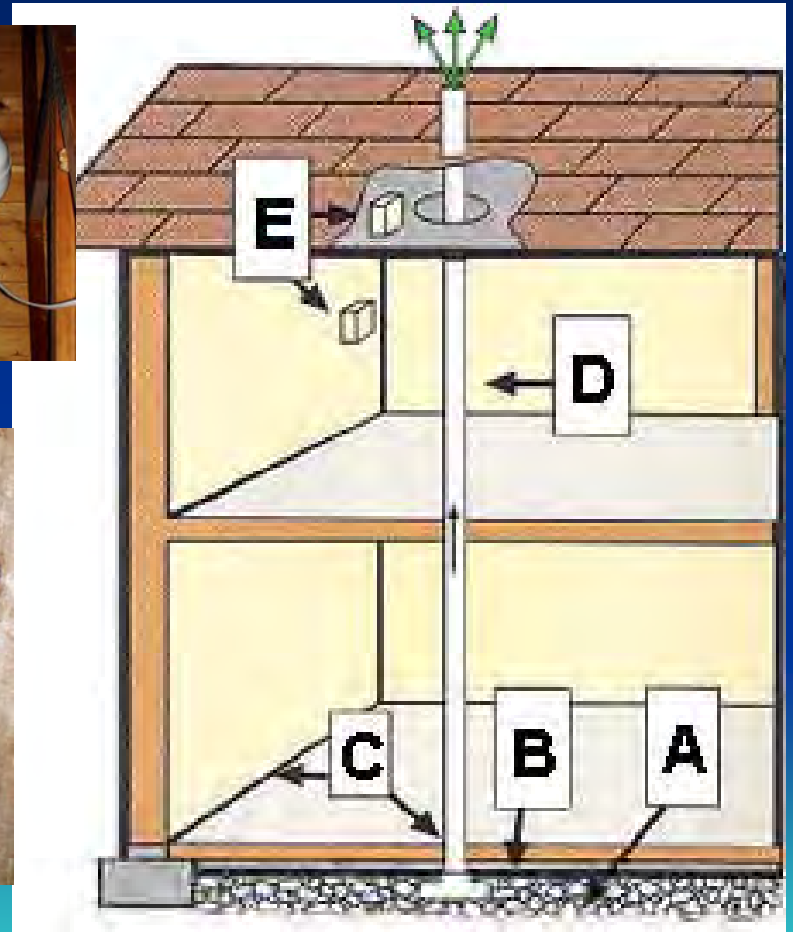




# Radon Control Highlights:

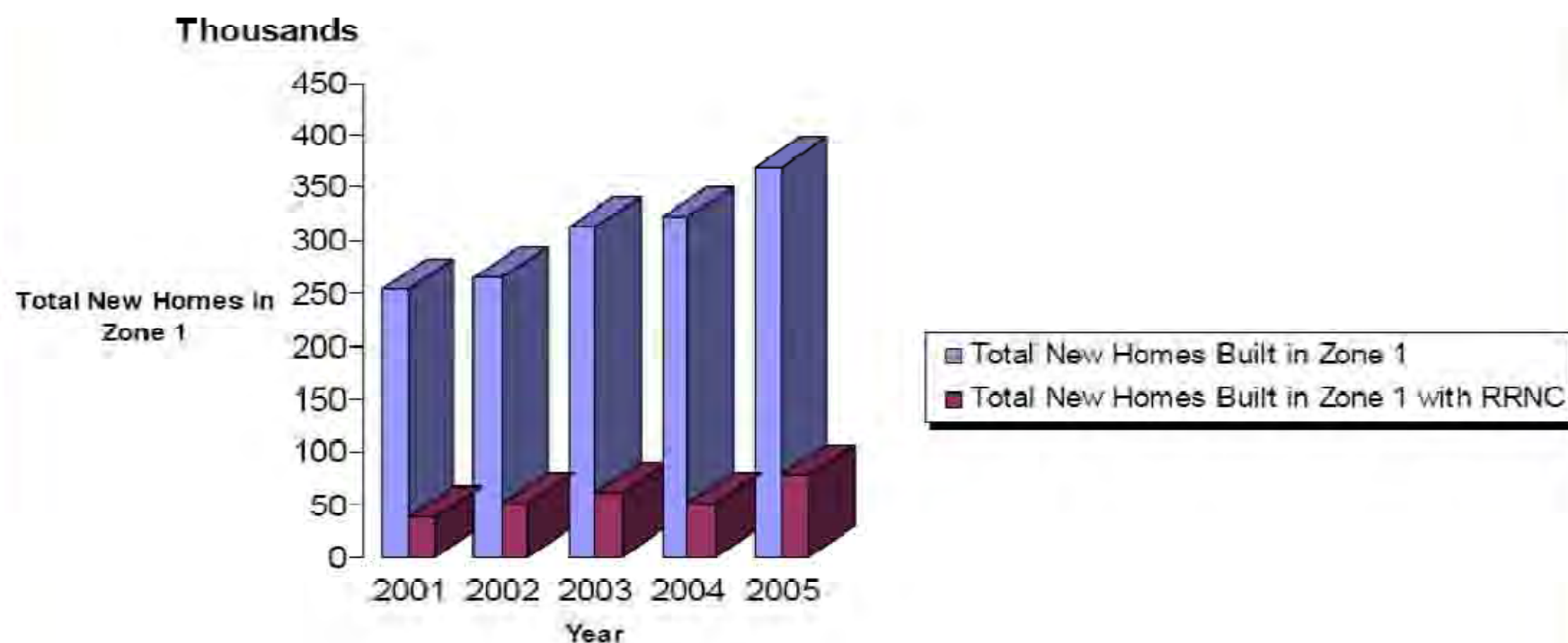
## Radon Resistant Construction 2.1

- A. Gas Permeable Layer  
(4" clean gravel)*
- B. Plastic Sheetting  
(under slab or over crawl space)*
- C. Sealing and Caulking  
(all openings in concrete floor)*
- D. Vent Pipe  
(3 or 4 inch PVC pipe)*
- E. Junction Box  
(if fan needed later)*



See: <http://www.epa.gov/radon/pdfs/buildradonout.pdf>

## From 2008 Office of Inspector General Report – total of number of homes built in high radon areas compared to number of homes constructed with radon resistant features



<sup>a</sup> New homes built with RRNC in Zone 1 is based on EPA's estimate that 60 percent of all homes built with RRNC are in Zone 1.

# Take Home Messages on Radon

- Know whether you are building in an area with radon in the soil (or other soil gases). Build radon/soil gas resistant construction where warranted.
- Consider testing for radon after construction (don't panic)
- Ventilation often helps solve the problem

Great websites are:

[www.cdph.ca.gov/healthinfo/environhealth/Pages/Radon.aspx](http://www.cdph.ca.gov/healthinfo/environhealth/Pages/Radon.aspx)

<http://www.epa.gov/radon/index.html>

<http://www.aarst.org/home.html>

<http://www.aarst.org/images/PCPRadonSlideShow.pdf>

# How does IAP fit in with **Green Point Rated?**

**With up to 68-70 additional points available in other categories !**

**IAP is automatic 7 Points!**

## J. BUILDING PERFORMANCE

1. Diagnostic Evaluations
  - a. House Passes Blower Door Test
  - b. House Passes Combustion Safety Backdraft Test
2. *Design and Build High Performance Homes - 15% above Title 24 - Required*
3. House Obtains ENERGY STAR® with Indoor Air Package Certification

**Building Performance = Total 39**

## K. FINISHES

1. Design Entryways to Reduce Tracked-In Contaminants
2. Use Low-VOC or Zero-VOC Paint
  - a. Low-VOC Interior Wall/Ceiling Paints (<50 gpl VOCs (Flat) and <150 gpl VOCs (Non-Flat))
  - b. Zero-VOC: Interior Wall/Ceiling Paints (<5 gpl VOCs (Flat))

1

1

30

5

2

1

1

3

# *IAP - Green Point Rated Comparison*

Category	IAP Points In <b>GPR</b>	<b>GPR</b> Minimum
Indoor Air Quality	23-25	5 points
Energy	38	30 points
Resources	7	6 points
Water		9 points
Total	68-70	50 Minimum

Sources for Data:  
2007 GreenPoint Rated Checklist  
EPA Energy Star Indoor Air Package Checklist, V3 January, 2008

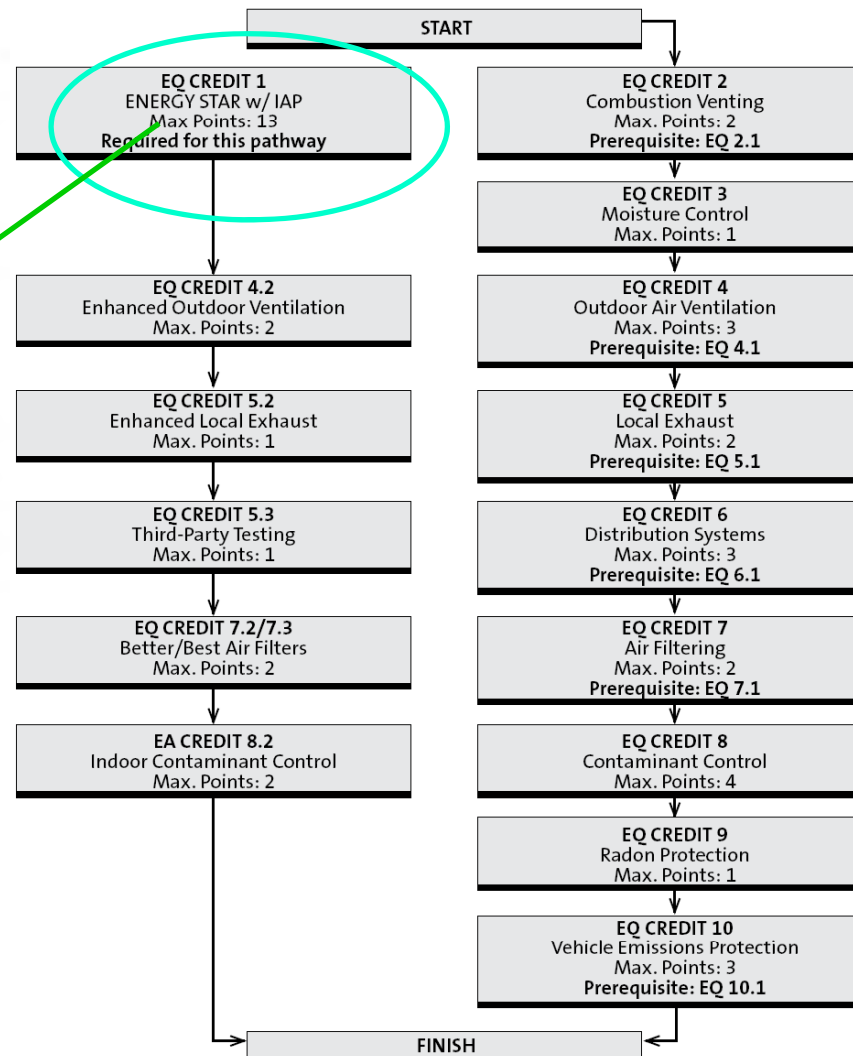
# How does IAP fit in with LEED-H?

## Indoor Environmental Quality (EQ)

### Optional Pathways through the EQ Category: **LEED EQ Credit 1 = IAP**

Important Note: A minimum of 6 points must be achieved in

Requirement	Points	Notes
EQ CREDIT 1 ENERGY STAR w/ IAP	13	Required for this pathway
EQ CREDIT 2 Combustion Venting	2	Prerequisite: EQ 2.1
EQ CREDIT 3 Moisture Control	1	
EQ CREDIT 4 Outdoor Air Ventilation	3	Prerequisite: EQ 4.1
EQ CREDIT 5 Local Exhaust	2	Prerequisite: EQ 5.1
EQ CREDIT 6 Distribution Systems	3	Prerequisite: EQ 6.1
EQ CREDIT 7 Air Filtering	2	Prerequisite: EQ 7.1
EQ CREDIT 8 Contaminant Control	4	
EQ CREDIT 9 Radon Protection	1	
EQ CREDIT 10 Vehicle Emissions Protection	3	Prerequisite: EQ 10.1
EA CREDIT 8.2 Indoor Contaminant Control	2	



LEED for Homes Rating System

**IAP is  
automatic  
13 Points!**



# Meeting IAP may qualify for up to 17 Total Points within **LEED-H**

**Table 28:** Applicability of ENERGY STAR Indoor Air Package Measures to LEED for Homes

LEED for Homes prerequisites / credits	Relevant Indoor Air Package measures	Applicability
Innovation & Design Process 2.1, 2.2	Various	Meeting Indoor Air Package specifications will address many durability issues listed in durability inspection checklist template.
Sustainable Sites 5	3.1–3.4	Depending on project location, meeting Indoor Air Package specifications may earn up to 2 LEED points.
Energy & Atmosphere 6.1	4.1, 7.4	Meeting Indoor Air Package specifications achieves prerequisites EA 6.1(a) and 6.1(c).
Materials & Resources 2.2	6.3–6.9	Depending on project details, meeting Indoor Air Package specifications may earn up to 2 LEED points.

Source: USGBC LEED-H rating System, <http://www.usgbc.org/ShowFile.aspx?DocumentID=3638>

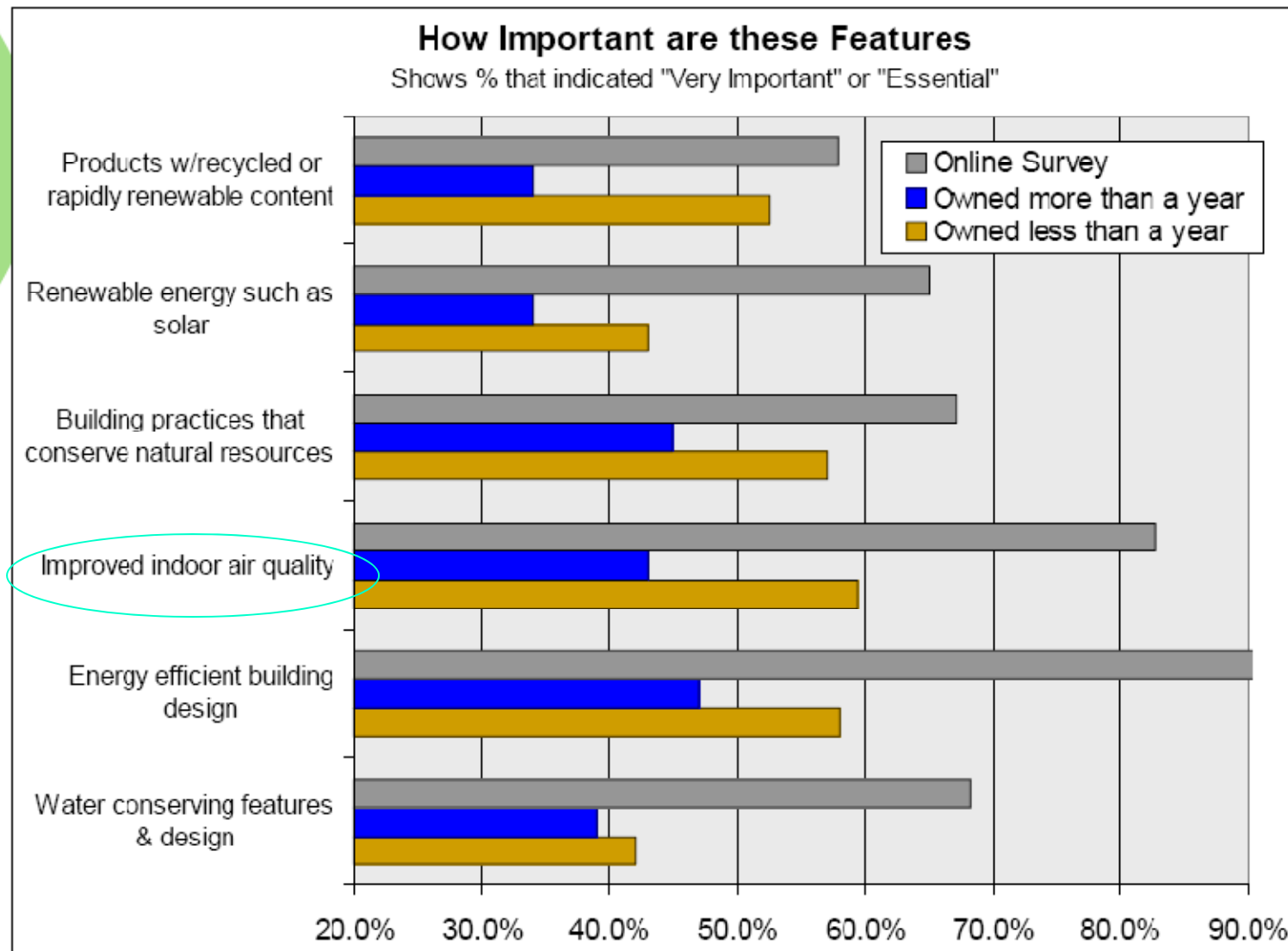
# What Homebuyers Value

<b>Built Green Idea Homes Visitor Survey – Seattle, 2004</b>	<b>Homebuyer Survey, Denver Parade of Homes Tour, 1999</b>
Controlled Ventilation for Clean Air	Energy Efficiency
Use of Renewable/Recycled materials	Indoor Air Quality
Clean Water and Water Conservation	Water Conservation
Low Emitting Materials	Materials Efficiency



# Green Building of Alameda Survey 2006

## Important Green Features

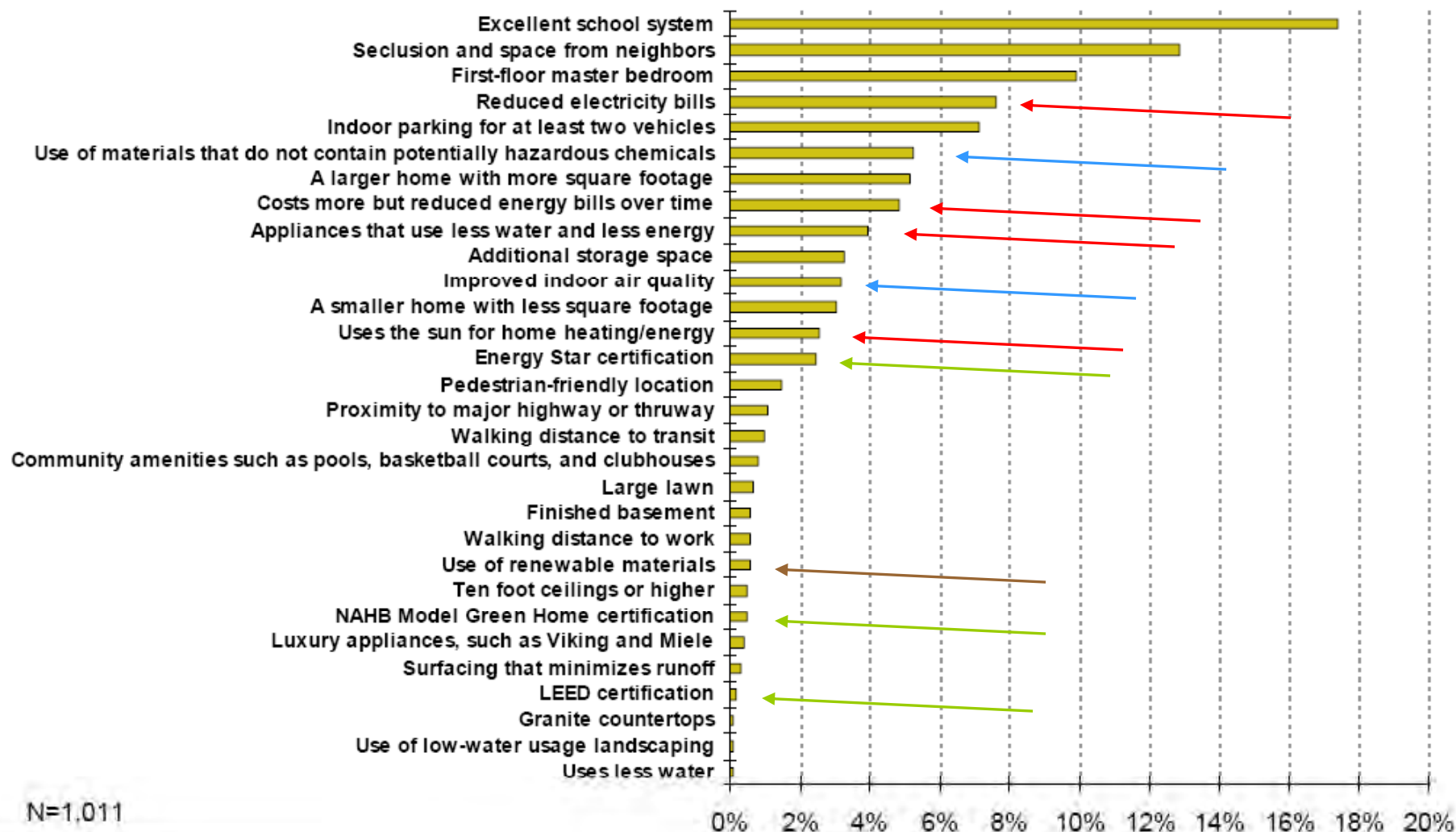


10-30% also answered "Somewhat Important" on this range of features.

# "GREEN" COMPETES WELL IN A CROWDED FIELD

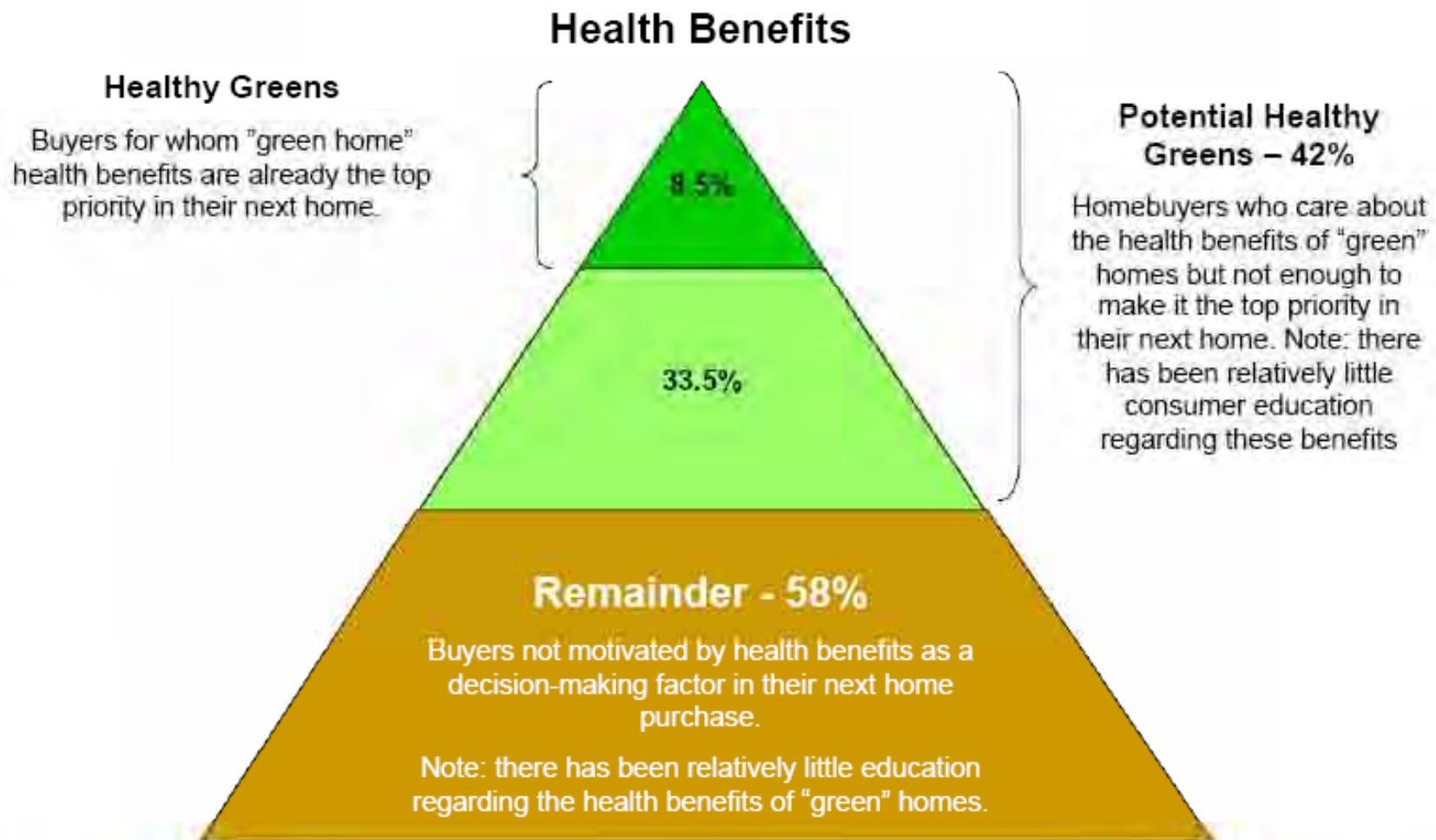
## SCHOOLS, SPACE, SIZE MORE IMPORTANT THAN GREEN BENEFITS

### Most Important Factors When Choosing a New Home



# HEALTHY GREENS

POTENTIAL POOL OF BUYERS NOT ALWAYS ASSOCIATED WITH "GREEN"



# *Costs and Differentiation*

Builders can Build to IAP  
if Builders can sell IAP

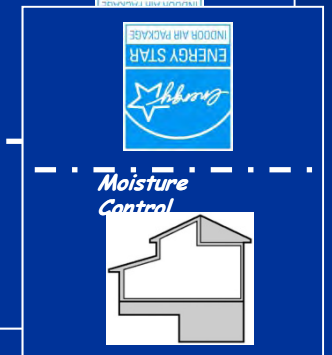


# IAP Marketing Tool Concepts

- IAP Label
- Sales Toolkit:
  - \*Checklists
  - \*IAQ House Map
  - \*Benefits Labels
  - \*Tag Line Labels
  - \*Brochures
  - \*Fact Sheets
  - \*Owner's Manual
- Internet:
  - \*EPA's Partner locator
  - IAQ info



Comparison Checklist		Us	A
Over 20 EPA recommended features to minimize Mold & water problems	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Less Carbon Monoxide risk	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Radon Resistant features (EPA approved)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Over 20 Advanced Heating & AC features to maximize comfort & minimize problems	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Whole-house Air Filtration for cleaner air	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Whole-house Fresh Air Ventilation system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Low-Formaldehyde building materials	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3rd Party Verification of Indoor Air Quality features	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>



# Making it Visible: GARAGE ISOLATION messaging

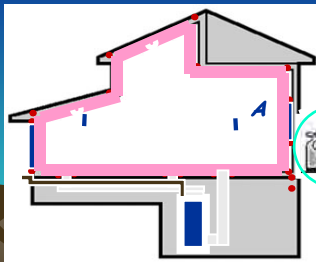


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## Garage Isolation

A. Air Sealing

B. Exhaust Fan



### Added Protection from Carbon Monoxide:

is responsible for hundreds of fatal poisonings each year, and at lower levels can cause respiratory, nervous system, and heart problems. Potential sources of CO in homes include: automobile exhaust, and improperly designed or vented heaters, stoves, and fireplaces. Your <Quality Builders> home includes EPA recommended combustion safety features and carbon monoxide alarms to guard against CO poisoning.

### And Other Chemicals:

Your <Quality Builders> home also protects you from toxic chemicals commonly found in the garage (VOC's, etc.). EPA recommended garage isolation features to keep these chemical out of your house.

### Involvement Questions:

• “Ever had garage smells in your house (car exhaust, paint, pesticides)?”

“That’s because toxic chemicals, including Carbon Monoxide from car exhaust, can leak into typical houses, because of ineffective air sealing.”

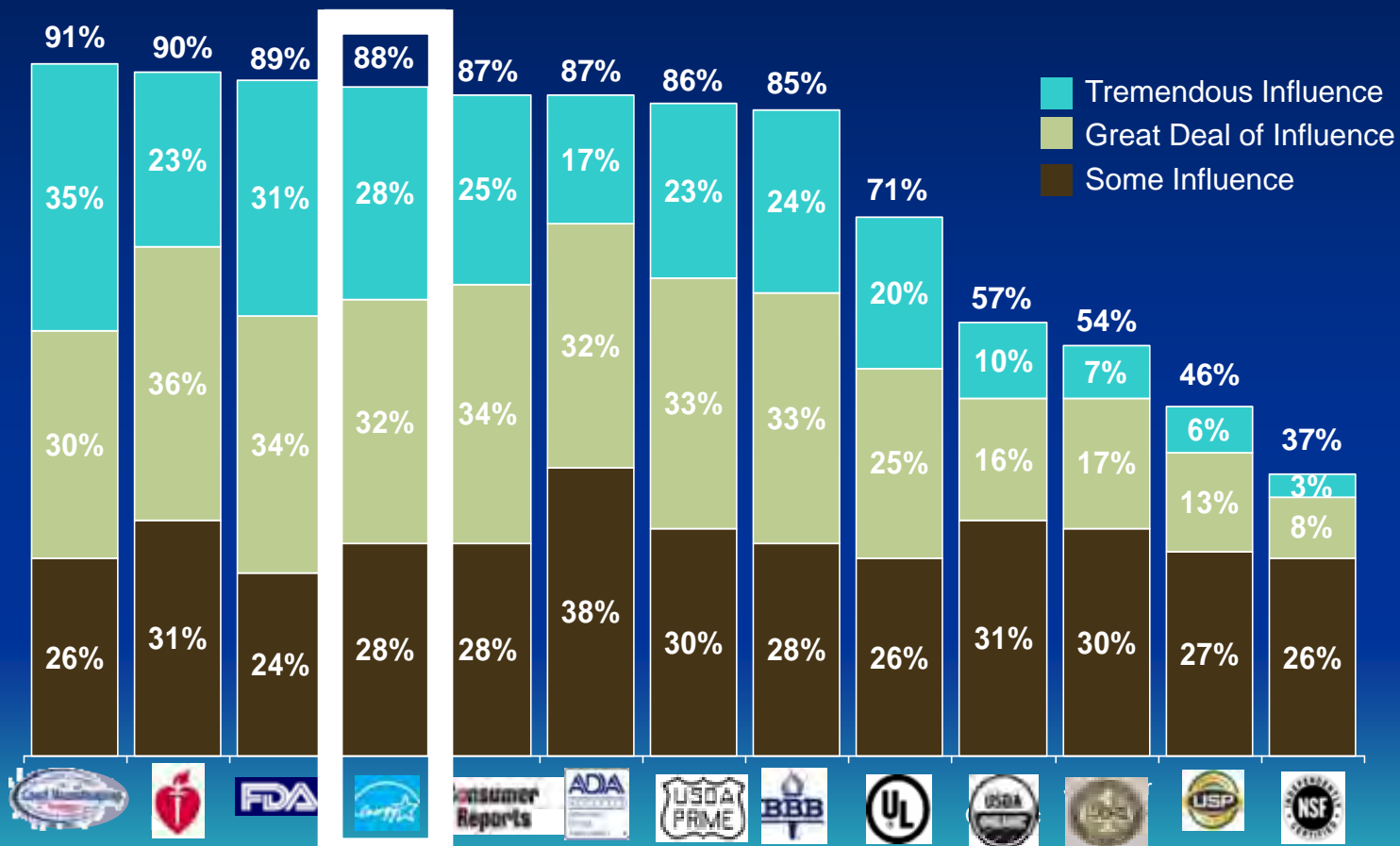
### How to Demonstrate Value:

“We take extra precautions to protect your family from garage pollutants, with air sealing and an EPA recommended exhaust fan.”

Leave a features comparison checklist.

Benefits label near garage.

# BRAND ADVANTAGE



Source: Fairfield Research, May 2003



# Be a Leader





# Why you should build to Meet EPA's ENERGY STAR Indoor Air Package

- The Health benefits are VERY significant
- IAP is worth significant points in LEED-H and Green Point Rated\*
- The IAP label confers substantial market differentiation

\* Comparison with DRAFT 2010 CALIFORNIA GREEN BUILDING STANDARDS CODE pending completion of code



*For More Information ...*

<http://epa.gov/indoorairplus/>

for

*Indoor Air Package*

*Or call:*

*Leif Magnuson*

[Magnuson.Leif@epa.gov](mailto:Magnuson.Leif@epa.gov)

*415-972-3286*

*Or*

*Sue Higgins, ICF*

[SHiggins@icfi.com](mailto:SHiggins@icfi.com)

*818-325-3151*

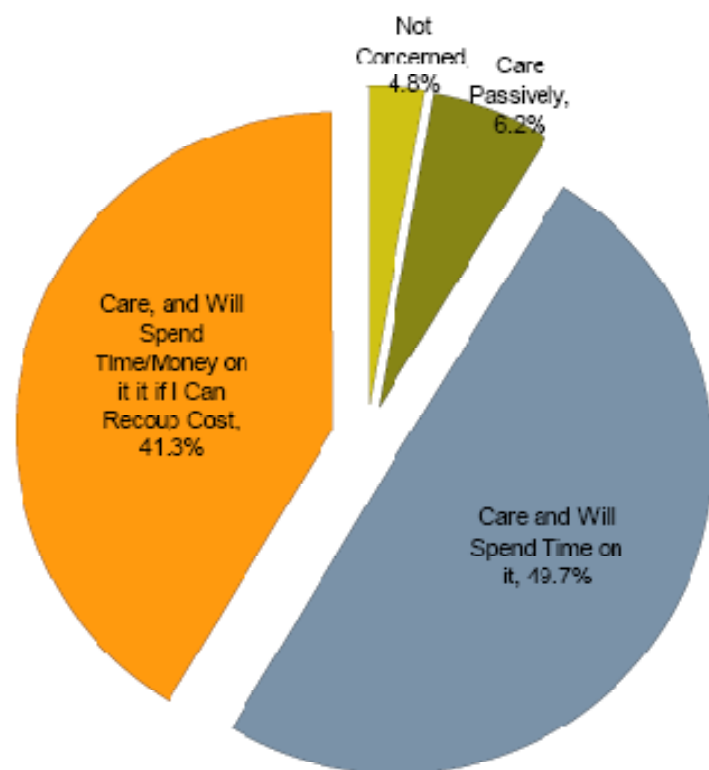
# Costs

Water managed roofs, walls and foundations	medium-large
Radon resistant construction	medium
Whole house ventilation	large
Direct or power vented furnace/water heater	medium-large
Air seal garage and add 70 CFM fan	small-medium
Sealed and tested ducts	medium
Transfer grills/jump ducts	medium
Low VOC carpet, paint, comp wood	small-medium
CO alarm	v. small

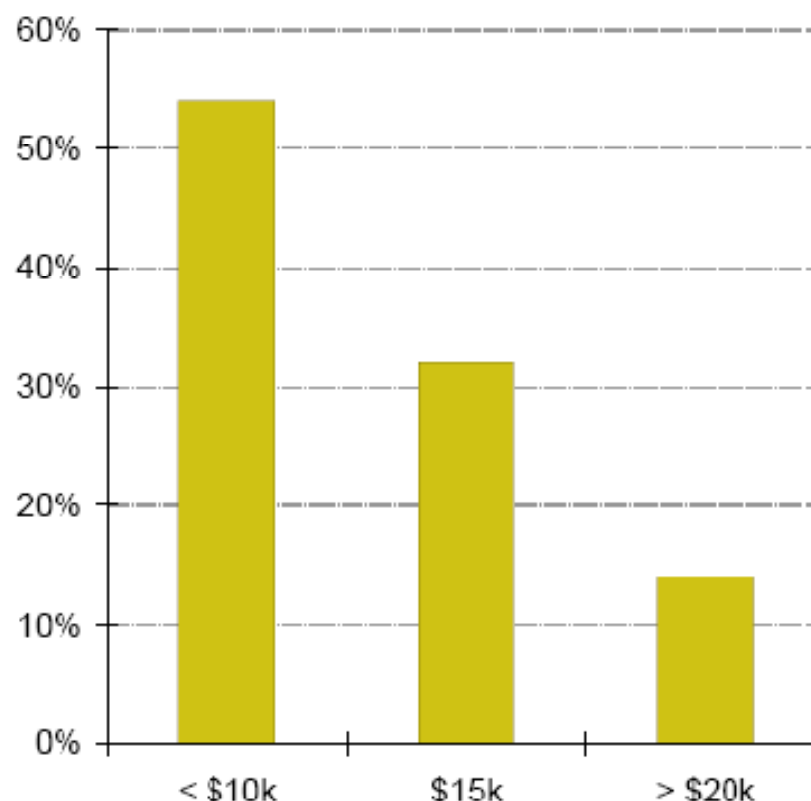


# HOMEBUYER ATTITUDES TOWARDS THE HEALTH BENEFITS OF GREEN BUILDING

How do you feel about spending money on a "healthy home"?



How much more would you be willing to pay for a healthy home?



# *Builder Benefits*

## Reduce Costs

- Fewer call backs
- Increased customer satisfaction
- Increased referral rate

## Increased Revenue

- Higher close rate
- More sales

## Higher Profits



Apted from USGBC