

DOE Zero Energy Ready Home

Tech Training Webinar Series

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



High-Performance Home Sales
Training Part I



The Home of the Future....Today

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



- Context
- Concepts
- Skills
- Tools
- Practice

Level 1: Unconsciously Incompetent

Level 2: Consciously Incompetent

Level 3: Consciously Competent

Level 4: Unconsciously Competent

Context: Hard Trends Pointing to Zero

Part I

Context: Hard Trends Pointing to Zero

Concepts

Skills

Tools

Practice

Knowledge Matters

Product Expertise

Building America Solution Center

Customized Field Kits for Your Home/Models

Part I

Context: Hard Trends Pointing to Zero

Concepts

Skills

Tools

Practice

Knowledge Matters

Product Expertise

Building America Solution Center

Customized Field Kits for Your Home/Models

Words Matter

Translate Jargon into Value

Building Science Translator

Power Word Fact Sheets for Your Home/ Models

Part II

Context: Hard Trends Pointing to Zero					
Part I	Concepts	Skills	Tools	Practice	
		Knowledge Matters	Product Expertise	Building America Solution Center	Customized Field Kits for Your Home/Models
Part II		Words Matter	Translate Jargon into Value	Building Science Translator	Power Word Fact Sheets for Your Home/ Models
		Questions Matter	Uncover Needs	Value Questions	Role Play with Colleagues

Context: Hard Trends Pointing to Zero				
Part I	Concepts	Skills	Tools	Practice
		Knowledge Matters	Product Expertise	Building America Solution Center
Part II	Words Matter	Translate Jargon into Value	Building Science Translator	Power Word Fact Sheets for Your Home/ Models
	Questions Matter	Uncover Needs	Value Questions	Role Play with Colleagues
	Clarity Matters	Create Contrast	Comparison Bars/ Experiences	Point-of-Sale Comparison Bars, Experiences

Context: Hard Trends Pointing to Zero				
Part I	Concepts	Skills	Tools	Practice
		Knowledge Matters	Product Expertise	Building America Solution Center
Part II	Words Matter	Translate Jargon into Value	Building Science Translator	Power Word Fact Sheets for Your Home/ Models
	Questions Matter	Uncover Needs	Value Questions	Role Play with Colleagues
	Clarity Matters	Create Contrast	Comparison Bars/ Experiences	Point-of-Sale Comparison Bars, Experiences
	Process Matters	Translate Relevant Value in ≤ 45 Seconds	5-Step Process	Role-Play with Colleagues



Context:

Hard Trends Pointing to Zero

“You can predict the future accurately.

*All you have to do is leave out the parts
you could be wrong about.”*

*“The key... is knowing how to distinguish a
soft trend from a **hard trend**...*

It’s knowing how to recognize certainty.”

Daniel Burrus, *“Flash Foresight”*

Performance
Risk

Differentiation
Opportunity

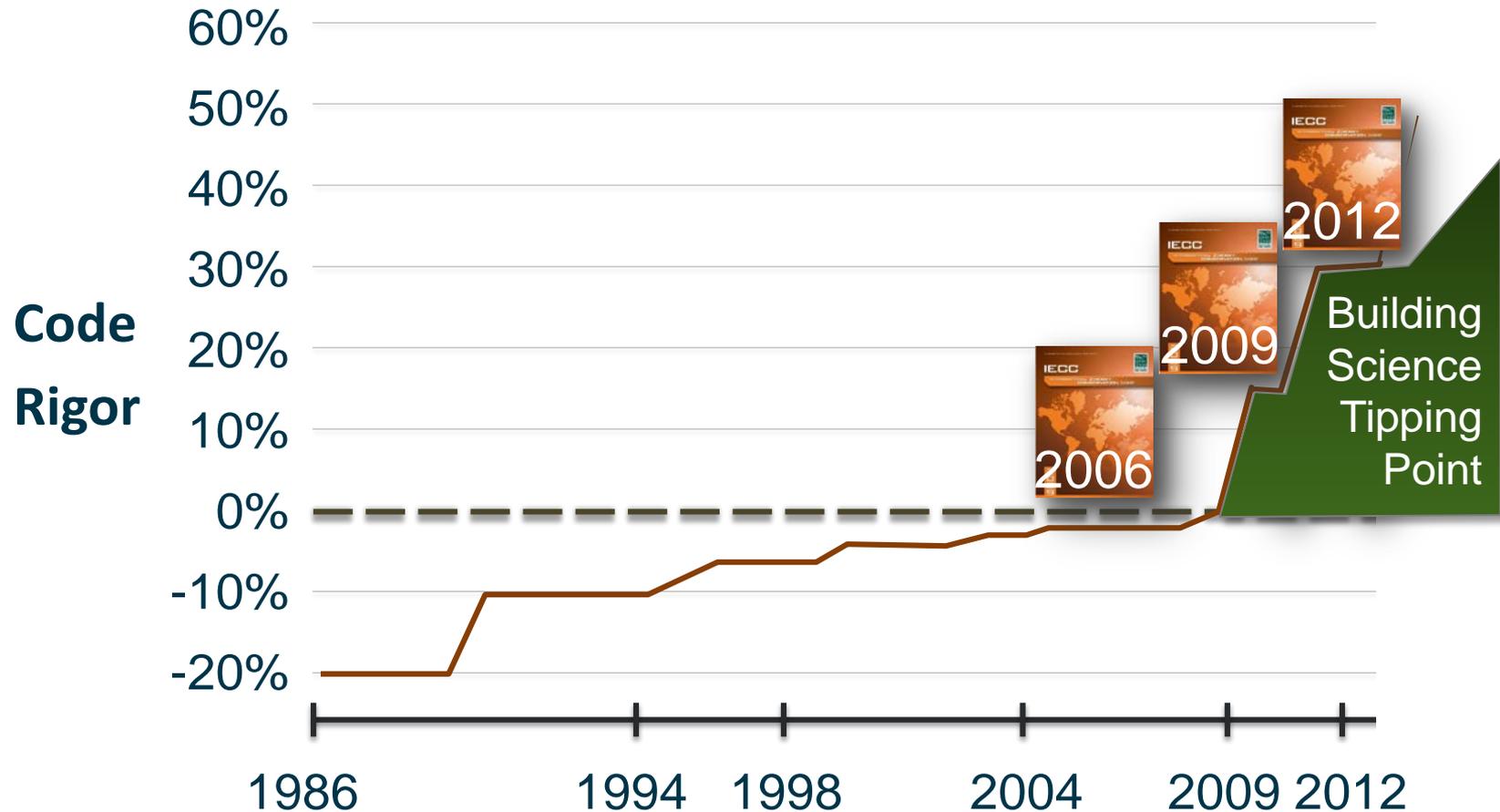
Innovation
Imperative

Performance Risk Driver

Performance

Differentiation

Innovation



Performance

Differentiation

Innovation



More Rigorous Specs:

- Latest Energy Codes
- Low HERS Scores



Adv. Thermal Enclosure:

- Adv. Insulation System
 - More Insulation
 - Quality Installation
 - Complete System
- Advanced Windows
- More Air Tightness

Performance

Differentiation

Innovation



Ultra Low HVAC Loads:

- Lower Air Flow/Mixing
- Longer Swing Seasons
- Less Humidity Control

Advanced Enclosure:

- Adv. Insulation System
 - More Insulation
 - Quality Installation
 - Complete System
- Advanced Windows
- More Air Tightness

Performance Risk 1: Ensured Comfort Strategy

Performance

Differentiation

Innovation



Ultra Low HVAC Loads:

- Lower Air Flow/Mixing
- Longer Swing Seasons
- Less Humidity Control



Optimized Low-Load Comfort System

- Right-Sized
- Properly Installed
- Complete (Htg., Clg. + RH)
- Tested

Performance

Differentiation

Innovation



More Wetting Risk

- Colder Surfaces
- Less Drying Potential



Advanced Enclosure:

- Adv. Insulation System
 - More Insulation
 - Quality Installation
 - Complete System
- Advanced Windows
- More Air Tightness

Performance Risk 2: Moisture Management Strategy

Performance

Differentiation

Innovation



More Wetting Risk

- Colder Surfaces
- Less Drying Potential



Comprehensive Water Protection

- Roofs
- Walls/Opening
- Site/Foundation
- Materials

Performance

Differentiation

Innovation



IAQ Risk:

- Less Dilution
- Less Filtration



Advanced Enclosure:

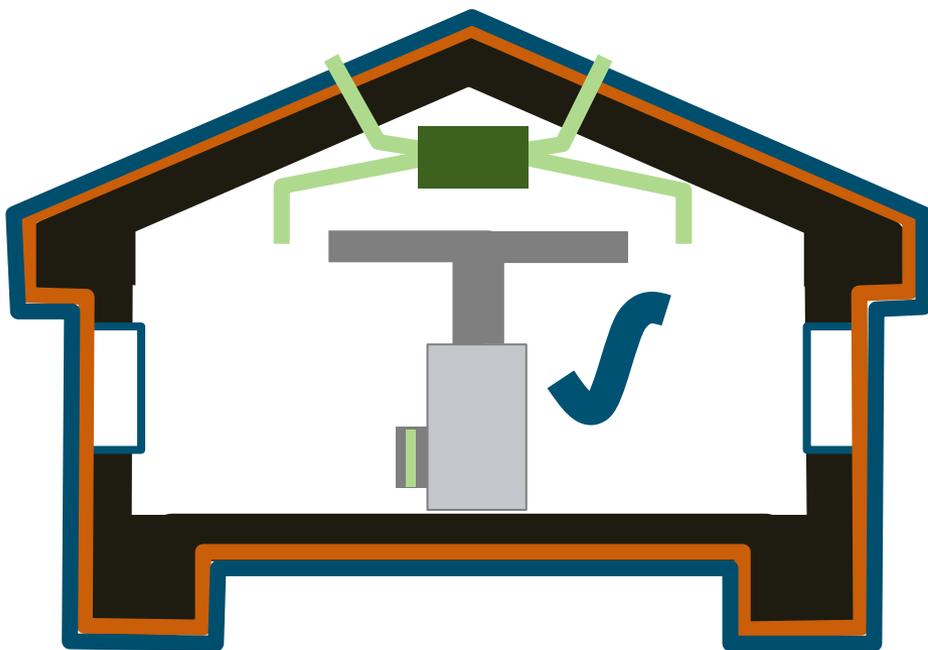
- Adv. Insulation System
 - More Insulation
 - Quality Installation
 - Complete System
- Advanced Windows
- More Air Tightness

Risk 3: Ensured IAQ Strategy

Performance

Differentiation

Innovation



IAQ Risk:

- Less Dilution
- Less Filtration



Comprehensive IAQ System:

- Contaminant Control
- Fresh Air System
- High-Capture Filtration

Performance

Differentiation

Innovation

- Next Generation of Buyers
- The Competition

Next Generation Homebuyers

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

Performance

Differentiation

Innovation



78 Million Gen-Y'ers

Performance

Differentiation

Innovation

- Debt
- Sharing Economy
- Delayed Commitment
- Crash Experience
- Innovation Junkies
(Willing to Pay More for a Better Experience)



Change

Information

Innovation



Increasing Health Concerns

Performance

Differentiation

Infrastructure



\$40 Billion



\$20 Billion

Performance

Differentiation

Infrastructure

Indoor vs. Outdoor Air Pollutants:

On average **2-5 times greater**

Up to **100 times greater**

While Americans Spend

90% of time indoors

Source: EPA

Performance

Differentiation

Infrastructure

“If your child doesn’t use an inhaler,
consider yourself a lucky parent because,

**1 in 10 children in the U.S.
suffers from asthma.”**

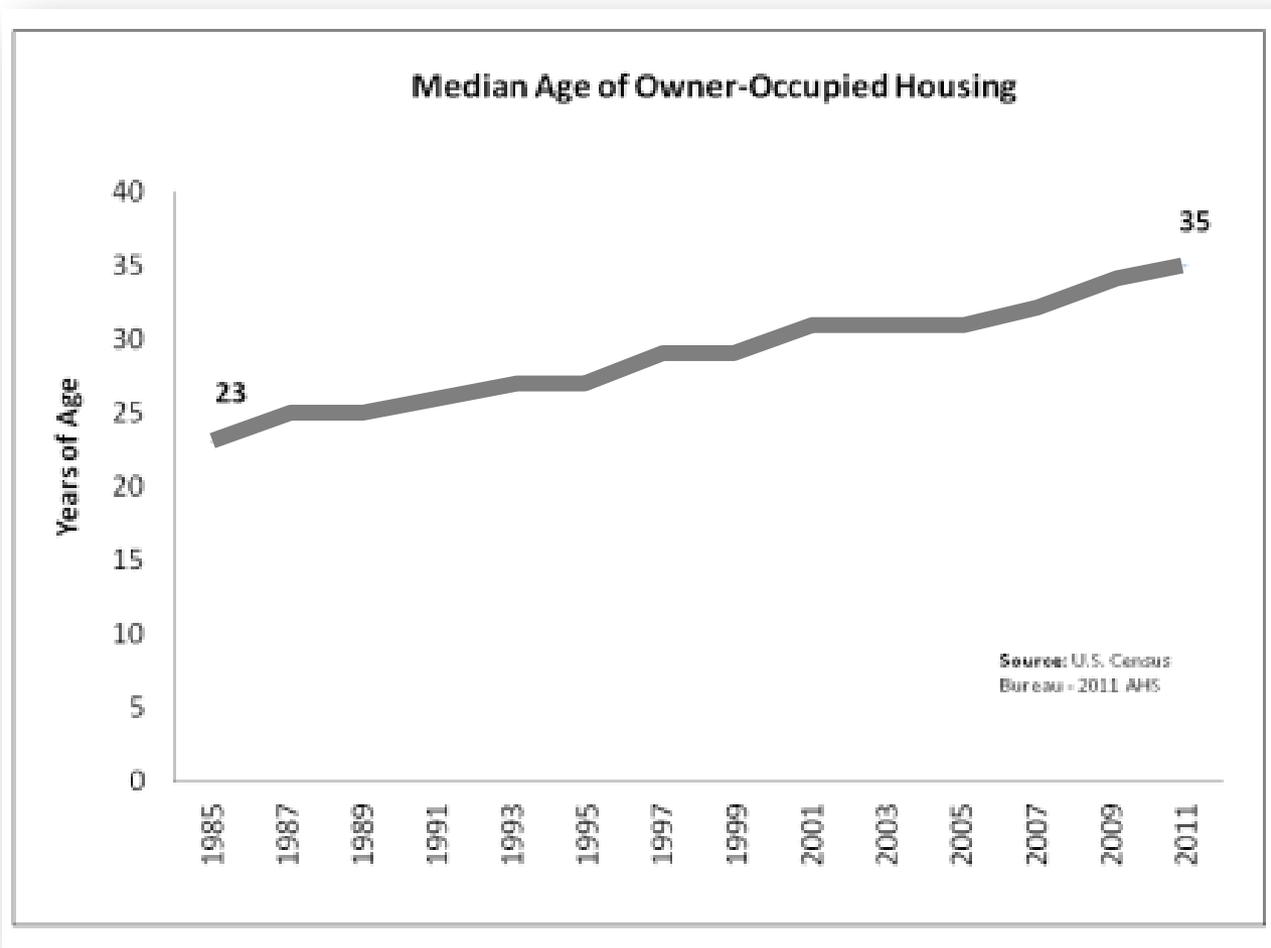
Source: Remarks for Administrator McCarthy, Announcement of Clean Power Plan,
Washington, DC, June 2, 2014

The Competition

Performance

Differentiation

Innovation



Performance

Differentiation

Innovation

Aging Housing Stock with:

- High Utility Bills
- Poor Comfort
- Health Risks
- Moisture Problem Risks
- Excessive Bugs/Pests
- Durability Issues
- Obsolete Technology

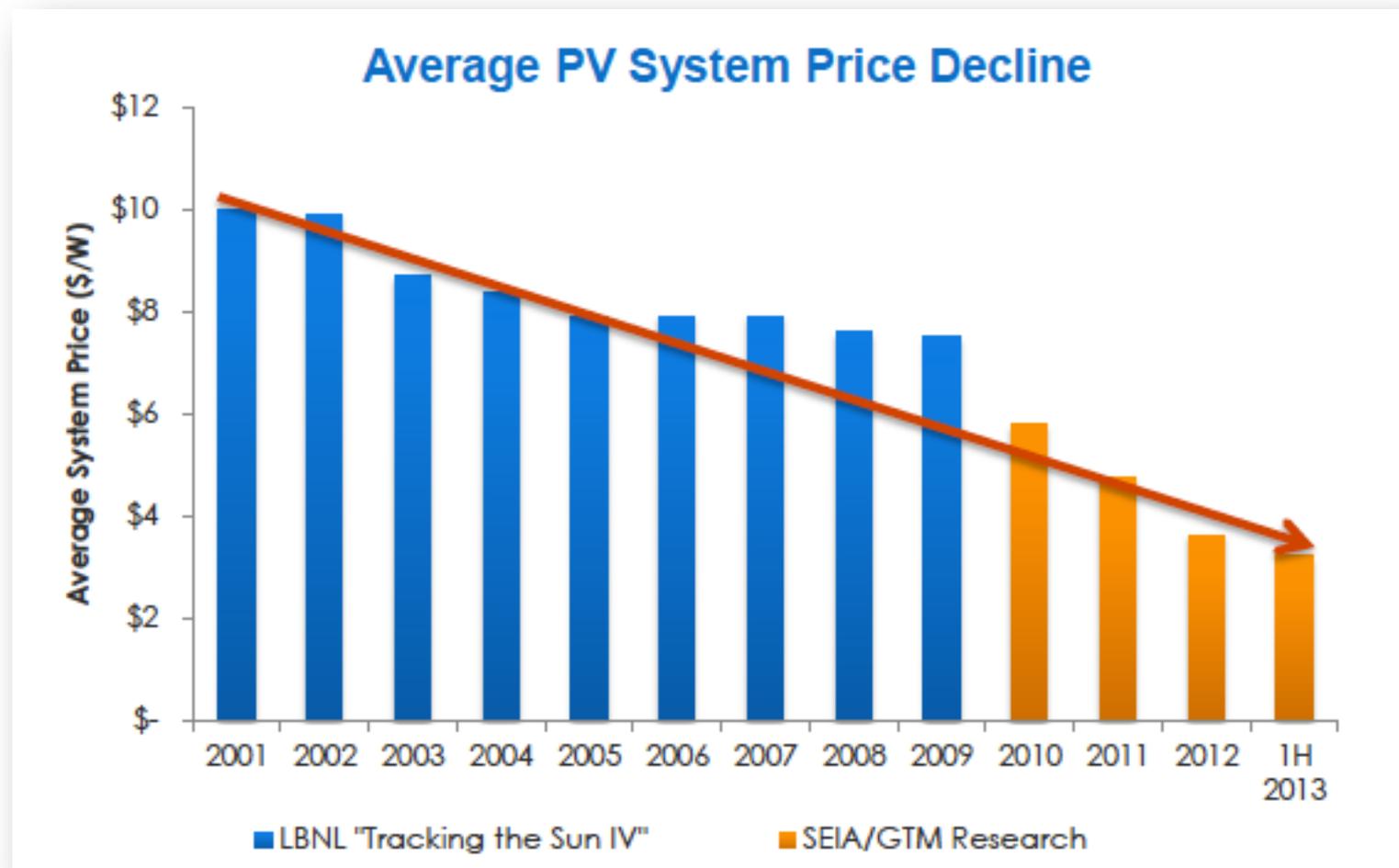
**Meet
85%
of Your
Competition**

Differentiation Opportunity

Performance

Differentiation

Innovation



Performance

Differentiation

Innovation



House of the Future:

- Meets or Exceeds Future Code/Expectations



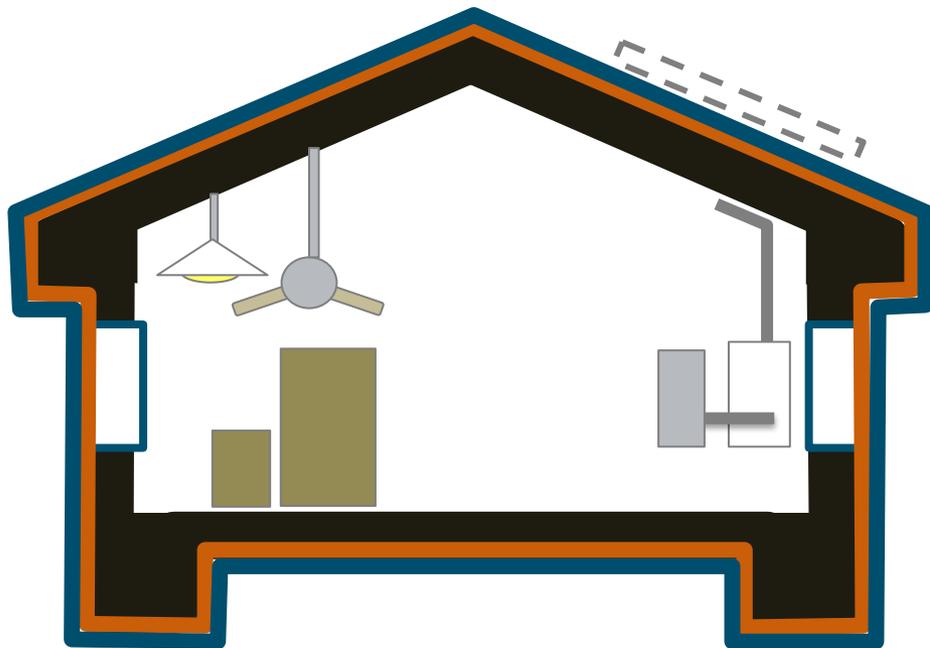
Optimized Enclosure:

- Opt. Insulation System
 - More Insulation
 - Quality Installation
 - Complete System
- Optimized Windows
- Optimized Air Tightness

Performance

Differentiation

Innovation



Solar Ready Home

Efficient Components:

Ultra Low HVAC Loads

Optimized Enclosure:

- Opt. Insulation System
 - More Insulation
 - Quality Installation
 - Complete System
- Optimized Windows
- Optimized Air Tightness

Zero Energy Ready Home Spec

Performance

Differentiation

Innovation



Advanced Enclosure



Risk Management:

Optimized Comfort System

Complete Water Protection

Comprehensive IAQ System



Differentiation:

Optimized Enclosure

Solar Ready Construction

Zero Energy Ready Home Value

Performance

Differentiation

Innovation

Lives Better

Engineered Comfort

Healthier Living

Exclusivity

Works Better

Ultra-Low Utility Bills

Advanced Technology

Visionary

Lasts Better

Quality Construction

More Durability

Smart

Performance

Differentiation

Innovation

BY JANN SWANSON

Real Estate Web Searches Climb 253% in Four Years as 90% of Homebuyers Use Internet as Primary Research

Jan 7 2013, 3:50PM

Text 

Home-shopping consumers are not only exponentially increasing their **reliance on the Internet** but are also developing distinct patterns for using it in their housing searches. **Google** and the **National Association of**

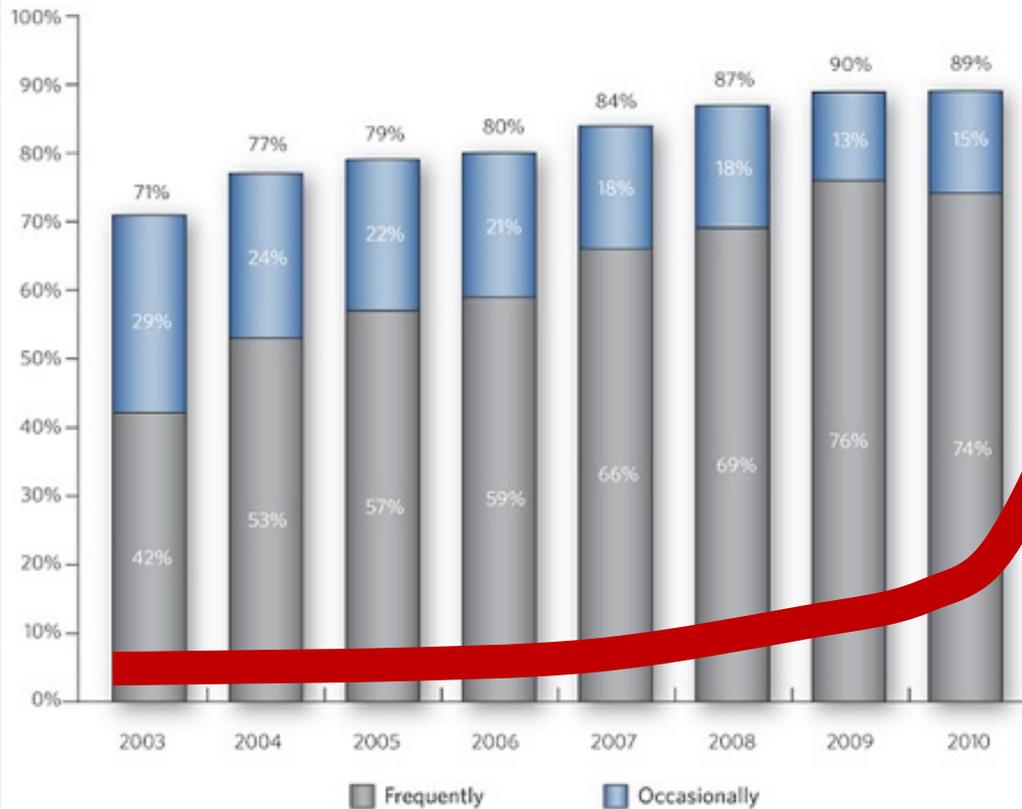
More Informed Consumers

Performance

Differentiation

Innovation

Exhibit 3-13 USE OF INTERNET TO SEARCH FOR HOMES, 2003-2010



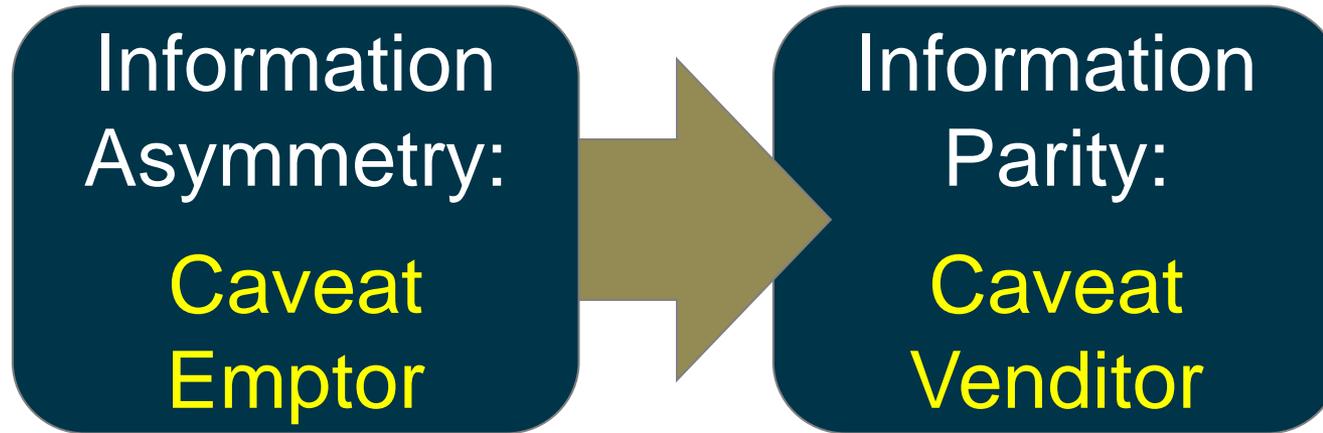
Internet Content Available

SOURCE: National Association of Realtors® - Profile of Home Buyers and sellers 2010

Performance

Differentiation

Innovation



> Energy Eff.

An air conditioner that anticipates your needs

PAGE 59

Solar panels that eliminate your energy bills

PAGE 76

A door that can sense your approach

PAGE 59

A sprinkler that tracks the weather

PAGE 80

> Performance



> Innovation

Walls that can weather a hurricane

PAGE 66

A car that can power your house

PAGE 79

A garden that filters your air

PAGE 87

> Energy Eff.

> Performance

> Innovation

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Home » Power of Zero Home Tour

POWER OF ZERO HOME TOUR

New Town Builders
The ArtZEN Plan
Denver, CO
303-707-4400
Newtownbuilders.com

ZERO ENERGY READY HOME
U.S. DEPARTMENT OF ENERGY
KEY FEATURES

- High-performance insulation system for enhanced quiet and comfort
- Comprehensive draft protection
- Fresh air system for cleaner, healthier indoor air
- High-efficiency HVAC, appliances, and lighting to save energy and water

Read more

HERS -3
This home's score (100 = typical new code home, 130 = average existing home)

2,115ft²
3 bedrooms, 2 baths, 2 stories, vinyl stairs

-\$0 avg. monthly energy bill
\$1,902 saved per year
\$58,772 saved over 30-yr mortgage

I want one!

U.S. DEPARTMENT OF **ENERGY** | Careers & Internships | EERE Home | Cooled EERE

Power of Zero Home Tour

> Energy Eff.

> Performance

> Innovation

POWER OF ZERO HOME TOUR



Power of Zero Home Tour

> Energy Eff.

> Performance

> Innovation

New Town Builders

The ArtiZEN Plan
Denver, CO
303-707-4400
Newtownbuilders.com



KEY FEATURES

- High-performance insulation system for enhanced quiet and comfort
- Comprehensive draft protection
- Fresh air system for cleaner, healthier indoor air
- High-efficiency HVAC, appliances, and lighting to save energy and water

[Read more.](#)



U.S. DEPARTMENT OF **ENERGY** | Energy Efficiency & Renewable Energy

New Town Builders

The ArtiZEN Plan
Denver, CO

DOE ZERO ENERGY READY HOME™



BUILDER PROFILE

New Town Builders, Denver, CO
Bill Rectanus
brectanus@newtownbuilders.com
303-707-4400
Newtownbuilders.com
Rater: EnergyLogic, Inc., Peter Oberhammer, www.ejlogic.com

FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: The ArtiZEN Plan
- Location: Denver, CO
- Layout: 3 bedrooms, 2.5 baths, 2 floors
- Conditioned Space: 2,85 ft²
- Climate Zone: IECC SB, cold
- Completion: September 2013
- Category: Production

Modeled Performance Data:

- HERS Index: without PV 38, with PV -3
- Projected Annual Utility Costs: without PV \$1,414, with PV \$5
- Projected Annual Energy Cost Savings (compared to a home built to the 2009 IECC): without PV \$493, with PV \$1,902
- Builder's Added Cost Over 2009 IECC: without PV \$22,000, with PV \$5,000
- Annual Energy Savings: without PV 48.5 MMBtu/yr, 2,588 kWh, 203 therms; with PV 8 MMBtu/yr, 14,476 kWh, 203 therms



New Town Builders has committed to a new way of building. The Denver area production builder hopes to convert all of its product lines to zero energy-ready construction by the end of next year.

"Our goal is to be 100% U.S. Department of Energy (DOE) Zero Energy Ready certified on all of our single-family homes," said Bill Rectanus, vice president of New Town Builders, which plans to build 150 single-family homes in the Denver metro area next year.

The builder constructed its first home to DOE's Zero Energy Ready Home program criteria in 2013 and has been gradually moving toward certification across the board since then. New Town was in the process of building 29 homes in its Solaris community when it learned about the DOE program. Most of the 29 homes in the first phase of Solaris are certified and all 34 homes in the next phase of Solaris will be certified. All of the homes come with at least a 2.75-kW photovoltaic system on the roof. In phase 2 the goal is to install 5-kW systems and homebuyers will have the option to add more PV to achieve a true net zero energy home, a home that produces as much power as it uses in a year.

In New Town's Z.E.N. (Zero Energy Now) community, which has 30 homes at or near completion and 33 more homes scheduled for a second phase, all of the homes are true zero energy. New Town is in the planning stages on two additional projects—Hyland Village, a development of 75 single-family detached homes, and Perrin's Row, a development of 26 attached homes. Both communities will be 100% DOE Zero Energy Ready.



The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built on a solid foundation of building science research. Advanced technologies are designed in to give you superior construction, durability, and comfort; healthy indoor air; high-performance HVAC, lighting, and appliances; and solar-ready components for low or no utility bills in a quality home that will last for generations to come.

Power of Zero Home Tour

> Energy Eff.

> Performance

> Innovation

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SERVICES EFFICIENCY RENEWABLES TRANSPORTATION ABOUT US OFFICES

POWER OF ZERO HOME TOUR -- NEW TOWN BUILDERS FLOORPLANS

Upper Level

Optional Bedroom 4 in lieu of Loft

Living Level

Optional Finished Basement

U.S. DEPARTMENT OF **ENERGY**

Office of Energy Efficiency & Renewable Energy
1000 Independence Avenue, SW
Washington, DC 20585

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ENERGY DEPARTMENT: Budget & Performance, Directions, Delegations & Requirements, FOIA, Inspector General, Privacy Program, Small Business

FEDERAL GOVERNMENT: The White House, USA.gov



More ...



2,115 ft²
3 bedroom, 2 bath
2 floors
cold climate

HERS -3 This home's score
(100 = typical new code home
130 = average existing home)

~\$0 avg. monthly energy bill
\$1,902 saved per year
\$58,772 saved over 30-yr mortgage

Power of Zero Home Tour

> Energy Eff.

> Performance

> Innovation

Building Technologies Office

Home > Residential Buildings > DOE Zero Energy Ready Home

DOE Zero Energy Ready Home: Partner Profile
New Town Builders

Partner ID: 619
Organization Type: Builder
Main Contact: Bill Rectanus
Address: 1553 PLATTE STREET DENVER, CO 80202
Primary Phone Number: (303) 707-4400
Certified DOE Zero Energy Ready Homes (2012 - Present): 41
Certified Builders Challenge Homes (2008 - 2012): 0
Website: www.newtownbuilders.com

NEW TOWN BUILDERS

All Places of Business

DOE Zero Energy Ready Home Version 4.5.1
Contact Us | Web Site Policies | U.S. Department of Energy | USA.gov
Content Last Updated: 1-07-2014



More ...

I want one!



2,115 ft²
3 bedroom, 2 bath
2 floors
cold climate

HERS -3 This home's score
(100 = typical new code home
130 = average existing home)

~\$0 avg. monthly energy bill
\$1,902 saved per year
\$58,772 saved over 30-yr mortgage



Knowledge Matters

World-Class Expert Guidance...

Building America Solution Center
BASC.energy.gov



...At Your
Fingertips

- Online/Mobile App Tool
- Fast, Free and Reliable Knowledge.
- Quick Access to Content:
 - Zero Energy Ready Home
 - ENERGY STAR Certified Homes
 - Indoor AirPLUS
 - Water Sense programs
- Guidance:
 - Specify
 - Install
 - Precedence

BASC Program Support



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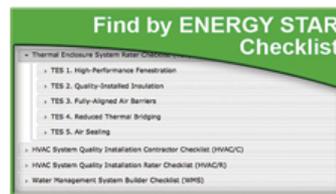
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[Optimized Climate Solutions](#)

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The Building America Solution Center provides access to expert information on hundreds of high-performance construction topics, including air sealing and insulation, HVAC components, windows, indoor air quality, and much more. Click on the links below to explore the Solution Center.



As a community driven tool, we welcome your [comments](#) on how to continuously improve the Solution Center. If you are interested in submitting content, please become a [registered user](#) and see the [criteria for submissions](#).

THANK YOU! Li Ling Young for providing substantive comments on window flashing leading to improvements to Solution Center content.

RECENTLY ADDED/UPDATED GUIDES

[Ventilation Air Inlet Locations](#)

Last Updated: January 6, 2015

[Reduce Pest Intrusion](#)

Last Updated: January 5, 2015

[Air Sealing Attached Garage](#)

Last Updated: December 29, 2014

[More Guides](#) ▶

RECENTLY ADDED CONTENT

[Right – Apply sealant around penetrations through foundation walls and along foundation wall seams](#)
Image Posted: January, 2015

[Evaluation of Ventilation Strategies in New Construction Multifamily Buildings](#)

Reference Posted: January, 2015

[Code Notes: Whole-House Mechanical Ventilation](#)
Reference Posted: January, 2015



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DOE Zero Energy Ready Home



The U.S. Department of Energy (DOE) Zero Energy Ready Home checklists provide links to technical guides for each measure included in the checklists for DOE's [Zero Energy Ready Home National Program Requirements](#). The numbers and titles included in the checklists follow the same order and have the same names as those in the DOE Zero Energy Ready National Program Requirements. To view programmatic footnotes, see the current program requirements. The DOE Zero Energy Ready Home [program webs](#) The Building America Solution Center is an ever e: be populated at this time. Checklist measures wi latest guides, resources, and additional content.

▶ Exhibit 1: Mandatory Requirements for All Labeled Homes

▶ Exhibit 2: Target Home

▶ Exhibit 3: Benchmark Home Size

▼ Exhibit 1: Mandatory Requirements for All Labeled Homes

▶ 1.0 ENERGY STAR for Homes Baseline

▶ 2.0 Envelope

▼ 3.0 Duct System

[Ducts located within the home's thermal and air barrier boundary](#)

▶ 4.0 Water Efficiency

▶ 5.0 Lighting & Appliances

▶ 6.0 Indoor Air Quality

▶ 7.0 Renewable Ready

▶ Exhibit 2: Target Home

▶ Exhibit 3: Benchmark Home Size

Access full DOE Zero Energy Ready Home specifications

Building America Solution Center

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Ducts located within the home's thermal and air barrier boundary

There are several possible methods for locating the home's HVAC system within the home's thermal air barrier boundary. See the [DOE Zero Energy Ready Home National Program Requirements](#) for exceptions and alternative compliance paths.

The following Solution Center guides provide more information about these measures:

[Ducts Buried in Attic Insulation and Encapsulated](#)

This guide describes approaches to burying and encapsulating ducts in unconditioned attics to increase the overall R-value of duct insulation.

[Encapsulated Ducts](#)

Guide that illustrates how and when to encapsulate ductwork in unconditioned attics, increases the R-value of duct insulation, mitigating condensation issues and reducing air leakage.

[Ducts Buried in Attic Insulation](#)

This guide describes buried ducts in loose-fill attic insulation, a method that can only be used in dry climates.

[Unvented Attic Insulation](#)

Guide describing methods for insulating an unvented attic along the roof line.

[Unvented Crawlspace and Conditioned Basements](#)

Guide describing methods for insulating an unvented crawlspace or conditioned basement with rigid foam on the interior side of the walls to provide an insulated space for HVAC equipment.

[Application of Spray Foam Insulation Under Plywood and OSB Roof Sheathing](#)

Guide describing a method for insulating an unvented attic by spraying foam insulation along the underside of the roof deck.

Each checklist item will provide program information and direct access to guides containing specific technical information

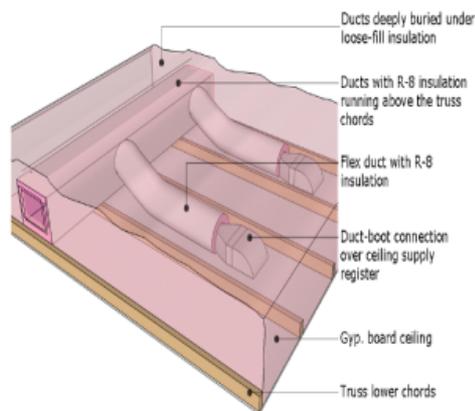
Ducts Buried in Attic Insulation

Please [Register](#) or [Login](#) to Provide Feedback.

 [Print this page](#)  [PDF version](#)

Scope	Description	Ensuring Success	Climate	Training	CAD	Compliance	More Info.
<h3>Scope</h3> <p>Buried ducts are installed in unconditioned attics. Ducts are installed in contact with the ceiling and/or truss lower chords. Loose-fill insulation is installed at the ceiling plane, covering the ductwork. This insulation serves as ceiling insulation and additional insulation for ductwork. The figure to the right provides a diagram of a finished buried duct installation. Buried Ducts should <u>not</u> be installed in moist and marine climate zones.</p> <ol style="list-style-type: none">1. Install ductwork in direct contact with the ceiling and/or truss lower chords.2. Mastic-seal all duct connections.3. Test total duct leakage.4. Install loose-fill ceiling insulation. <p>See Encapsulated Ducts and Ducts Buried in Attic Insulation & Encapsulated for more information.</p>							

Scope of Work



Last Updated: 05/12/2014

Ducts Buried in Attic Insulation

Scope Description Ensuring Success Climate Training CAD Compliance More Info.

Description

Buried ducts reduce heat transfer between ducts and the unconditioned attic, which boosts the R-value of the duct insulation. Buried duct insulation levels are categorized by the depths of the loose-fill insulation, as measured by the distance from the top of the duct to the loose-fill insulation. Figure 1 shows the three categories of buried duct insulation: partially; fully; and deeply-buried.

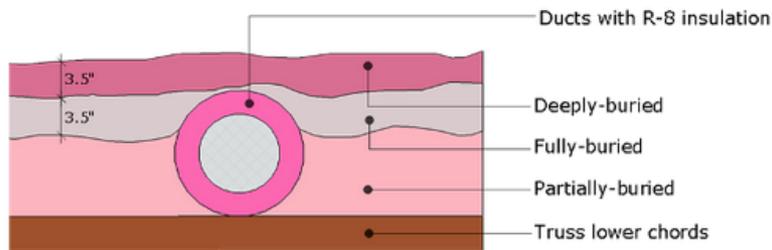


Figure 1. Categorization of buried duct insulation levels. [i](#) [r](#)

The effective R-value of a buried duct installation depends on the size of the ducts, the R-value of the duct insulation and the depth of the loose-fill insulation. For simplicity, the effective R-values of 8-in round ducts are shown for the three burial depths and three duct insulation levels (R-4.2, R-6, and R-8).

Table 1. Effective R-values of buried ducts by duct insulation and burial depth. [i](#) [r](#)

Duct configuration	R-4.2 ducts	R-6 ducts	R-8 ducts
Partially-buried beneath fiberglass	8.1	10.2	12.3
Fully-buried beneath fiberglass	12.0	14.1	16.2
Deeply-buried beneath fiberglass	20.7	22.1	23.5

Typically, the duct design will consist of one or more main supply trunk(s) and perpendicular duct branches serving each of the ceiling registers. If the trunk is perpendicular to the truss bottom chords, then the duct branches can be parallel and rest directly on ceiling. If the main trunk is placed parallel to the ceiling supports, then the branches will need to run perpendicular to and rest on top of the truss chords. Either configuration will work, giving the designer the flexibility to select whichever method works best for a particular circumstance. In every case, a compact, low-profile layout should be a primary goal.

Scope of Work

Description (how to install)

Ducts Buried in Attic Insulation

Scope	Description	Ensuring Success	Climate	Training	CAD	Compliance	More Info.
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Ensuring Success

Buried ducts in new construction have few impediments and are extremely flexible. As with all advanced systems, however, the key to optimal implementation lies with the initial planning. To accommodate a buried ducts strategy, the designer must also consider how best to incorporate a low-profile design, where the system layout is specifically designed to place ducts as low as practical and allow ductwork to hug the drywall ceiling where possible. Other best-practice measures, which assist in achieving the desired low-profile layout, should be incorporated into the building, including compact HVAC distribution and right-sized HVAC sizing. Specifically, smaller ducts (lower duct height) and inboard registers (shorter duct runs) mean that there is less ductwork to bury.

Return trunks and branches could be treated in the same manner; however, to keep the HVAC distribution system at a minimum, while simultaneously providing good comfort and proper airflow, the use of central returns is recommended. Return air paths from bedrooms and other spaces can be accommodated by low-profile jump ducts.

Last Updated: 05/12/2014

Scope of Work

Description (how to install)

**Ensuring Success
(safety, planning)**

Ducts Buried in Attic Insulation

Scope	Description	Ensuring Success	Climate	Training	CAD	Compliance	More Info.
<h3>Climate</h3> <p>Buried ducts should <i>not</i> be installed in moist (A) and marine (C) climate zones. In these climate zones there is a risk of condensation on the surface of the ductwork.</p> <p>All of Alaska is in Zone 7 except for the following boroughs in Zone 8: Bethel, Northwest Arctic, Dillingham, Southeast Fairbanks, Fairbanks N. Star, Wade Hampton, Nome, Yukon-Koyukuk, North Slope</p> <p>Zone 1 includes Hawaii, Guam, Puerto Rico, and the Virgin Islands</p> <p>Warm-Humid below white line</p>							

Last Updated: 05/12/2014

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Scope of Work

Description (how to install)

Ensuring Success (safety, planning)

Climate Specific Information

Ducts Buried in Attic Insulation

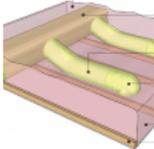
Scope | Description | Ensuring Success | Climate | **Training** | CAD | Compliance | More Info.

Training

Right and Wrong Images



Presentations



Presentation: [Design Options for Locating Ducts within Conditioned Space](#) (2 MB)
Author(s): Zoeller
Organization(s): Steven Winter Associates
Presentation with technical training covering several possible approaches to locating ducts within the home's air and thermal barriers, and then dig into design considerations and details for the spray foam encapsulation approach.

Videos
None Available

Last Updated: 05/12/2014

Scope of Work

Description (how to install)

Ensuring Success (safety, planning)

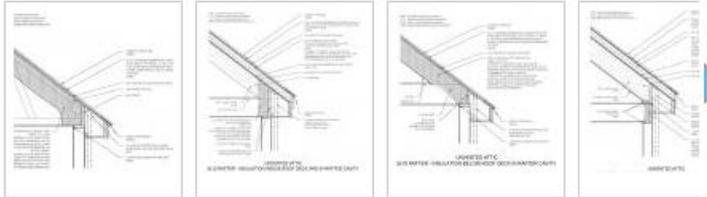
Climate Specific Information

Training (images, presentations, videos)

Ducts Buried in Attic Insulation

Scope Description Ensuring Success Climate Training CAD Compliance More Info.

CAD Images



The image displays four CAD drawings of ducts buried in attic insulation. Each drawing shows a cross-section of the duct and the surrounding insulation, with various components labeled. The drawings illustrate different installation scenarios and details, such as duct placement, insulation thickness, and air flow paths. The drawings are arranged in a row, with a blue arrow pointing to the right between the third and fourth drawings.

Scope of Work

Description (how to install)

Ensuring Success (safety, planning)

Climate Specific Information

Training (images, presentations, videos)

CAD Drawings

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Ducts Buried in Attic Insulation

Scope	Description	Ensuring Success	Climate	Training	CAD	Compliance	More Info.
						Compliance <p>ENERGY STAR Version 3 </p> <p>Buried ducts have the same requirements as all other ductwork installed in unconditioned attics. Supply ducts shall have insulation \geq R-8 and all other ducts shall have insulation \geq R-6. Total duct leakage shall be \leq 8 CFM25 per 100 sq. ft. of conditioned floor area and duct leakage to outdoors shall be \leq 4 CFM25 per 100 sq. ft. of conditioned floor area</p> <p>DOE Zero Energy Ready Home </p> <p>Buried ducts alone are not compliant with the DOE Zero Energy Ready Home. Buried & encapsulated ducts, however, may be compliant.</p> <p>2009 IECC</p> <p>Buried ducts have the same requirements as all other ductwork installed in unconditioned attics. Supply ducts shall have insulation \geq R-8 and all other ducts shall have insulation \geq R-6. Total duct leakage shall be \leq 12 CFM25 per 100 sq. ft. of conditioned floor area or duct leakage to outdoors shall be \leq 8 CFM25 per 100 sq. ft. of conditioned floor area.</p> <p>2012 IECC</p> <p>Buried ducts have the same requirements as all other ductwork installed in unconditioned attics. Supply ducts shall have insulation \geq R-8 and all other ducts shall have insulation \geq R-6. Total duct leakage shall be \leq 4 CFM25 per 100 sq. ft. of conditioned floor area.</p> <p>2008 Title 24 California Building Energy Efficiency Standards</p> <p>Buried ducts may be used to comply with the 2008 Title 24 California Building Energy Efficiency Standards or take credit for additional duct insulation. The Residential ACM Manual states that ducts shall have a minimum insulation value of R-4.2 prior to burial. The ACM Manual also provides tables for effective R-value of buried ducts based on attic insulation level and nominal duct diameter.</p>	

Last Updated: 05/12/2014

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Scope of Work

Description (how to install)

Ensuring Success (safety, planning)

Climate Specific Information

Training (images, presentations, videos)

CAD Drawings

Compliance Information

Ducts Buried in Attic Insulation

Scope Description Ensuring Success Climate Training CAD Compliance More Info.

More Info.

Case Studies

[Building America Top Innovations 2013 Profile: Buried and Encapsulated Ducts](#) 
Author(s): PNNL
Organization(s): PNNL
Publication Date: September, 2013
Case study providing information about buried and encapsulated ducts.

[Technology Solutions Case Study: Buried and Encapsulated Ducts, Jacksonville, Florida](#) 
Author(s): CARB
Organization(s): CARB
Publication Date: November, 2013
Case study exploring how using buried and/or encapsulated ducts can reduce duct thermal losses in existing homes.

References and Resources*

[2008 Building Energy Efficiency Standards: Residential Compliance Manual](#)
Author(s): California Energy Commission
Organization(s): California Energy Commission
Publication Date: January, 2008
Document intended to help owners, designers, builders, inspectors, examiners, and energy consultants comply with and enforce California's 2008 energy efficiency standards for low-rise residential buildings.

[2009 IECC—International Energy Conservation Code](#)
Author(s): ICC
Organization(s): ICC
Publication Date: January, 2009
Code establishing a baseline for energy efficiency by setting performance standards for the building envelope (defined as the boundary that separates heated/cooled air from unconditioned, outside air), mechanical systems, lighting systems and service water heating systems in homes and commercial businesses.

Scope of Work

Description (how to install)

Ensuring Success (safety, planning)

Climate Specific Information

Training (images, presentations, videos)

CAD Drawings

Compliance Information

**External Resources
and Case Studies**

The screenshot shows the 'Building America Solution Center' page. At the top, there is a navigation bar with the U.S. Department of Energy logo and 'Energy Efficiency & Renewable Energy' text. Below this, the page title 'Building America Solution Center' is displayed. A search bar with a 'SEARCH' button is located in the top right corner. The main content area features a breadcrumb trail: 'EERE » BTQ » Building America » Solution Center » Checklists'. The primary heading is 'ENERGY STAR Qualified Homes, Version 3 (Rev. 06)'. To the left, a 'Component Explorer' sidebar lists 'Checklist Manager' (with 'ENERGY STAR' sub-item), 'Building Science Explorer', and 'Browser'. The 'Checklist Manager' section includes a description: 'Checklist Manager provides links to technical guides that align with each measure included in the checklists for ENERGY STAR Qualified Homes, Version 3 (Rev. 6). The numbers and titles included in the Checklist Manager follow the same order as the four ENERGY STAR Inspection Checklists for National Program Requirements. To view programmatic footnotes, see the original [program checklists](#). Portions of the programmatic footnotes have been added to the Scope tabs in the guides. For additional ENERGY STAR program requirements and information, visit the [ENERGY STAR Website](#).' Below the text is a list of four checklist items, each with a right-pointing arrow: 'Thermal Enclosure System Rater Checklist (TES)', 'HVAC System Quality Installation Contractor Checklist (HVAC/C)', 'HVAC System Quality Installation Rater Checklist (HVAC/R)', and 'Water Management System Builder Checklist (WMS)'. An orange arrow points to the first item, 'Thermal Enclosure System Rater Checklist (TES)'. At the bottom, there are links for 'Contact Us', 'Web Site Policies', 'U.S. Department of Energy', and 'USA.gov', along with the text 'Content Last Updated: 12/13/2012'.

The screenshot shows the 'Building America Solution Center' page. At the top left is the U.S. Department of Energy logo and 'Energy Efficiency & Renewable Energy'. On the right, there are 'Login' and 'Register' links and a search bar with a 'SEARCH' button. The main heading is 'Building America Solution Center'. Below it is a breadcrumb trail: 'EERE » BTO » Building America » Solution Center » Checklists'. A left sidebar contains navigation links: 'Solution Center Home', 'Component Explorer', 'Checklist Manager' (highlighted), 'ENERGY STAR', 'Building Science Explorer', 'Browser', 'Guides', 'CAD Files', 'Case Studies', 'Image Gallery', and 'References'. The main content area features the 'ENERGY STAR Qualified Homes, Version 3 (Rev. 06)' section with the ENERGY STAR logo and a descriptive paragraph. Below this is a list of checklists under the heading 'Thermal Enclosure System Rater Checklist (TES)'. The list includes: 'TES 1. High-Performance Fenestration', 'TES 2. Quality-Installed Insulation', 'TES 3. Fully-Aligned Air Barriers', 'TES 4. Reduced Thermal Bridging', and 'TES 5. Air Sealing'. An orange arrow points to 'TES 3. Fully-Aligned Air Barriers'. Below the TES section are three other checklist categories: 'HVAC System Quality Installation Contractor Checklist (HVAC/C)', 'HVAC System Quality Installation Rater Checklist (HVAC/R)', and 'Water Management System Builder Checklist (WMS)'. At the bottom, there are links for 'Contact Us', 'Web Site Policies', 'U.S. Department of Energy', and 'USA.gov', along with the text 'Content Last Updated: 12/13/2012'.

The screenshot shows the 'Building America Solution Center' website. At the top, there is a navigation bar with the U.S. Department of Energy logo and 'Energy Efficiency & Renewable Energy' text. Below this, the page title 'Building America Solution Center' is displayed. A search bar with a 'SEARCH' button is located in the top right corner. The main content area features a breadcrumb trail: 'FERE » BTO » Building America » Solution Center » Checklists'. A sidebar on the left contains navigation links: 'Solution Center Home', 'Component Explorer', 'Checklist Manager' (highlighted), 'Building Science Explorer', and 'Browser'. The 'Checklist Manager' section is titled 'ENERGY STAR Qualified Homes, Version 3 (Rev. 06)' and includes an ENERGY STAR logo. A paragraph of text explains the purpose of the Checklist Manager and provides a link to the original program checklists. The main content area displays a tree view of checklists under the heading 'Thermal Enclosure System Rater Checklist (TES)'. The tree is expanded to show 'TES 3. Fully-Aligned Air Barriers', which is further expanded to show sub-items: 'TES 3.1. Walls', 'TES 3.2. Floors', and 'TES 3.3. Ceilings'. An orange arrow points to the 'TES 3.1.3. Attic knee walls' item.

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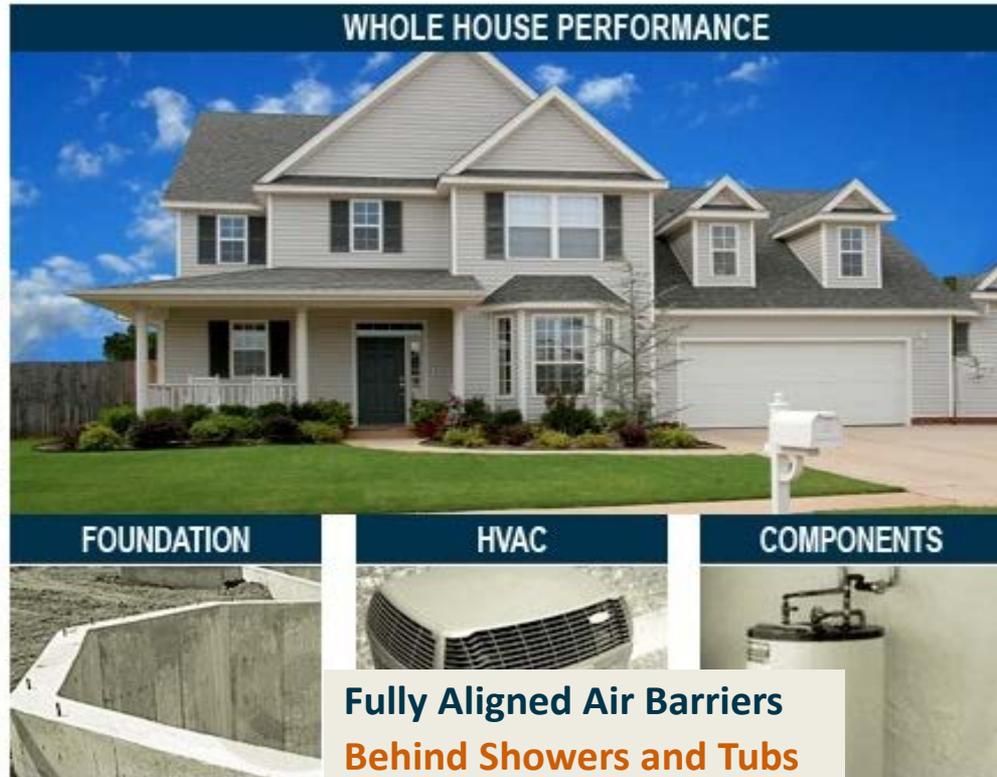
ENERGY STAR Qualified Homes, Version 3 (Rev. 06)

Checklist Manager provides links to technical guides that align with each measure included in the checklists for ENERGY STAR Qualified Homes, Version 3 (Rev. 06). The numbers and titles included in the Checklist Manager follow the same order as the four ENERGY STAR Inspection Checklists for National Program Requirements. To view programmatic footnotes, see the original [program checklists](#). Portions of the programmatic footnotes have been added to the Scope tabs in the guides. For additional ENERGY STAR program requirements and information, visit the [ENERGY STAR Website](#).

Thermal Enclosure System Rater Checklist (TES)

- TES 1. High-Performance Fenestration
- TES 2. Quality-Installed Insulation
- TES 3. Fully-Aligned Air Barriers
 - TES 3.1. Walls
 - TES 3.1.1. Walls behind showers and tubs
 - TES 3.1.2. Walls behind fireplaces
 - TES 3.1.3. Attic knee walls
 - TES 3.1.4. Skylight shaft walls
 - TES 3.1.5. Wall adjoining porch roof
 - TES 3.1.6. Staircase walls
 - TES 3.1.7. Double walls
 - TES 3.1.8. Garage rim / band joist adjoining conditioned space
 - TES 3.1.9. All other exterior walls
 - TES 3.2. Floors
 - TES 3.2.1. Floor above garage
 - TES 3.2.2. Cantilevered floor
 - TES 3.2.3. Floor above unconditioned basement or unconditioned crawlspace
 - TES 3.3. Ceilings
 - TES 3.3.1. Dropped ceiling / soffit below unconditioned attic
 - TES 3.3.2. All other ceilings

BASC Component Explorer



ROOF/FLOOR/CEILING



WALLS/OPENINGS



FOUNDATION



HVAC



COMPONENTS



QA/QC



DESIGN



Walls/Opening
Water Managed Walls
Minimum Thermal Bridging
Insulation
Air Sealing
Fully Aligned Air Barriers

Fully Aligned Air Barriers
Behind Showers and Tubs
Behind Fireplaces
Attic Knee Walls
Skylight Shaft
Walls Adjoining Porch
Double Walls
Garage Rim/Band Joist

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Attic Knee Walls

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Scope

Fully Aligned Air Barrier

- Install a top and bottom plate or blocking at the top and bottom of all knee wall cavities.
- Back attic knee walls with a rigid air barrier or other supporting material to prevent insulation from sagging and create a continuous thermal barrier*
- Seal all seams, gaps, and holes of the air barrier with caulk or foam.
- Install insulation without misalignments, compressions, gaps, or voids in all knee wall cavities.



* ENERGY STAR recommends using a rigid air barrier, but it is not a requirement.

Notes:

An air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. ENERGY STAR recommends, but does not require, rigid air barriers. Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 inches or 1.5 inches, respectively, to qualify as an air barrier unless the manufacturer indicates otherwise. If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 inch diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft



MOBILE FIELD KIT

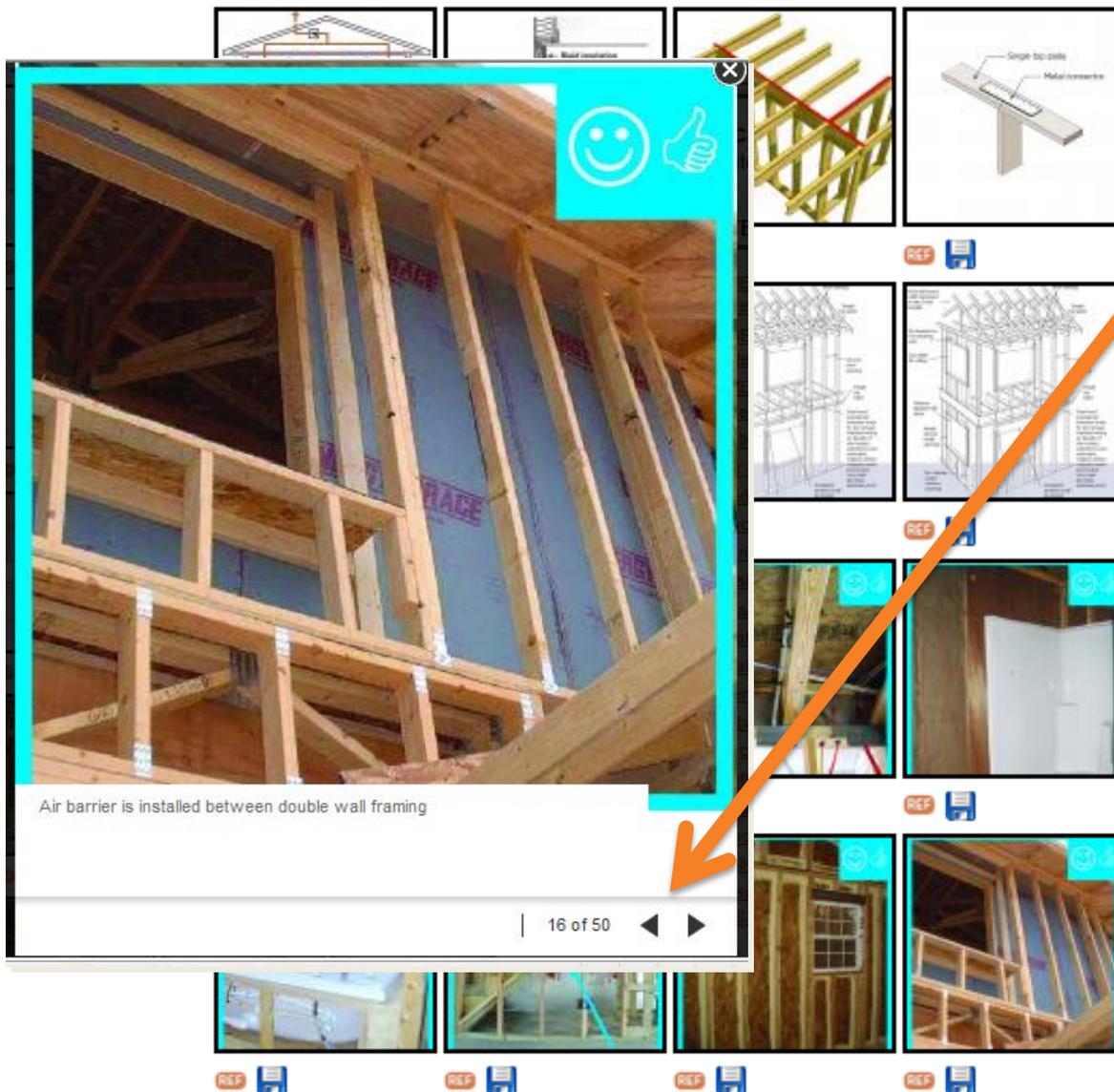
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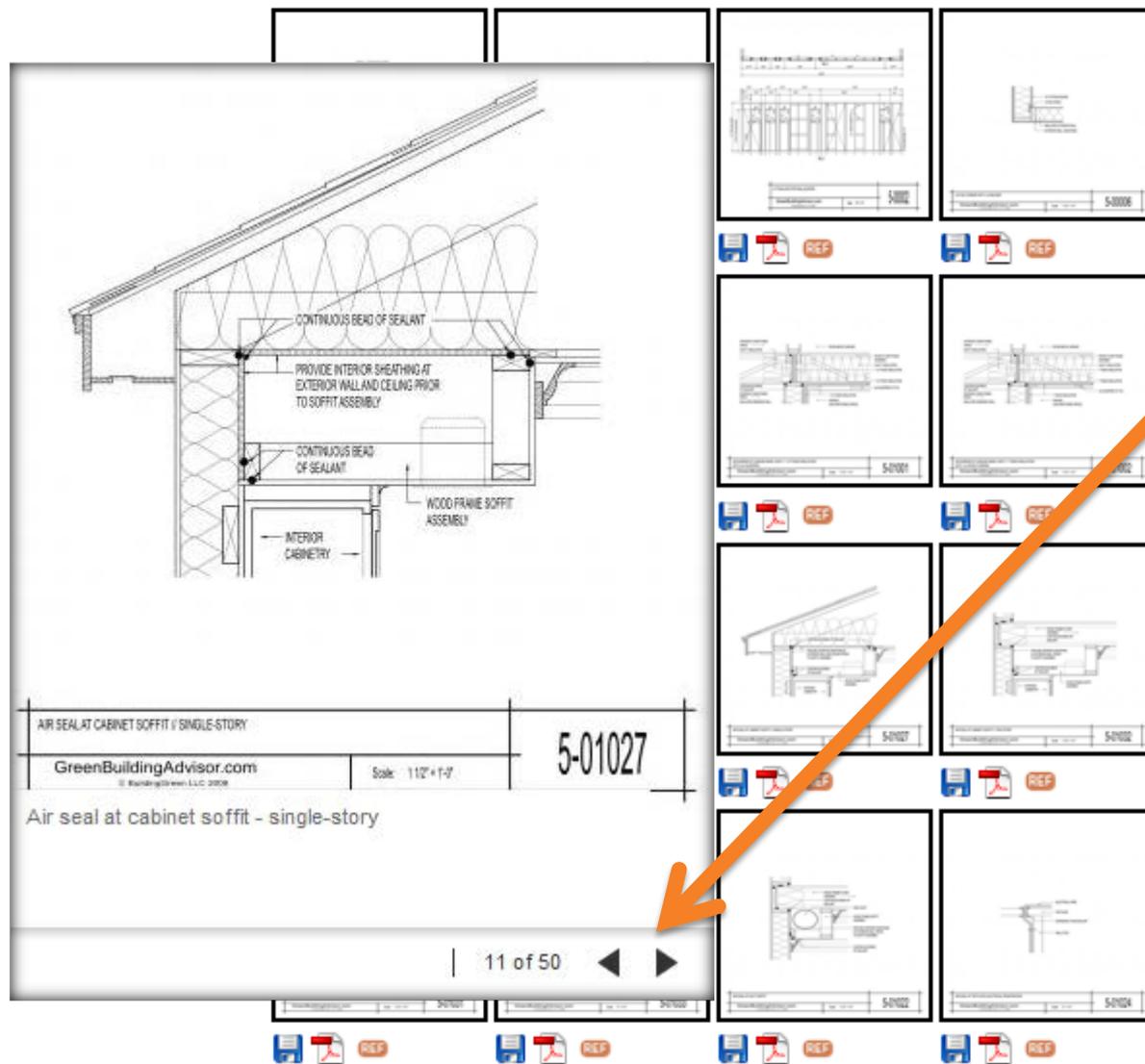
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BASC Browser Image Gallery



- Click an image to enlarge in a sliding window.

BASC Browser Cad Files



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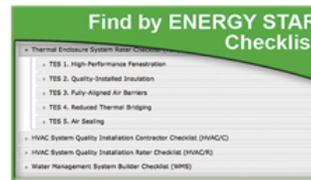
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The Building America Solution Center provides access to expert information on hundreds of high-performance construction topics, including air sealing and insulation, HVAC components, windows, indoor air quality, and much more. Click on the links below to explore the Solution Center.



As a community driven tool, we welcome your [comments](#) on how to continuously improve the Solution Center. If you are interested in submitting content, please become a [registered user](#) and see the [criteria for submissions](#).

THANK YOU! Justin Mackoyak, ICF International, for your recent image contributions to the Solution Center.

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[Taped Insulating Sheathing Drainage Planes](#)

Last Updated: January 29, 2014

[Removable Interior Storm Windows](#)

Last Updated: January 10, 2014

[ENERGY STAR 2009 IECC Code Level Insulation](#)

Last Updated: December 20, 2013

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[Clean taping areas and install 3" tape on vertical joint of upper insulation overlapping the horizontal joint](#)

Image Posted: January 30, 2014

[Tape the joint between the top insulation sheet and the Z-flashing with 2" wide tape to improve air tightness](#)

Image Posted: January 30, 2014

[Upper wall insulation installation with butyl z-flashing](#)

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Title *

A short, descriptive title for this Field Kit. Limit to 255 characters.

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Scope

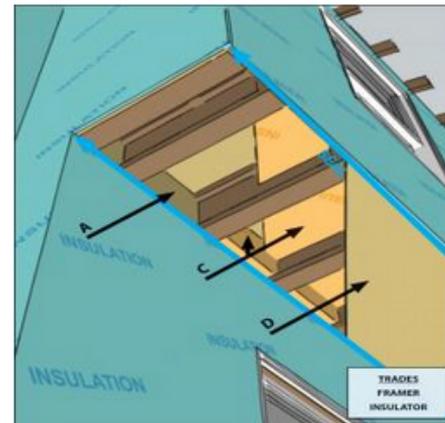
Fully Aligned Air Barrier

- Install a rigid air barrier or other supporting blocking to separate the cantilever from the conditioned space.*
- Seal all seams, gaps, and holes of the air barrier with caulk or foam.
- Install insulation without misalignments, compressions, gaps, or voids and align it with the sub-floor, the rigid air barrier (A), and the exterior face of the cavity.
- Once insulated, enclose the cavity with a rigid air barrier material.

* ENERGY STAR highly recommends using a rigid air barrier, but it is not a requirement.

ENERGY STAR Notes:

An air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. ENERGY STAR recommends, but does not require, rigid air barriers. Open-cell or closed-cell foam shall have a finished thickness \geq 5.5 inches or 1.5 inches, respectively, to qualify as an air barrier unless the manufacturer indicates otherwise. If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads \geq 1 inch in diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper,



Print and PDF Functionality

Insert Replacement Window

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Scope Description Ensuring Success Climate Training

Scope

As summarized within the [Ensuring Success](#) tab, before beginning this work, inspect the interior and exterior of the building, including each window, to identify impacts and potential risks with completing the work. Diagnose water and air infiltration pathways, and choose strategies most appropriate to address each leak.



Remove the existing window sash.

Remove the existing sash-weight and balance system and air seal and insulate the cavity. Windows must be custom ordered to size; however, they do not require as tight an installation tolerance as the replacement sash option.

Insulate and seal all voids and cracks between the replacement window assembly and the original window jambs, sill, and head.

Install the window insert according to manufacturer's instructions.

Last Updated: 10/02/2013

PDF and Print are now available for all Guides

Insert Replacement Window-1.pdf - Adobe Acrobat Pro

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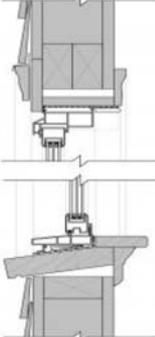
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Insert Replacement Window

Last Updated: 10/02/2013

Scope



As summarized within the [Ensuring Success](#) tab, before beginning this work, inspect the interior and exterior of the building, including each window, to identify impacts and potential risks with completing the work. Diagnose water and air infiltration pathways, and choose strategies most appropriate to address each leak.

Remove the existing window sash.

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Insulate and seal all voids and cracks between the replacement window assembly and the original window jambs, sill, and head.

Install the window insert according to manufacturer's instructions.

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Building America Optimized Solutions
for New Homes:

Hot- Dry Climate

CLIMATE ZONE MAPS



The U.S. Department of Energy's (DOE) Building America program has been a source of innovations in residential building energy performance, durability, and affordability for nearly 20 years. This world-class research program partners with many of the top U.S. home builders, contractors, and manufacturers to bring cutting-edge solutions and resources to market.

The most recent goal of the Building America program has been to demonstrate how cost-effective strategies can reduce home energy use by more than 30% in new homes, in all climate regions, by 2015. As part of the strategy to prove that this level of performance is achievable in the market, DOE created a labeling program called the DOE Zero Energy Ready Home (ZERH) program.

Working together, Building America and the ZERH programs have created this series of optimized solutions to demonstrate how builders have achieved these high savings goals. These optimized solutions provide guidance to other builders for cost effectively meeting the 30% energy savings goal in their climate zones.

Building America's five major climate regions include: cold/very-cold, mixed-humid, hot-humid, hot-dry/mixed-dry and marine. These climate regions are outlined in Figure 1, along with a map of the IECC climate regions for comparison. This document outlines the Building America recommendations for achieving 30% in the hot-dry climate region.

The hot-dry climate performance package detailed in Table 1 uses common building practices to meet the performance criteria of 30% energy savings. Due to the tradeoff decisions that are made when building a home, there are hundreds of ways to meet the 30% performance criteria. The table lists common recommendations. To capture as many alternatives as possible, Table 1 includes an "Options" column on the far right, which provides ways to meet the various criteria listed.

Figure 1. Map of Building America climate regions (top) for program reporting and IECC climate zones (bottom) as a reference for compliance information



- Recommended Measure Packages to Meet or Exceed the 2009 IECC by 30%/ZERH
- All Climate Zones
- Standalone Tool
- Direct Access to Proven Performance Case Studies
- PDF documents Available

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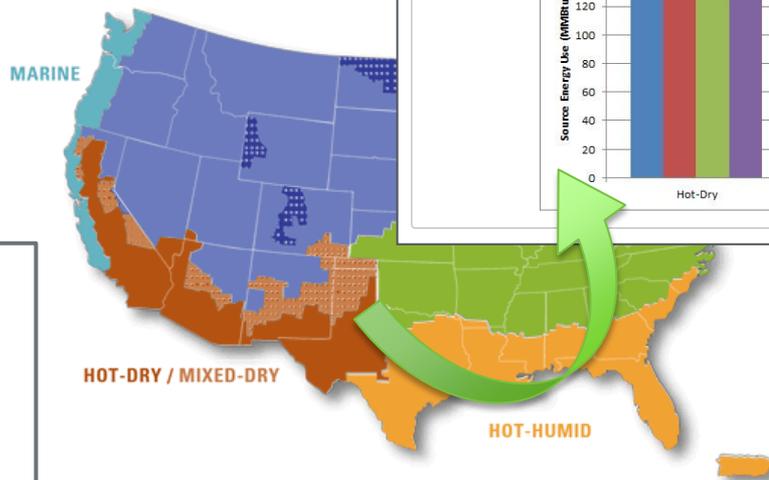
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Optimized Climate Solutions

The Building America Program, funded by the DOE, is designed to help the building industry reach the next level of cost effective energy performance. The program's goal is to make high performance building practices roughly consistent with the 2009 International Energy Conservation Code (IECC 2009). This performance is achievable and market viable, DOE's [Zero Energy Ready Home \(ZERH\)](#). The climate-specific guidance in this package provides information on optimized solutions that meet or exceed the requirements of the IECC 2009.

Use the interactive map below to find climate-specific solutions for your region. For more information about climate design, see [Regions by County](#).



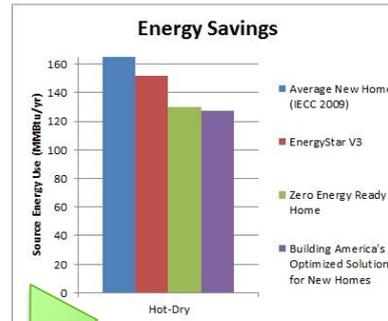
Hot-Dry/Mixed-Dry

This Building America Optimized Solution describes a set of building practices necessary to achieve the next step in energy performance for new homes (approximately 30% energy savings above the [B10 Benchmark](#) - roughly consistent with the 2009 International Energy Conservation Code). This package of measures meets and exceeds DOE's [Zero Energy Ready Home \(ZERH\)](#) program requirements and was selected for its performance in the following areas:

- Energy Savings
- Affordability
- Buildability
- Durability
- Healthy Indoor Environment

The high performance builders profiled in the [case studies found below](#) the interactive box show just a few examples of the hundreds of ways a builder can meet the premium levels of energy savings Building America strives for, while qualifying for the ZERH. Print the [Optimized Solution for the Hot-Dry/Mixed-Dry Climate](#).

Energy Savings | Thermal Enclosure | HVAC System | Efficient Components



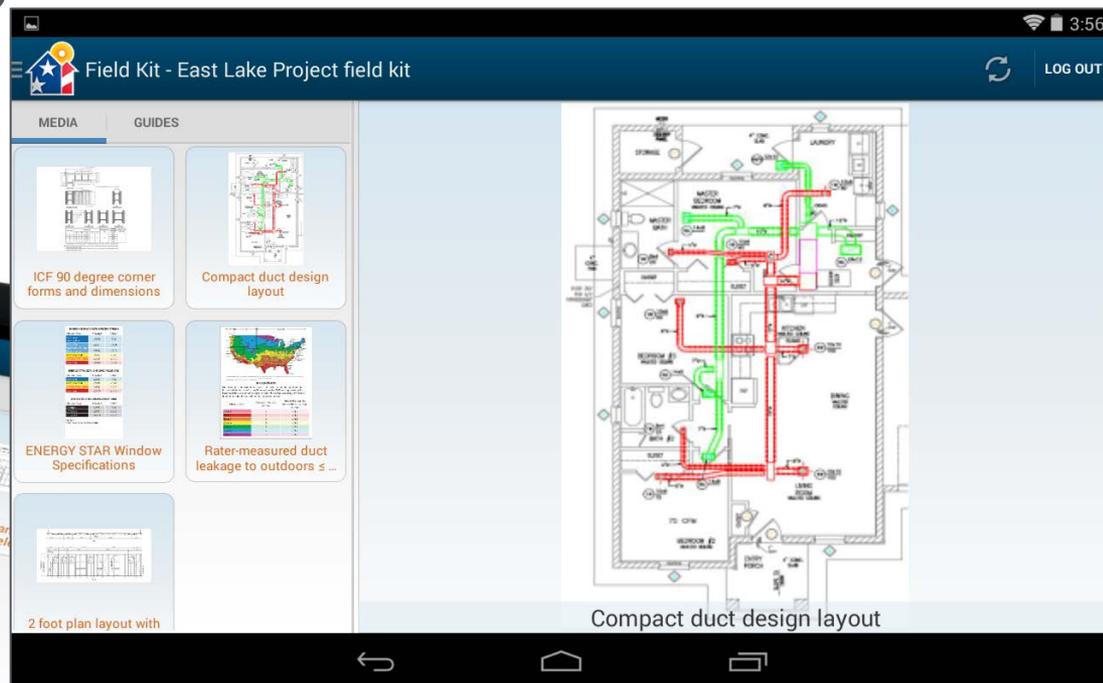
HOT-DRY & MIXED-DRY CLIMATES



Access building packages designed to achieve 30% energy savings by climate zone

A Department of Energy (DOE) [ZERH](#) represents a whole new level of energy performance, with rigorous requirements that ensure outstanding levels of energy savings, comfort, health and durability.

- Access Field Kits Remotely
- Android and IOS
Android at <https://energy.gov/solutions>
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Transfer Grills

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BUILDING SCIENCE-TO-SALES TRANSLATOR

Transfer Grill = Comfort Vent



TECHNICAL DESCRIPTION

Most new homes only have a central return. When doors are closed, conditioned bedroom air cannot flow adequately to the central return which can block air flow from the ducts. This can compromise comfort and pressurize the room so warm humid air is driven into wall assemblies for added risk of moisture damage. Transfer Grills are a through-wall vent sized to allow adequate flow of air to the hallway central return while also including baffles for sound and visual privacy.

RELATED BUILDING SCIENCE MEASURES

- [Jump Duct](#)
- [Pressure Balancing](#)
- [HVAC Room-by-Room Return Ducts](#)

COMFORT VENT
SALES MESSAGE



Comfort vents at each bedroom ensure a continuous flow of heating and cooling even when the doors are closed. What this means to you is that you will no longer have to compromise comfort when you keep your bedroom doors closed. Wouldn't you agree bedroom doors shouldn't have to kept open to maintain comfort?

MY FIELD KITS

[North Portland Residential](#)

12 items

[General Air Sealing Guidance](#)

4 items

[San Francisco Challenge Home Project #1](#)

12 items

 [New Field Kit](#)



Garson Homes Healthful Environment



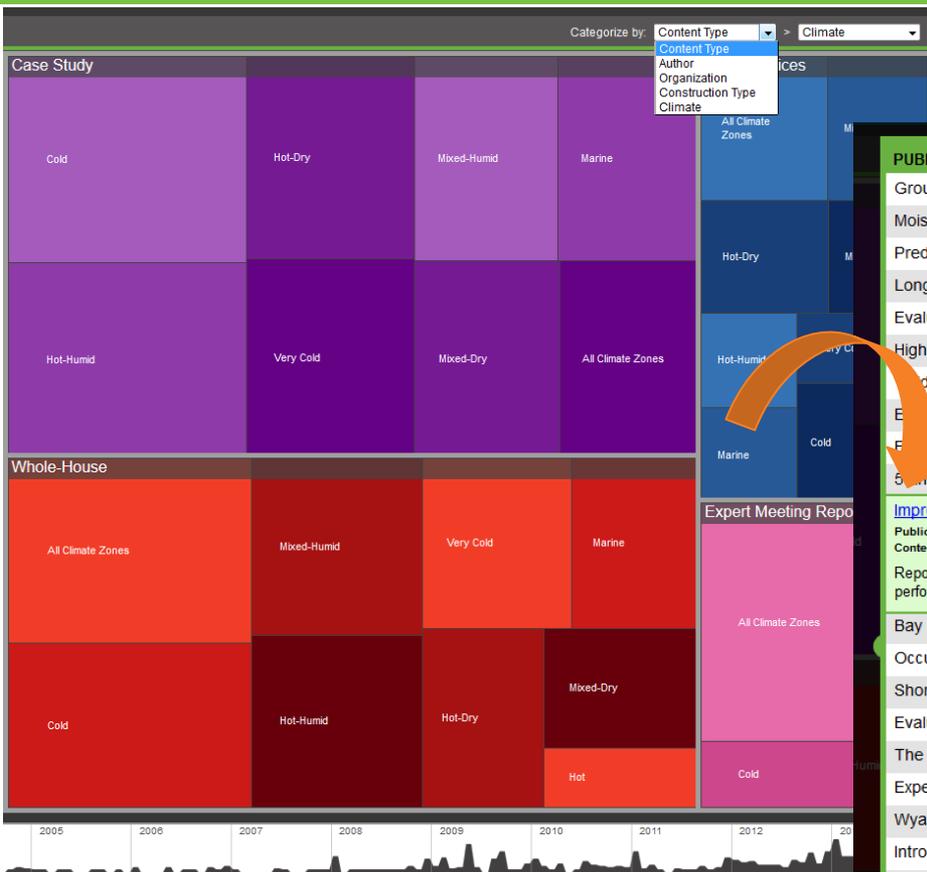
- Fresh Air:**
 - Supply Fresh Air System
 - Odor and Moisture Control Fans
 - High-Capture Filtration Technology
- Quiet:**
 - Quiet Window Technology
 - Quiet Wall Technology
- Moisture Control:**
 - Dry-by-Design Construction
 - Moisture Control System – Whole House
 - Moisture Controlled Comfort System
 - Moisture Controlled Windows
 - Moisture Controlled Lower Level
- Pest Control:**
 - Bug Control Barrier
 - Pest Screened Home
- Outdoor Contaminant Control:**
 - Contaminant Sealed Construction
 - Contaminant Sealed Comfort Delivery
 - Dust and Pollen Barrier
 - Radon Controlled Home
- Chemical Control:**
 - Formaldehyde Controlled Home
 - VOC Controlled Home
- Fume Control:**
 - Carbon Monoxide Controlled Equipment
 - Carbon Monoxide Controlled Fireplace
 - Fume Controlled Garage

Building Science Publications



Building Science Publications visualizes the entire Building America library and BASC references. It allows a user to explore the classification of content, and to drill down to specific Publications.

Building Science Publications: CATEGORY BLOCKS



PUBLICATIONS			EXPORT
Ground Source Heat Pump Sub-Slab Heat Exchange Loop Performance in a Cold Climate			
Moisture Management for High R-Value Walls			
Predicted Versus Actual Savings for a Low-Rise Multifamily Retrofit in Boulder, Colorado			
Long-Term Results from Evaluation of Advanced New Construction Packages in Test Homes: Lake Elsinore, California			
Evaluation of Early Performance Results for Massachusetts Homes in the National Grid Pilot Deep Energy Retrofit Program			
High Performance Home Building Guide for Habitat for Humanity Affiliates			
Validation of a Hot Water Distribution Model Using Laboratory and Field Data			
Evaluation of Retrofit Delivery Packages			
Energy Savings and Breakeven Costs for Residential Heat Pump Water Heaters in the United States			
Sutton & Walnut - A Philly Gut Rehab Development			
Improving Gas Furnace Performance: A Field and Laboratory Study at End of Life			
Publication Date:	Aug 1, 2013	Author: Brand, Yee, Baker	Climate: Cold
Content Type:	Measure Specific	Organization: FARR	Construction Type: New and Existing Homes
Report examining the impacts that common installation practices and age-induced equipment degradation may have on the installed performance of natural gas furnaces, as measured by steady-state efficiency and AFUE.			
Bay Ridge Gardens - Mixed Humid Affordable Multifamily Housing Deep Energy Retrofit			
Occupant-in-Place Energy Efficiency Retrofit in a Group Home for 30% Energy Savings in Climate Zone 4			
Short-Term Test Results: Transitional Housing Energy Efficiency Retrofit in the Hot Humid Climate			
Evaluation of Two CEDA Weatherization Pilot Implementations of an Exterior Insulation and Over-Clad Retrofit Strategy for Resident			
The Next Step Toward Widespread Residential Deep Energy Retrofits			
Expert Meeting: Recommended Approaches to Humidity Control in High Performance Homes			
Wyandotte Neighborhood Stabilization Program: Retrofit of Two Homes			
Introducing the Market to High-performance Building on Hilton Head Island			
Long-Term Results: New Construction Occupied Test House, Urbana, Illinois			
Newporter Apartments: Deep Energy Retrofit Short Term Results			
Proven Performance of Seven Cold Climate Deep Retrofit Homes			
Results From Development of Model Specifications for Multifamily Energy Retrofits			
Retrofitting Las Vegas: Implementing Energy Efficiency in Two Las Vegas Test Homes			
Serenbe Nest Cottages			
The Winding Road Towards ""Zero"" Energy: Lessons From Monitoring Efficient Solar Homes			
Utility Benefits of Homes Approaching ""Zero Energy			

- Search by categories

- Provide feedback and content
- Customize content to your climate
- Build and track your Field Kits
- Save content that can be accessed in the field through Android and IOS mobile applications
- Help DOE understand how the tool is used

Create User Account or Log In

Log In | Register

User account

User information

Username *

Spaces are allowed; punctuation is not allowed except for periods, hyphens, apostrophes, and underscores.

E-mail Address *

A valid e-mail address. All e-mails from the system will be sent to this address. The e-mail address is not made public.

Work Experience

Profession *

Construction Type *

New Homes
Existing Homes

Location

State *

Alaska
Arizona
Arkansas

Climate Zone *

Zone 1
Zone 2
Zone 3

User account

Username Or E-mail Address *

You may login with either your assigned username or your e-mail address.

Password *

The password field is case sensitive.

- Register as a BASC User.
- Compile a list of home performance measures for each specific home or model to be sold.
- Create a 'My Field Kit' for each home or model, and populate with 'BASC Guides' for each measure.
- Print Guides and compile in a binder or save them in a digital format.
- Study the package of measure Guides every week until you achieve Level 4 knowledge on your product.

Zero Energy Ready Home

Sales Training Part II

February 12, 2015

12:00 p.m. EST

- Review Part I
- Words Matter
- Questions Matter
- Clarity Matters
- Process Matters

Website

- www.buildings.energy.gov/zero/
- Events:
 - Upcoming in-person ZERH Trainings
 - Technical Training webinars
 - Conference Presentations
- Partner Locator
- Program Specifications
- Webinar Recordings



Building America Solution Center

- <http://basc.pnnl.gov/>

Thank You



For More Information:

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