

DOE Challenge Home Webinars

April 18, 2014

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Building America Solution Center:
Meet Your New Best Friend

PNNL Team

Market Transformation Process

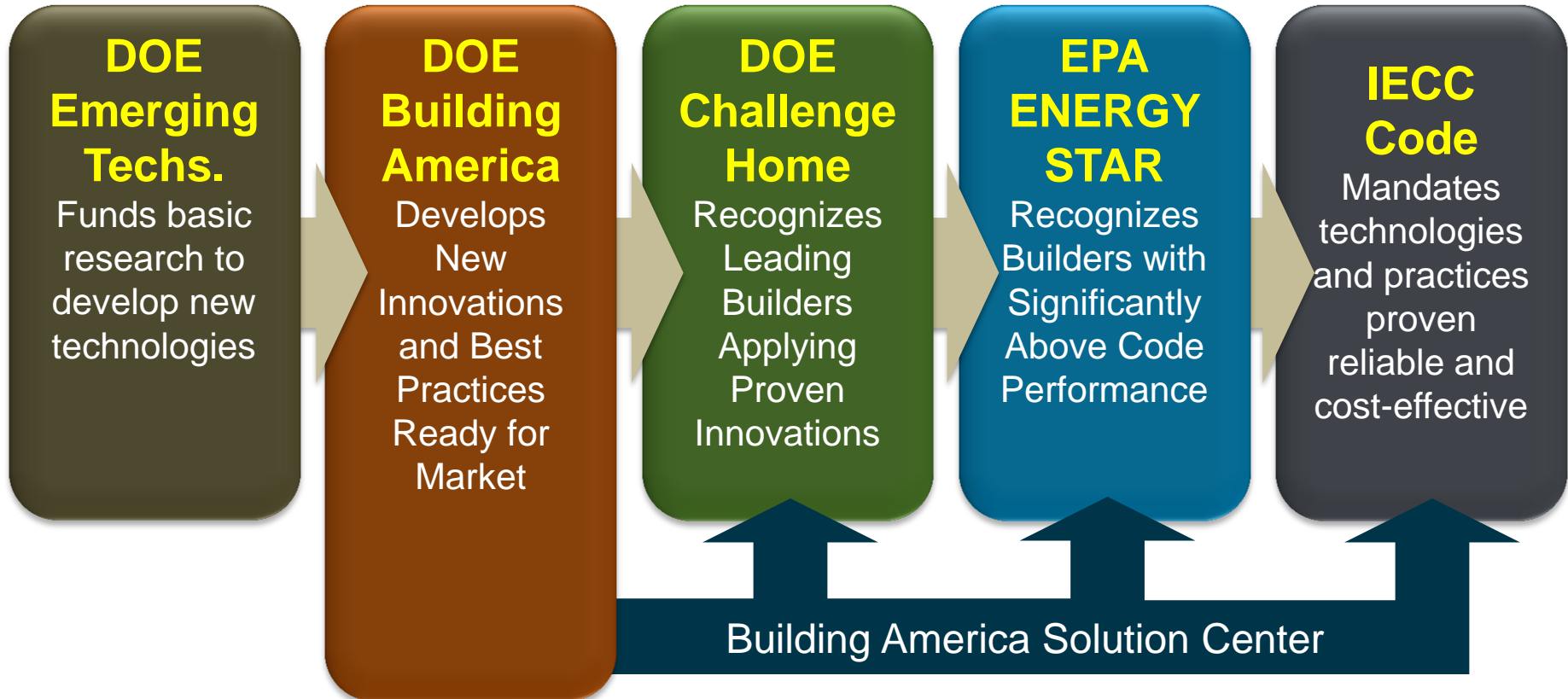
Research & Development



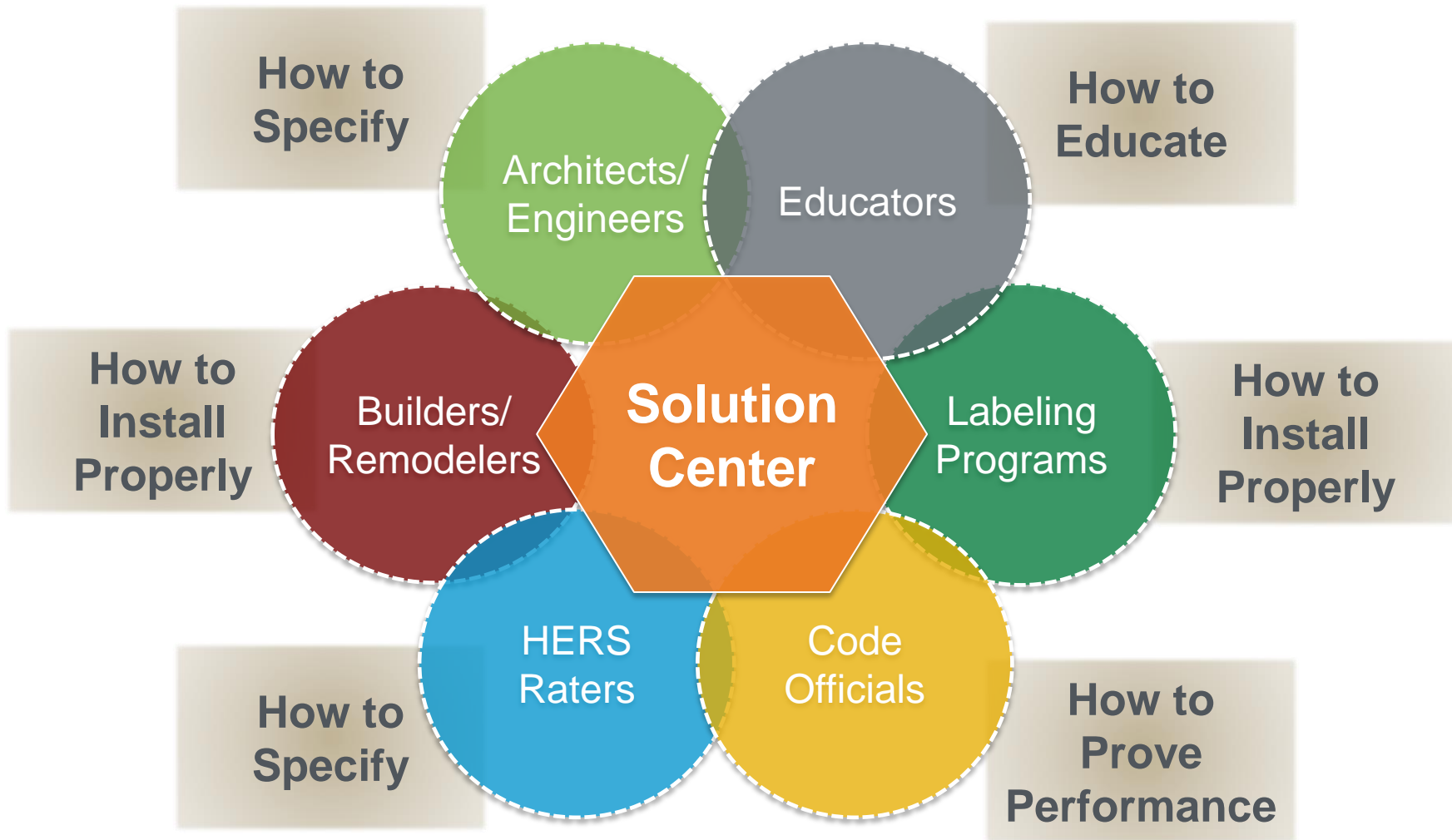
Market Stimulation



Codes and Standards



Serve the market transformation process by disseminating Building America content most critical for customers to apply proven innovations.



Is:

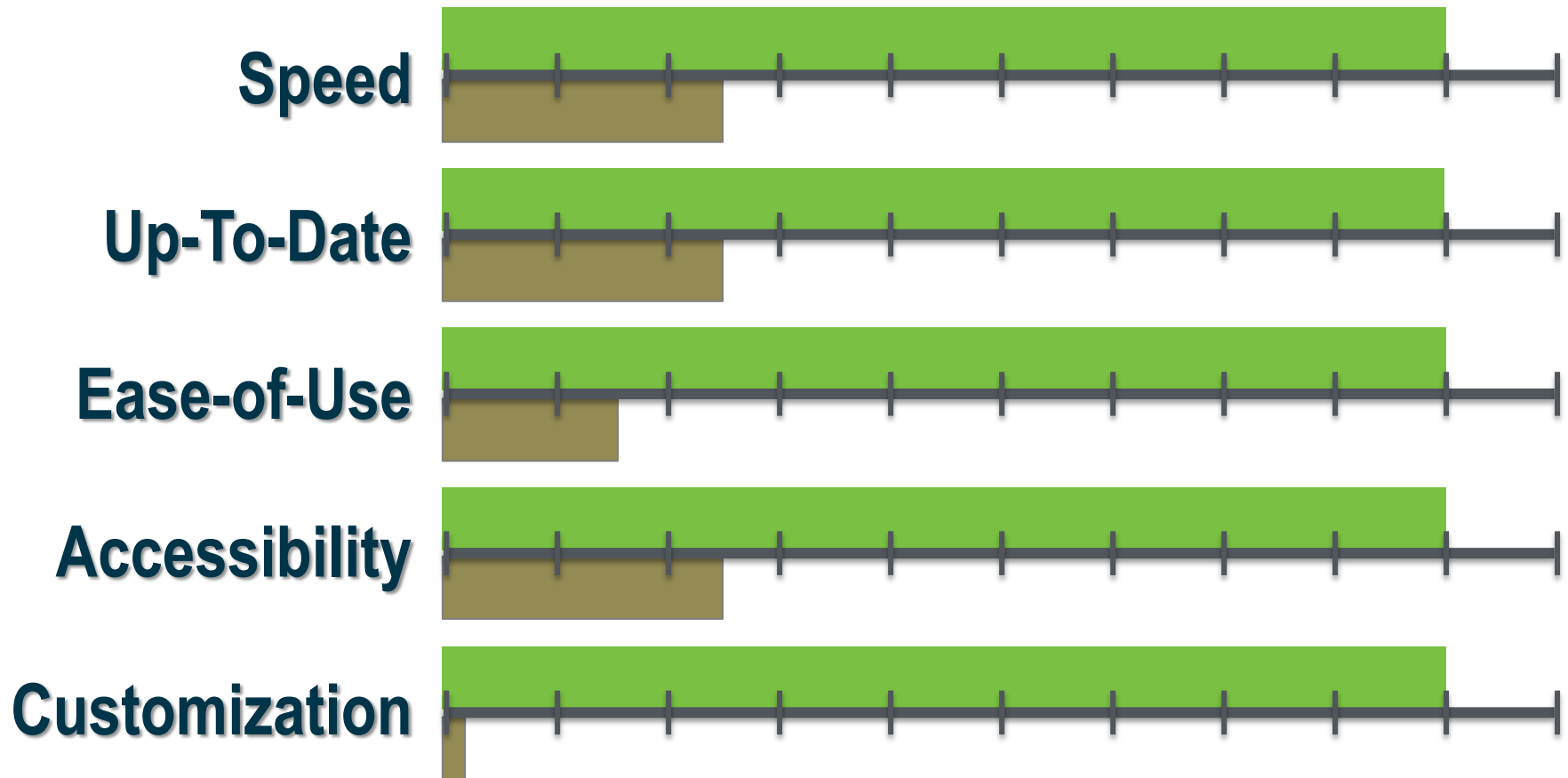
Content for Applying Proven Innovations:

- How to Specify
- How to Install Properly
- How to Prove Performance
- How to Educate

Is Not:

- Design Tool for Customized Energy Packages

Key: Pre-BASC BASC



BASC...this is just the beginning



Thank You

For More Information:

<http://basc.energy.gov>

Also Accessible via Building America Web Site:

<http://www.buildingamerica.gov>



Building America Solution Center

Michael Baechler

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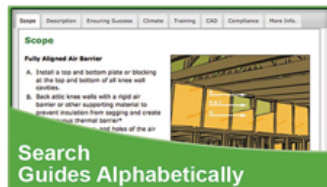
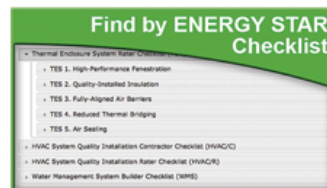
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As a community driven tool, we welcome your [comments](#) on how to continuously improve the Solution Center. If you are interested in submitting content, please become a [registered user](#) and see the [criteria for submissions](#).

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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](#)

Image Posted: January 30, 2014



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Help

The U.S. Department of Energy's [Building America](#) program strives to reduce energy use and peak energy loads in existing and new homes. Building America's whole building systems approach also seeks to improve quality, comfort, safety, durability, and a healthy living environment.

The Building America Solution Center was designed to offer fast, online access to expert guidance on hundreds of high-performance construction topics and give users the tools to customize field kits to take the information you need to the job site.

What You Will Find

Within the Solution Center, building science measures are described in [guides](#). Each guide provides an overview of a specific measure, including a scope of work, full description and tips for installation, climate considerations, training images, presentations and videos, code and program compliance, plus other external information related to the topic. Guides contain a variety of resources such as [images](#), [CAD files](#), [case studies](#) and [references](#). With a few exceptions, each guide is organized into 8 tabs. The Solution Center is a new tool and not all information is fully populated. As new research is completed and users provide additional content, Solution Center guides are continuously updated.

The screenshot shows a tabbed interface with tabs for Scope, Description, Ensuring Success, Climate, Training, CAD, Compliance, and More Info. The main content area displays a list of resource types: Guides, CAD Files, Case Studies, Images, and References. To the right is a diagram of a window frame with labels A, B, C, and D pointing to different components, and a legend for TRADES, FRAMER, and INSULATOR.

▶ [Find What You Need](#)

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- Guides: core organization of information in the Solution Center.
- Includes 8 tabs of specific information.
- How to install, how to specify, how to prove performance.

Attic Knee Walls

Scope Description Ensuring Success Climate Training CAD Compliance More Info.

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.



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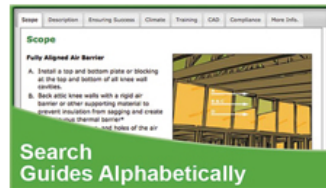
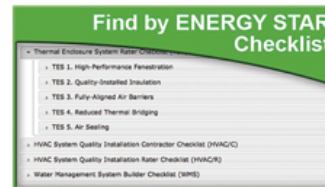
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Last Updated: January 29, 2014

[Removable Interior Storm Windows](#)

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

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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](#)

Image Posted: January 30, 2014



- 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.

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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.

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Profession *

Construction Type *

New Homes
Existing Homes

Location

State *

Alaska
Arizona
Arkansas

Climate Zone *

Zone 1
Zone 2
Zone 3

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

Password *

The password field is case sensitive.

Attic Knee Walls

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

Scope Description Ensuring Success Climate

Scope

Fully Aligned Air Barrier

- A. Install a top and bottom plate or blocking at the top and bottom of all knee wall cavities.

Attic Knee Walls

[Feedback](#)

Scope Description

Scope

Fully Aligned Air Barrier

- A. Install a top and bottom plate or blocking

Feedback on this Guide

Guide Title

Do you have suggestions to improve this guide?

Did this page resolve your question or help you learn?

- Yes
- Maybe
- No (please explain below)

Other Comments

Submit



The screenshot displays a web application interface. At the top right, there are links for "Log Out" and "My Account". Below these is a search bar with a green "SEARCH" button. The main content area shows a search result for "Heavy Membranes at Eaves in Cold Climates". A red banner below the title contains the text: "This measure may not be appropriate for your climate. Please see the climate tab for more information." Below the banner is a "Feedback" link. A navigation bar contains tabs for "Scope", "Description", "Ensuring Success", "Climate", "Training", "CAD", "Compliance", and "More Info.". The "Scope" tab is selected, showing the following text: "Water Managed Roof Assembly. In 2009 IECC Climate Zones 5 and higher, self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to > 2 feet up roof deck from the interior plane of the exterior wall." To the right of the text is a technical diagram of a roof assembly cross-section. The diagram shows a dark roof deck with a lighter-colored membrane applied at the eaves. A dimension line indicates a distance of "2 ft." from the edge of the roof line to the interior plane of the exterior wall. A dashed line labeled "A" represents the interior plane of the exterior wall.

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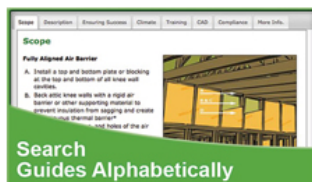
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[North Portland Residential](#)
12 items

[General Air Sealing Guidance](#)
4 items

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

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Image Posted: January 30, 2014



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San Francisco Challenge Home Project #1



Guides



[Cantilevered Floor](#)



[Step and Kick-Out Flashing at Roof-Wall Intersections](#)



[Double Walls](#)



[Heavy Membranes at Valley and Roof Deck Penetrations](#)



[Bathroom Fan Ratings](#)

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4 items

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Cantilevered Floor

[Feedback](#)

Add or remove this item in your Field Kits.

- North Portland Residential
12 items
- General Air Sealing Guidance
4 items
- San Francisco Challenge Home Project #1
12 items

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12 items

[General Air Sealing Guidance](#)

4 items

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

12 items

[New Field Kit](#)



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

Scope

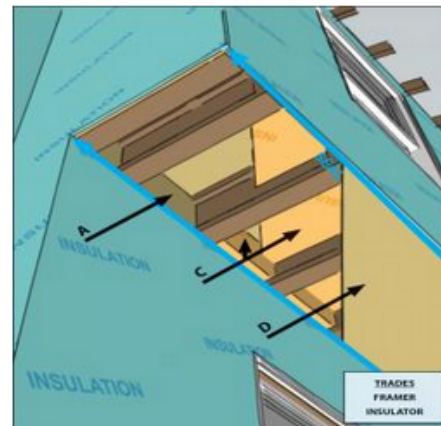
Fully Aligned Air Barrier

- 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

File Edit View Window Help

Create [Icons]

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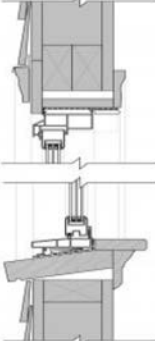


Tools Sign Comment

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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.

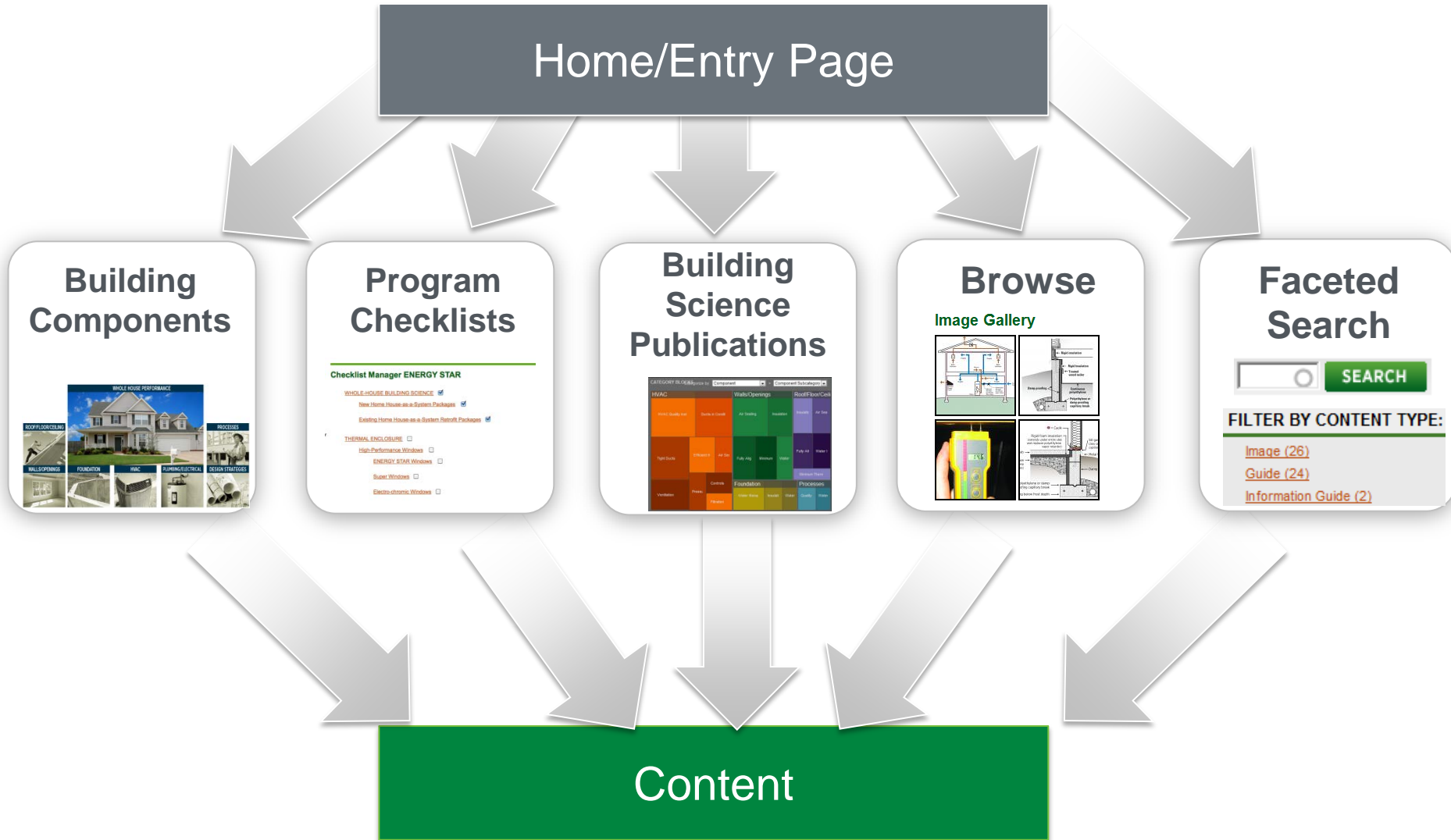
Remove the existing window sash.

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.

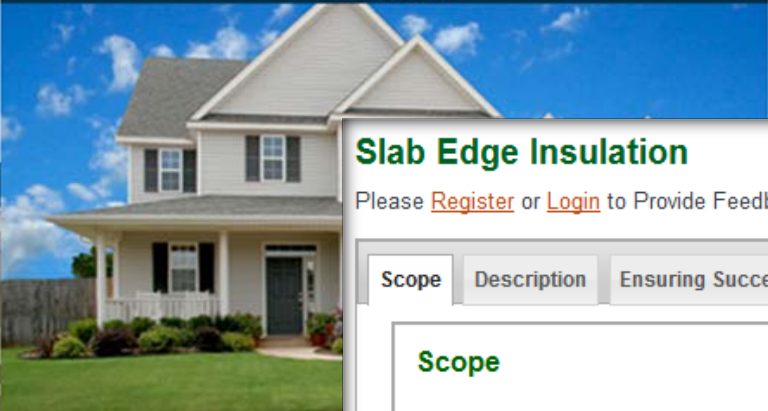
Building America Solution Center More Accessible




- Topics by Building Component are displayed as images representing eight building-related component areas
- Each component is further organized into Component Subcategories (e.g., air sealing, insulation, etc.)




CASE STUDIES




ROOF/FLOOR/CEILING



WALLS/OPENINGS



FOUNDATION



Slab Edge Insulation

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Scope Description Ensuring Success Climate Training CAD Compliance More Info.

Scope

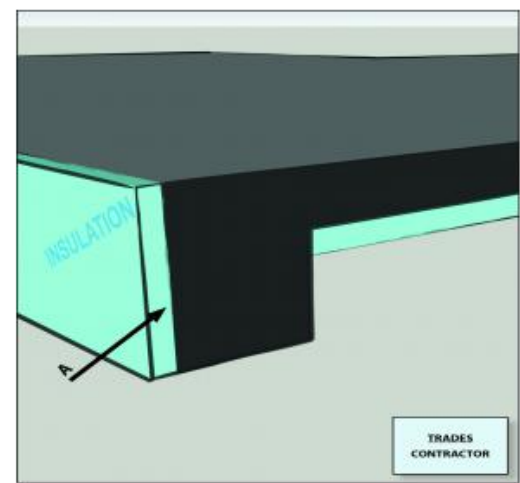
Reduced Thermal Bridging

For slabs on grade in [Climate Zone 4 and higher](#), 100% of the slab edge is insulated to \geq R-5 at the depth specified by the 2009 IECC and aligned with thermal boundary of the walls.

A. Install slab edge insulation to extend to the top of the slab so it provides a complete thermal break.

Notes:

Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall.



Foundation

[Water Managed Foundation](#)
[Minimum Thermal Bridging Insulation](#)
[Air Sealing](#)
[Fully Aligned Air Barriers](#)

- Building America Solution Center currently allows exploration of content specific to ENERGY STAR Version 3 checklists.
- DOE's Zero Energy Ready Home checklist (formerly Challenge Home) is currently under development and will be available on May 9, 2014.
- The initial rollout of the Zero Energy Ready Home checklist will include a subset of checklist content, and will constantly be updated until the checklist is fully populated.
- Topics are displayed in the same order as they appear on the ENERGY STAR or Zero Energy Ready Home checklists.
- Users can drill down into the checklist to display Guides associated with each requirement.

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. 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](#).

ENERGY STAR Windows

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

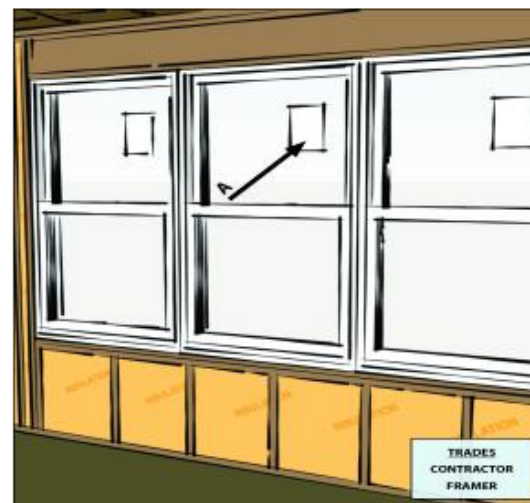
Scope Description Ensuring Success Climate Training CAD Compliance More Info.

Scope

ENERGY STAR Windows

Prescriptive Path: Fenestration shall meet or exceed ENERGY STAR requirements

- A. Select windows, doors, and skylights to meet ENERGY STAR program requirements for windows, doors, and skylights.
- B. Note that the U-value and the Solar Heat Gain Coefficient (SHGC) for doors apply to the whole door, not just the glazing portion.



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Energy Ready Checklist](#)

[Indoor airPLUS Checklist](#)

[Zero Energy Ready Home](#)

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Zero Energy Ready Home



Checklist Manager provides links to technical guides that align with each measure included in the checklists for DOE's Zero Energy Ready Home. The numbers and titles included in the Checklist Manager follow the same order and have the same names as those in the [Zero Energy Ready National Program Requirements](#). To view programmatic footnotes, see the current program requirements. Portions of programmatic footnotes have been added to the Scope tabs in the guides. Visit the DOE Zero Energy Ready Home [program website](#), to learn more about training and marketing tools, to find a builder, or to become a partner. The Building America Solution Center is an ever expanding and improving technical resource for builders and installers. Not all measures may be populated at this time.

Checklist measures with black type are not currently populated and do not link to content. Visit often to see the latest guides, resources, and additional content.

▶ [Exhibit 1: Mandatory Requirements for All Labeled Homes](#)

▶ [Exhibit 2: Target Home](#)

▶ [Exhibit 3: Benchmark Home Size](#)

MY FIELD KITS

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12 items

[North Portland Residential Project](#)
1 items

[General Guidance for Air Sealing](#)
0 items

[New Field Kit](#)

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Zero Energy Ready Home



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Checklist measures with black type are not currently populated in the latest guides, resources, and additional content.

Exhibit 1: Mandatory Requirements for All Labeled Homes

▶ 1.0 ENERGY STAR for Homes Baseline

▶ 2.0 Envelope

▶ 3.0 Duct System

▶ 4.0 Water Efficiency

▼ 5.0 Lighting & Appliances

All installed refrigerators, dishwashers, and clothes
80% of lighting fixtures are ENERGY STAR qualified
sockets
All installed bathroom ventilating and ceiling fans are

▶ 6.0 Indoor Air Quality

▶ 7.0 Renewable Ready

Refrigerators

Zero Energy Ready Home (Rev. 03, Exhibit 1) Item 5 requires that

- All installed refrigerators ... are ENERGY STAR qualified.

See the latest [ENERGY STAR specifications](#).

Search the [Database of State Incentives for Renewables & Efficiency \(DSIRE\)](#) for possible state, local, and federal tax incentives and rebates for energy-efficient refrigerators.



Always look for the ENERGY STAR label on a refrigerator.

MY FIELD KITS

[Zero Energy Ready Home Project #1](#)

12 items

[North Portland Residential Project](#)

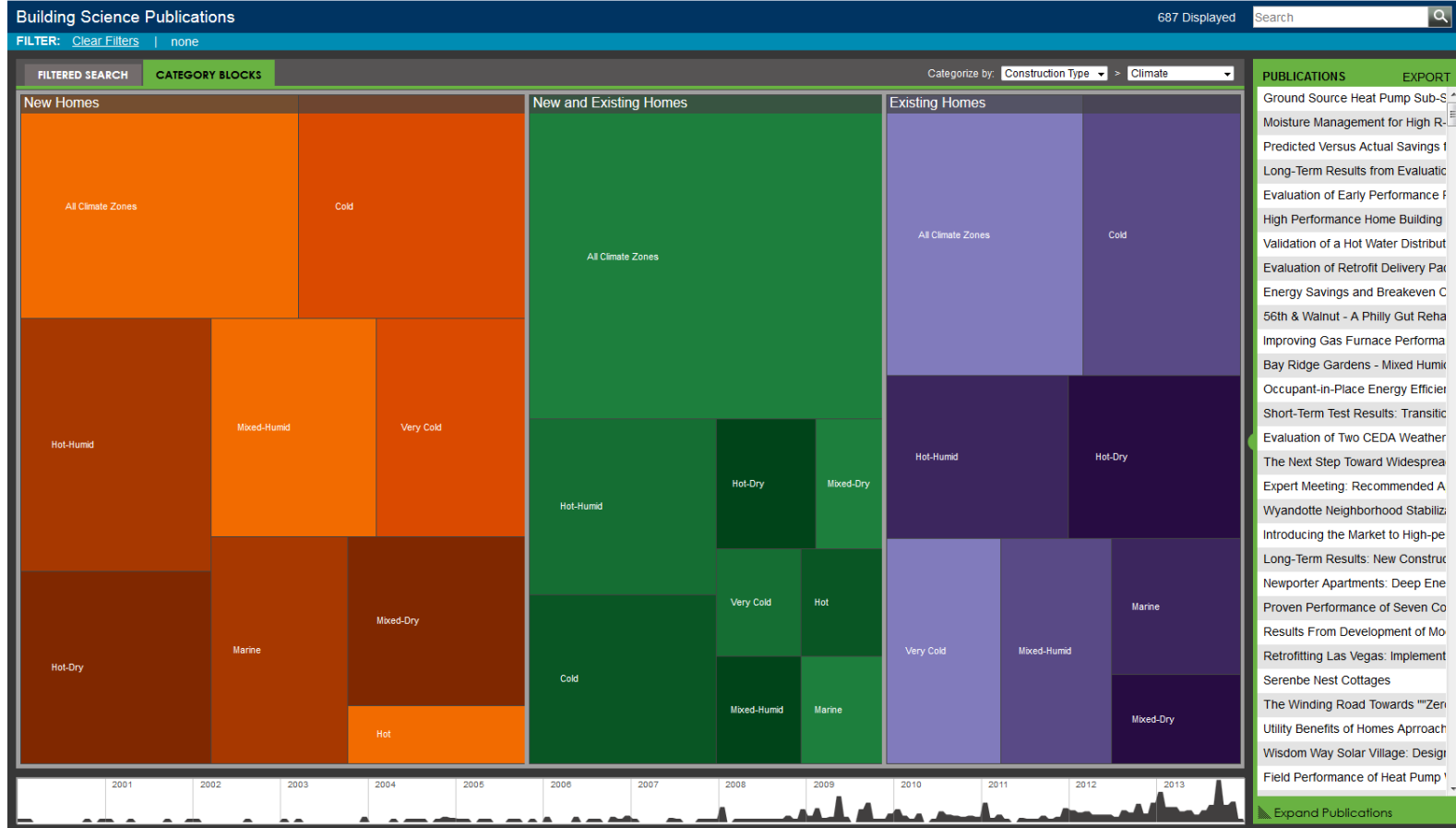
1 items

[General Guidance for Air Sealing](#)

0 items

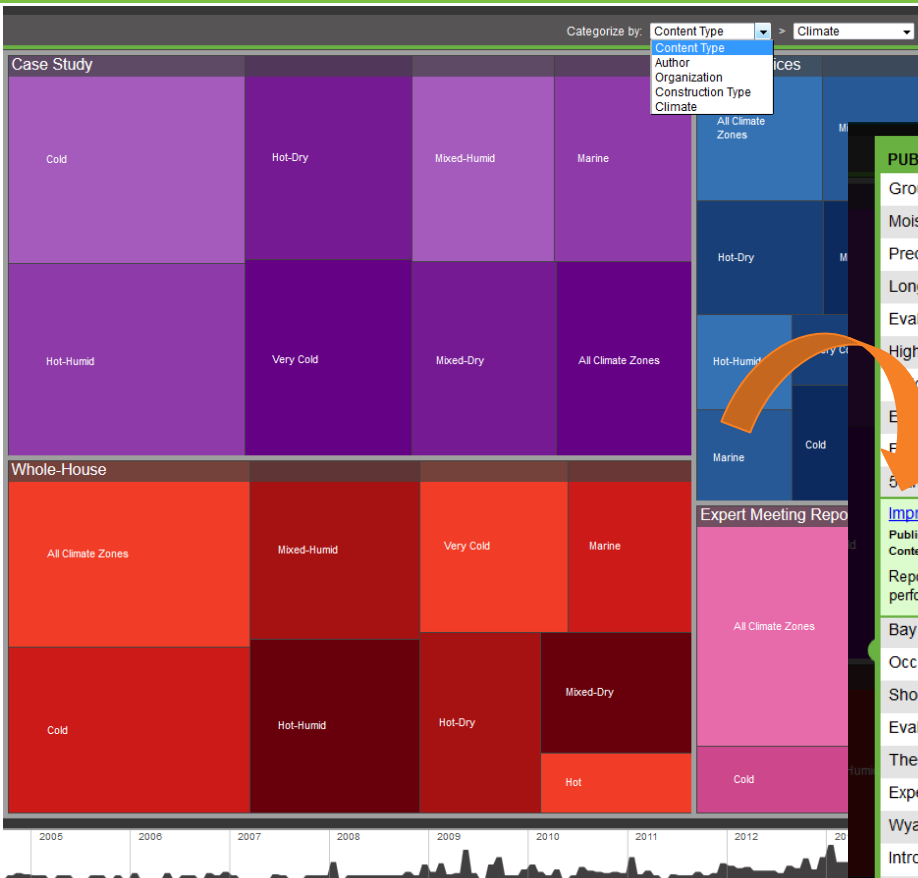
[New Field Kit](#)

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
- Shun & 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

Collapse Publications

- Search by categories

Image Gallery

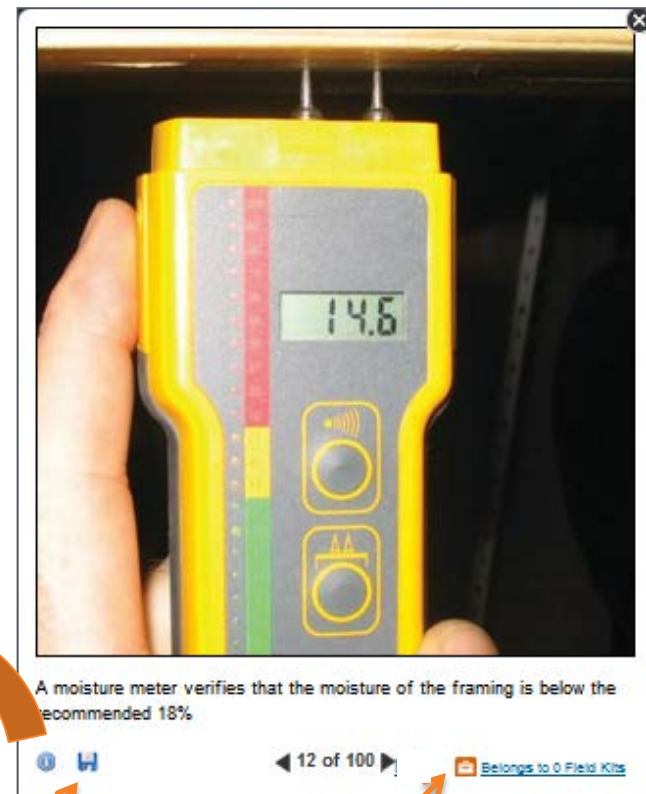
Items per page 100

A moisture meter verifies that the moisture of the framing is below the recommended 18%

12 of 100

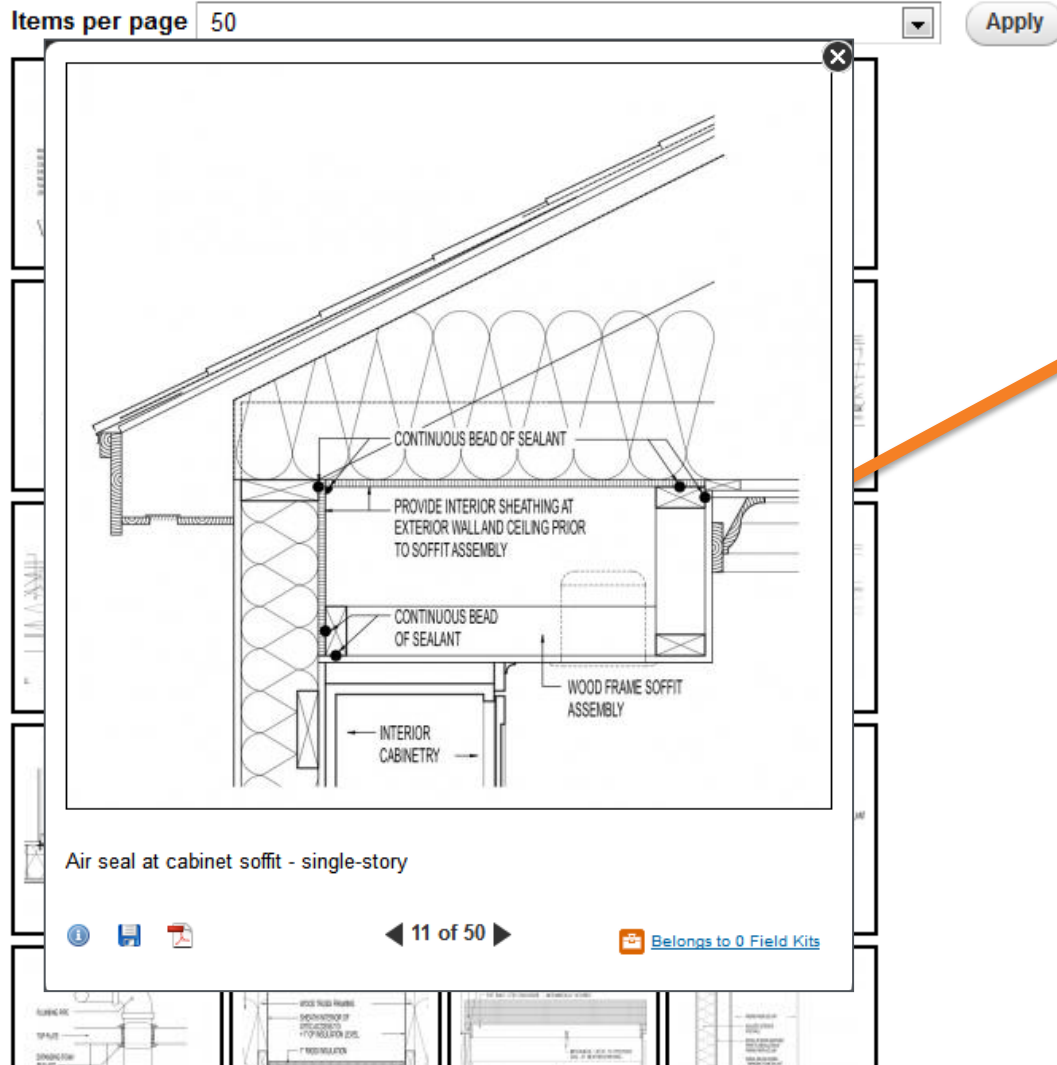
Belongs to 0 Field Kits

Click an image to enlarge in a sliding window.



- Images can be displayed full size. Use save icon to save to file.
- Select the Field Kit icon to add or remove from your Field Kit
- Use the “Information” icon to locate the source of the image

CAD Files

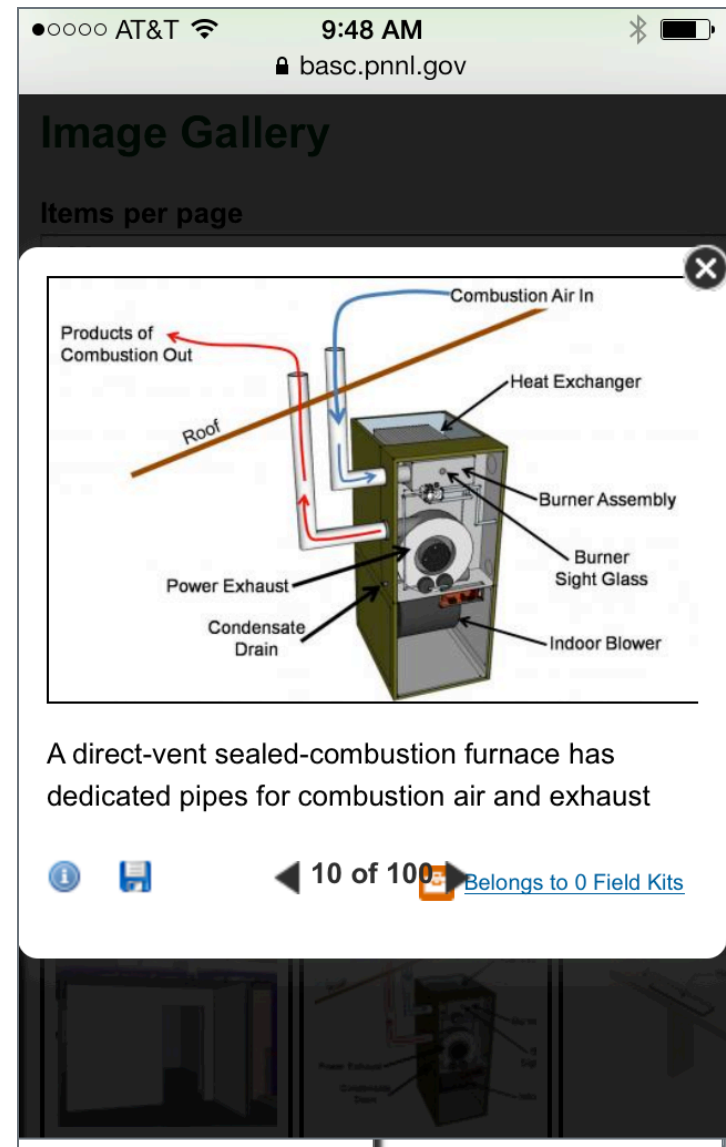


- Click the CAD file image to load in a slider window
- CAD files can also be saved in PDF or DWG file formats

View the Solution Center from a Mobile Device

- View the Solution Center from any mobile device with internet or cellular data plan.
- Log in to save images, CAD files and guides to Field Kits.

<http://basc.energy.gov>



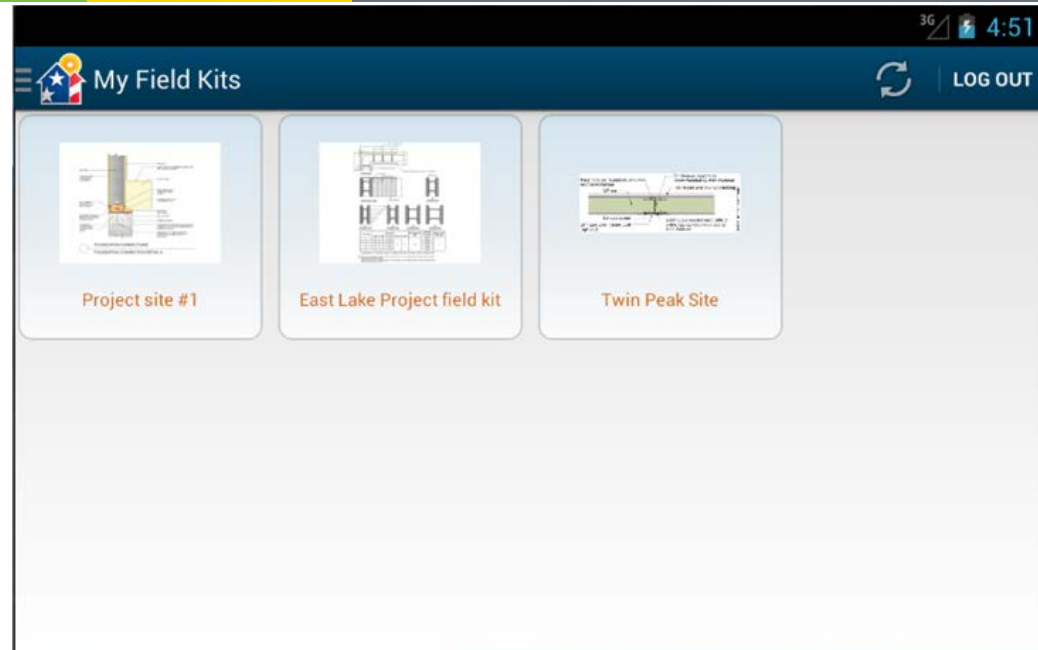


Mobile Access to Field Kits using Solutions

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

- Access saved Field Kits remotely without an internet connection

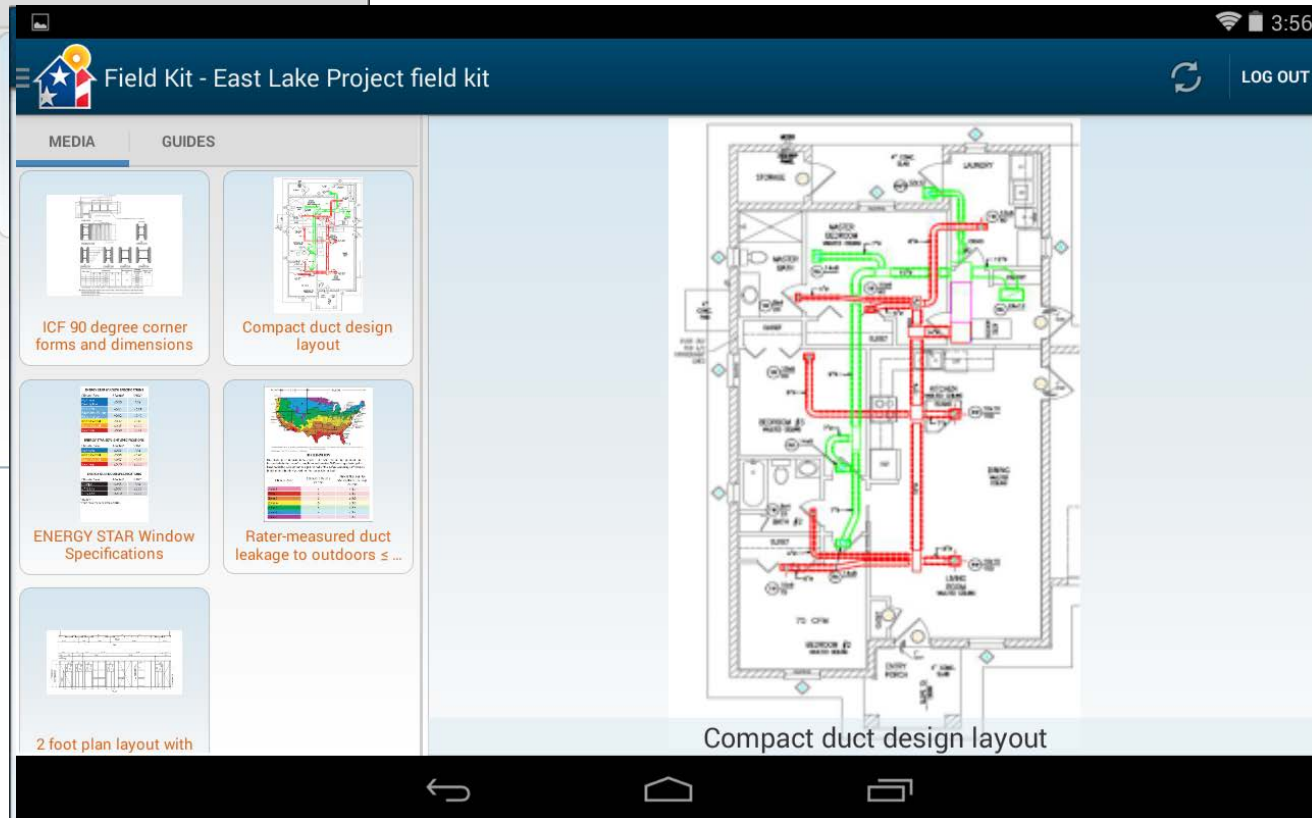
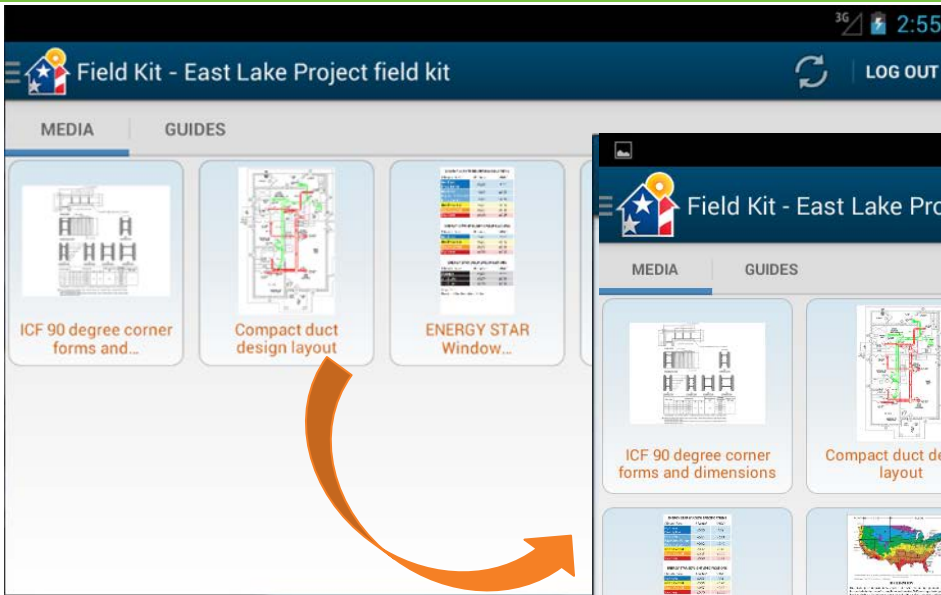




Mobile Access to Field Kits using Solutions

U.S. DEPARTMENT OF
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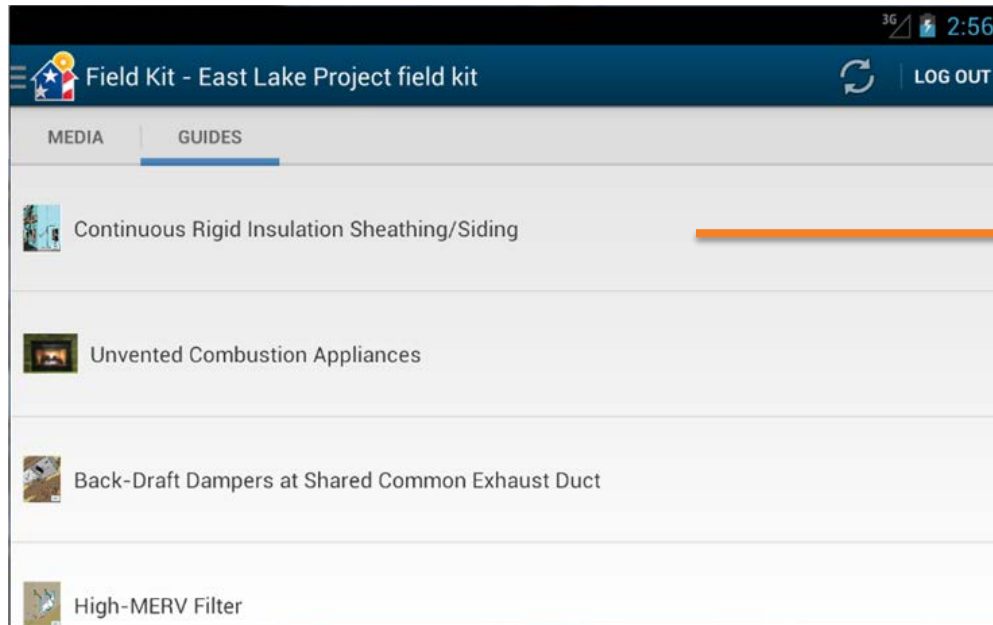
Energy Efficiency &
Renewable Energy



- Tap media thumbnails to enlarge images or CAD files
- View media and Guides in portrait or landscape



Mobile Access to Field Kits using Solutions



Continuous Rigid Insulation Sheathing/Siding

Scope | Description | Ensuring Success | Climate | Training | CAD | Compliance

More Info.

Case Studies

1. [Technology Solutions Case Study: Preventing Thermal Bypass](#)
2. [New Whole-House Solutions Case Study: Pine Mountain Builders, Pine Mountain, Georgia](#)

References and Resources

1. [ENERGY STAR Qualified Homes, Version 3 \(Rev. 07\) Inspection Checklist for National Program Requirements](#)
2. [Thermal Enclosure System Rater Checklist Guidebook](#)
3. [DOE Challenge Home National Program Requirements](#)
4. [Guide to Insulated Sheathing](#)
5. [Fastening Furring Strips to a Foam-Sheathed Wall](#)
6. [Rigid Insulating Sheathing Assumed Order of Work](#)
7. [Water Management of Noninsulating and Insulating Sheathings](#)
8. [Insulated Siding as Home Insulation: Guide for Users and Energy Raters](#)
9. [How to Install Western Red Cedar Siding](#)
10. [Tennessee Valley Authority's Campbell Creek Energy Efficient Homes Project: 2010 First Year Performance Report](#)

- Flip through all tabs of saved Guides





Mobile Apps

- The Android “Solutions” app is now available.
- The iOS “Solutions” app will soon be available.
- Creating user accounts and saving Field Kits, Images and CAD files allows users to access their saved content without an internet or cellular connection.
- The Android version of Solutions is currently available on the Solution Center website: basc.pnnl.gov/solutions

Building America Solution Center Wrap-Up

- At its core, the Solution Center is web-accessible, structured data base of Building America best practices.
- The user interface consists of a number of tools to find focused content and to support partnering programs.
- Registered users gain access to more customized and mobile information.
- Initial content has been based on legacy information.
- The first priority was developing tools and content to support ENERGY STAR Version 3.
- New content is flowing from Building America for the Zero Energy Ready Home and existing homes.
- The Solution Center is a living database that is continuously populated and updated.

- The Solution Center now supports creation and management of multiple Field Kits.
- PDF and Print functionality is available for all guides.
- The Solution Center can now be viewed through any mobile device with internet access.
-  “Solutions” app for Android is now available.
-  iOS app will be rolled out May 9th.
- Both apps allow synchronization and access to saved Field Kits with or without cell or Wi-Fi coverage.

- Building Science Publications now provides access to the entire Building America library and all BASC references.
- DOE's Zero Energy Ready Home Checklist will be rolled out May 9th.
- We plan to launch an existing home checklist in fall.
- New Help page and acknowledgements.

Three Updated Mechanisms for Comments from Registered Users

- Submit specific comments on each guide using the “FEEDBACK” links within the guides.
- Links for general comments and content submission guidelines are available on the Homepage.
- Email comments to:

basc@pnnl.gov

Access the Building America Solution Center at:

<https://basc.energy.gov>

Also accessible through the Building America Website at:

<http://www.buildingamerica.gov>

World-Class Expert Guidance...

Building America Solution Center **BASC.energy.gov**

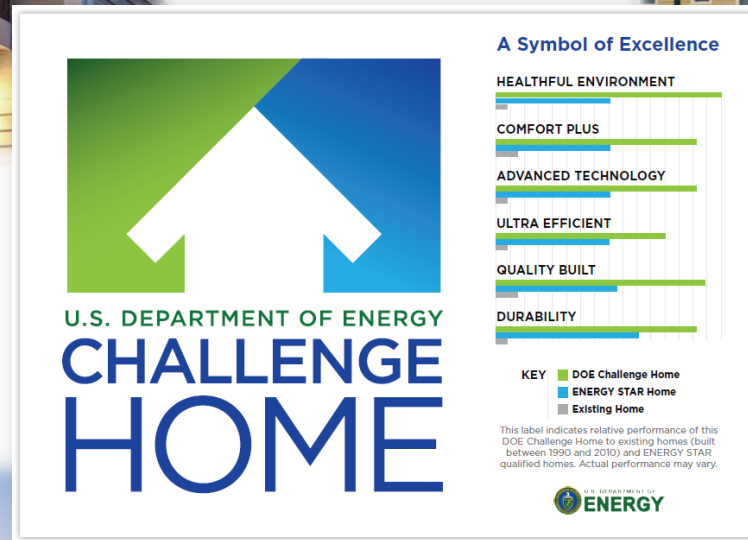


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The Home of the Future....Today

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Website

- www.buildings.energy.gov/challenge/
- Events:
 - Upcoming in-person ZERH Training
 - Technical Training webinars
 - Conference Presentations
- Partner Locator
- Program Specifications
- Webinar Recordings (coming soon)

Building America Solution Center

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

The screenshot shows the DOE Challenge Home website. At the top, it features the U.S. Department of Energy logo and the text 'Energy Efficiency & Renewable Energy'. Below this is a green navigation bar for the 'Building Technologies Office' with links for HOME, ABOUT, EMERGING TECHNOLOGIES, RESIDENTIAL BUILDINGS (highlighted), COMMERCIAL BUILDINGS, and APPLIANCE EQUIPMENT STANDARDS. A breadcrumb trail reads 'EERE » Building Technologies Office » Residential Buildings'. The main content area is titled 'DOE Challenge Home' and includes a paragraph explaining the program's history and goals. To the left is a sidebar menu with categories like 'About', 'Take Action to Save Energy', 'Partner With DOE', 'Activities', and 'Technology Research, Standards, & Codes'. The 'Challenge Home' section is expanded to show links for 'Partner Log In', 'Become a Partner', 'Criteria', 'Partner Locator', 'Resources', 'Housing Innovation Awards', and 'Events'. Below the text are four interactive tiles: 'Find partners & homes' (with a magnifying glass icon), 'Technical Resources' (with a performance scale icon), 'Become a Partner' (with the Challenge Home Partner logo), and 'Resources' (with a smartphone icon).

Thank You



For More Information:

www.buildings.energy.gov/challenge/

Email:

doechallengehome@newportpartnersllc.com