

Building America Webinar

September 4, 2012

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Preparing Content for the Solution Center

SAM RASHKIN

Chief Architect
Building Technologies Program

With PNNL

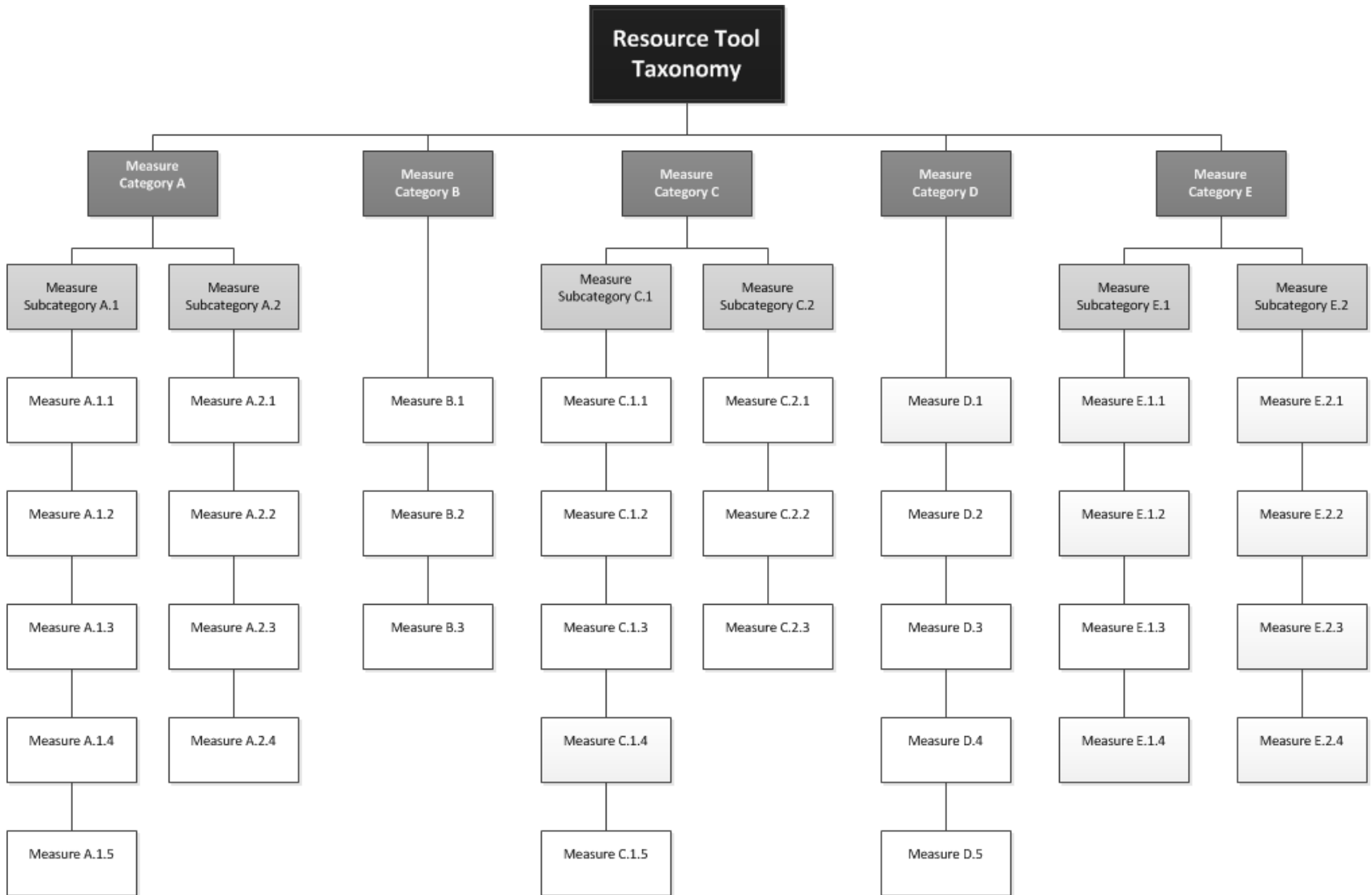
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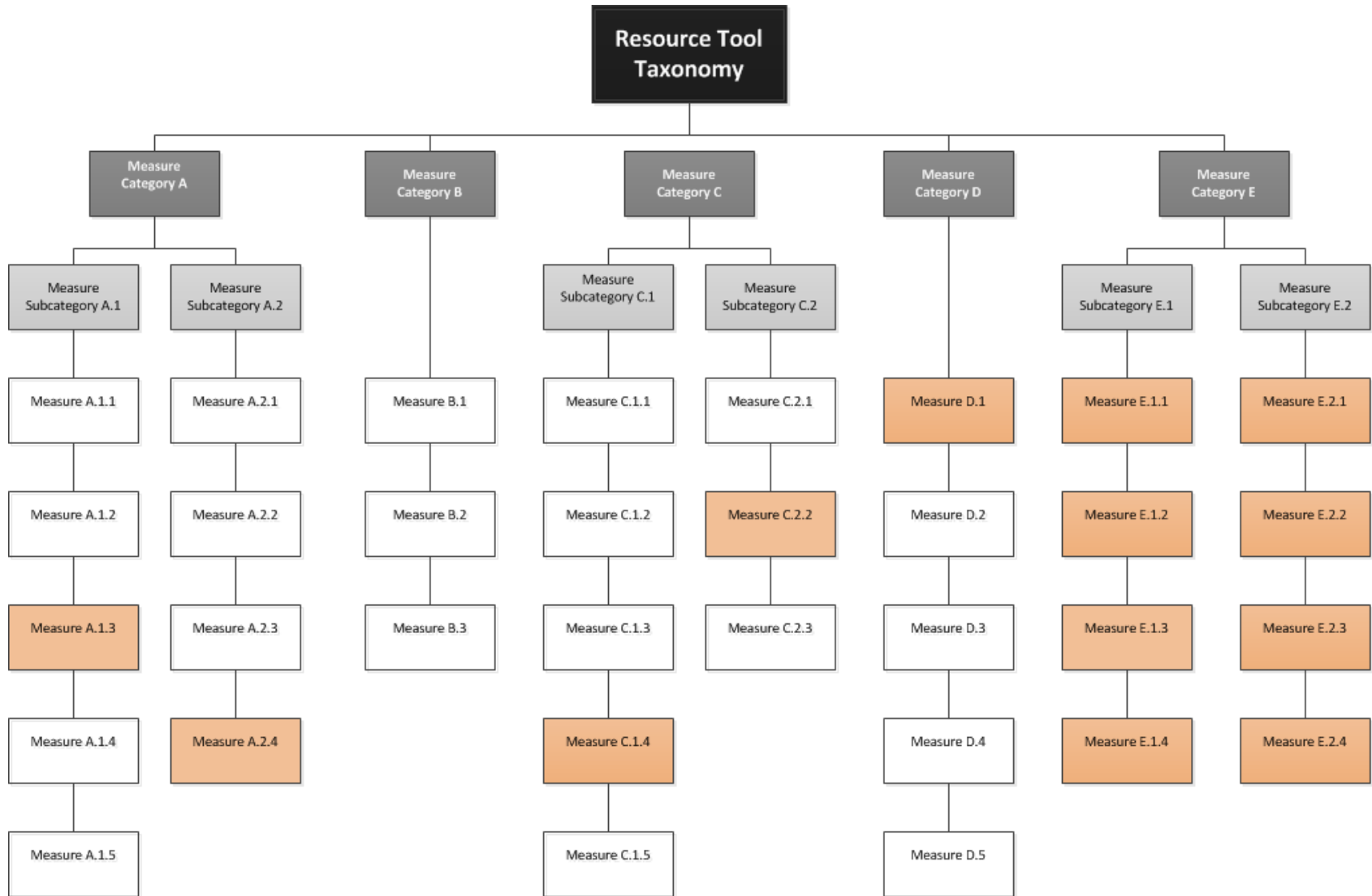
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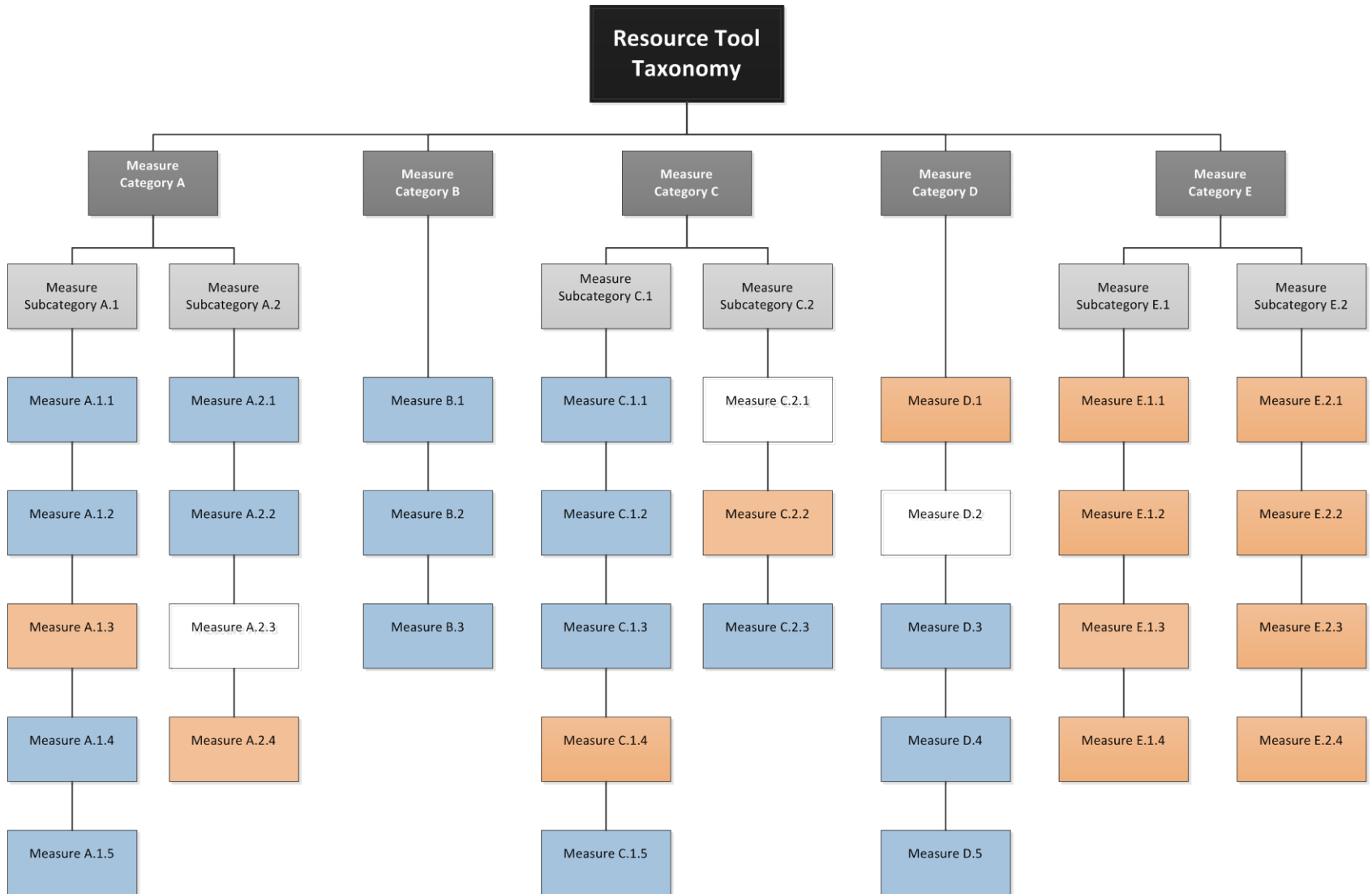
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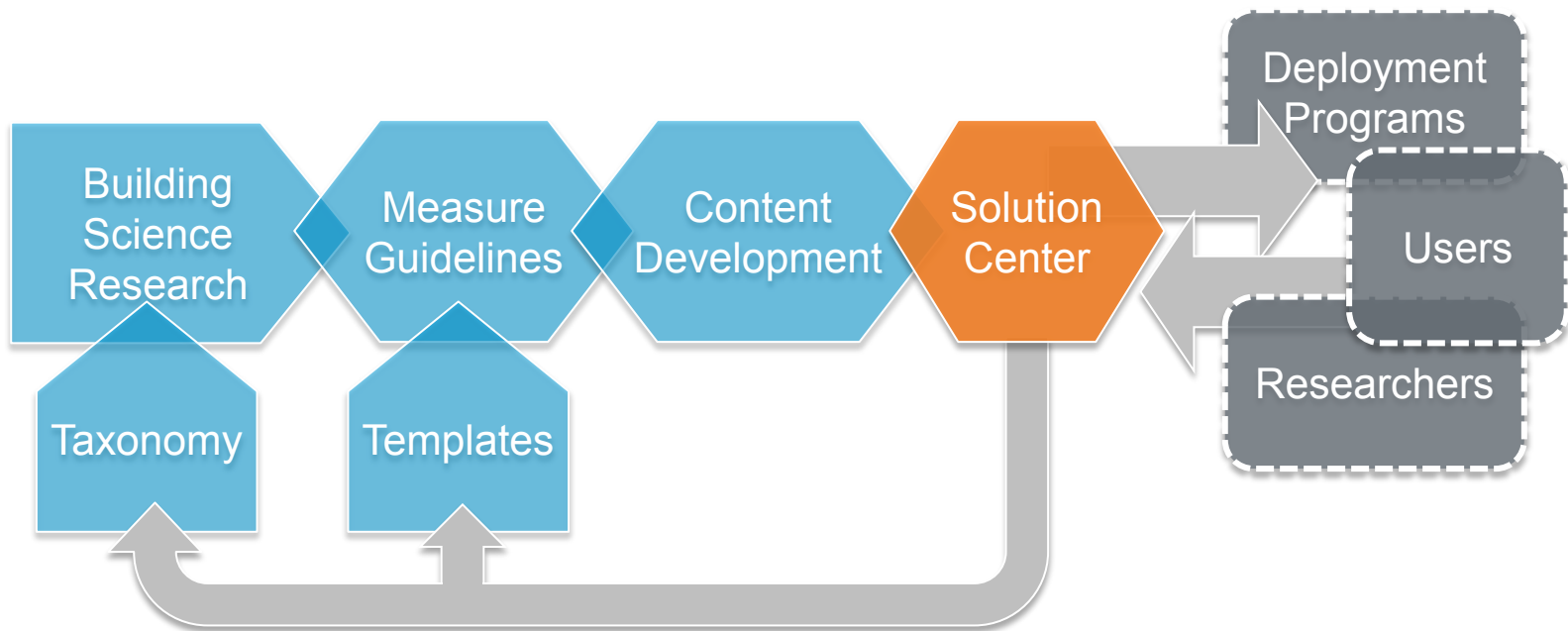









Content Development Process



CUSTOMIZE

- New Homes
- Existing Homes

Select a Climate Zone 

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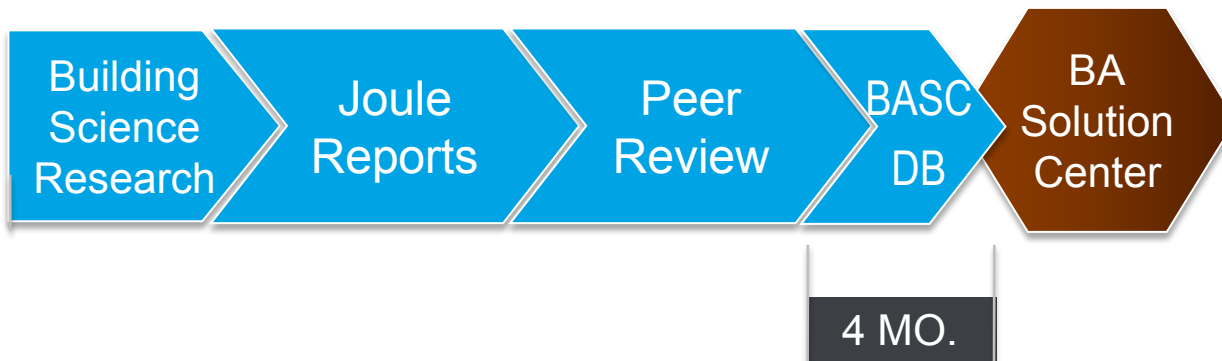
OR

Log In

Existing Development Process



Future Development Process

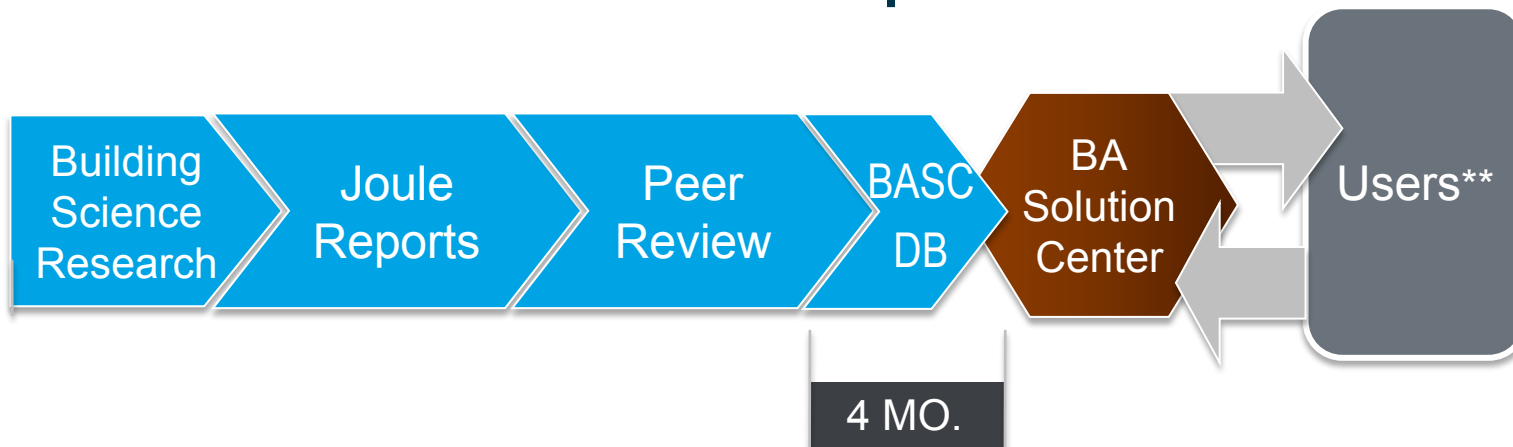


Existing Development Process

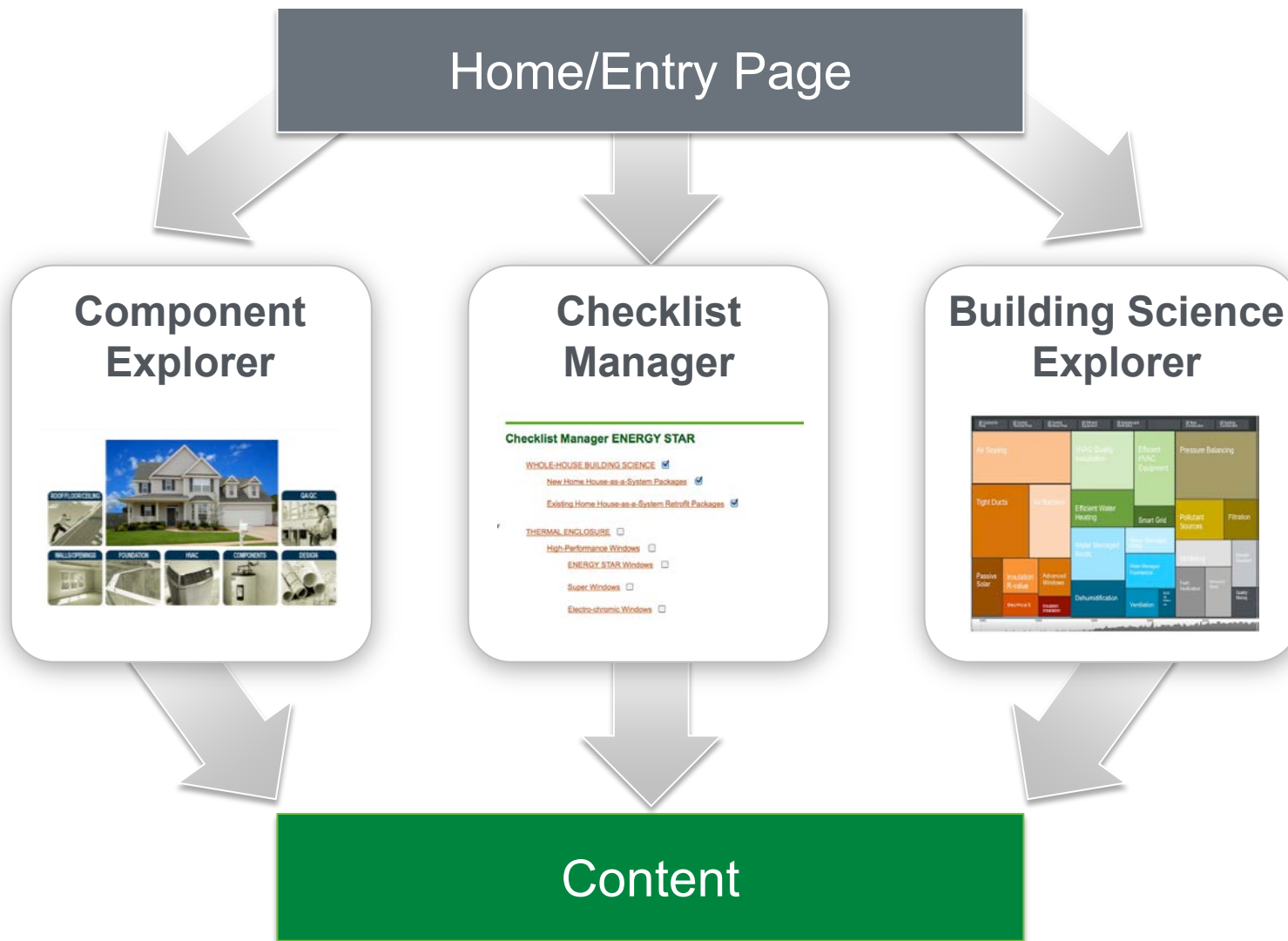


* If they can find it

Future Development Process



** Dramatically improved accessibility



[Home](#)

[Component Explorer](#)

[Building Science Explorer](#)

[Home Explorer](#)

[Checklist Manager](#)

• [ENERGY STAR](#)

• [Builder's Challenge](#)

• [Other](#)

Component Explorer



ROOF/FLOOR/CEILING



WALLS/OPENINGS



FOUNDATION



HVAC



COMPONENTS



QA/QC



DESIGN

Roof/Floor/Ceiling

[Air Barriers](#)

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Checklist Manager > ENERGY STAR > Thermal Enclosure Checklist

+ WHOLE-HOUSE BUILDING SCIENCE

[+ New Home House-as-a-System Packages](#)[+ Existing Home House-as-a-System Retrofit Packages](#)

+ THERMAL ENCLOSURE

[+ High-Performance Windows](#)[+ ENERGY STAR Windows](#)[+ Super Windows](#)[+ Electro-chromic Windows](#)[+ High-Performance Insulation](#)[+ Insulation Quantity](#)[+ IECC Code Level Insulation](#)[+ Builders Challenge Level Insulation](#)[+ Insulation Installation \(RESNET Grade 1\)](#)[+ Fully Aligned Air Barriers](#)[+ Walls](#)[+ Walls Behind Showers and Tubs](#)

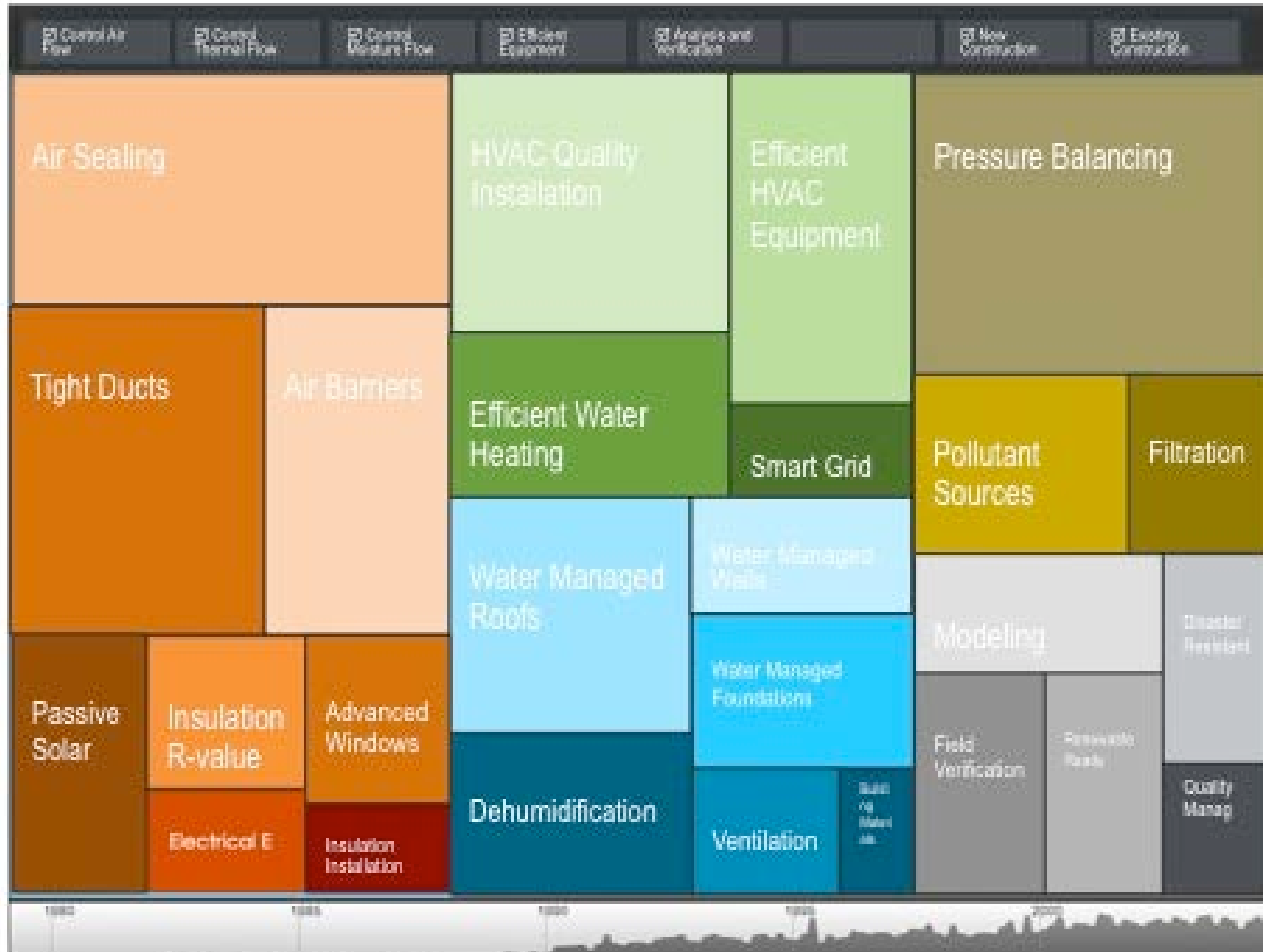
Checklist Manager

The Building America Checklist Manager will track your progress through the material in this checklist.

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- **Contribute BASC Content**
 - Voluntary FY12
 - Contractual FY13
- **Follow the Submission Instructions**
- **Promote Solution Center**
- **Contributions One Factor Impacting Funding Priorities**

Big Picture Prep Instructions:

1. Use Taxonomy as a consistent vocabulary.
2. Prepare Solution Center content as an appendix to your measure guideline report. No need to duplicate.
3. Use MS Word for text and tables.
4. Place graphics/photos/tables in the text and
5. Prepare an image folder containing the 1- to 3-megabyte files (jpg or CAD dwg) for all graphics and photos.

From Template

Within the online Solution Center, the following are the content elements for one measure (resource guide): * Scope of Work, * Ensuring Success, * Climate Specific Factors/Details, * Description, * Right and Wrong Images, * Architectural CAD Files, * Compliance Issues, * Case Studies, * References, * Training, * Resources

Please organize the elements listed above and as described the table below.

Overall Document Preparation Directions— including graphics

- As an appendix to the measure guideline report, please prepare within the headings listed above the appropriate content as described in the table below. Use MS Word for the text and table software, and place graphics and photos saved as jpgs in the text. If you do not have data for an element, like “right and wrong images,” state this.
- Also prepare a folder containing a high-resolution (1 to 3 megabyte) jpg file for each figure/photograph/graphic. Include both jpg and dwg files for each CAD drawing. These images will be uploaded into the Solution Center.
- Send the final (reviewed and approved) measure guideline report, appendix, and image folder to Marye Hefty (marye.hefty@pnnl.gov). Specifically, email Marye Hefty so she can send you a link for uploading large files. Please call 503-417-7572 if you have any questions.

Big Picture Delivery Instructions:

- Send the final report with the appendix (reviewed, approved, and cleared) to marye.hefty@pnnl.gov
- Also, send the folder containing the high-res graphics/photos.
- For large file sizes, email Marye at marye.hefty@pnnl.gov requesting a file transfer link. She will respond with a link for uploading large and multiple files.

Note: Because of the national laboratory security firewall, she may be unable to access any links to data you send. So please email for a link to upload data.

From Template

Within the online Solution Center, the following are the content elements for one measure (resource guide): * Scope of Work, * Ensuring Success, * Climate Specific Factors/Details, * Description, * Right and Wrong Images, * Architectural CAD Files, * Compliance Issues, * Case Studies, * References, * Training, * Resources

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Content for Each Measure

Scope

Ensuring Success

Climate Specific

Description

Right/Wrong Images

CAD Drawings

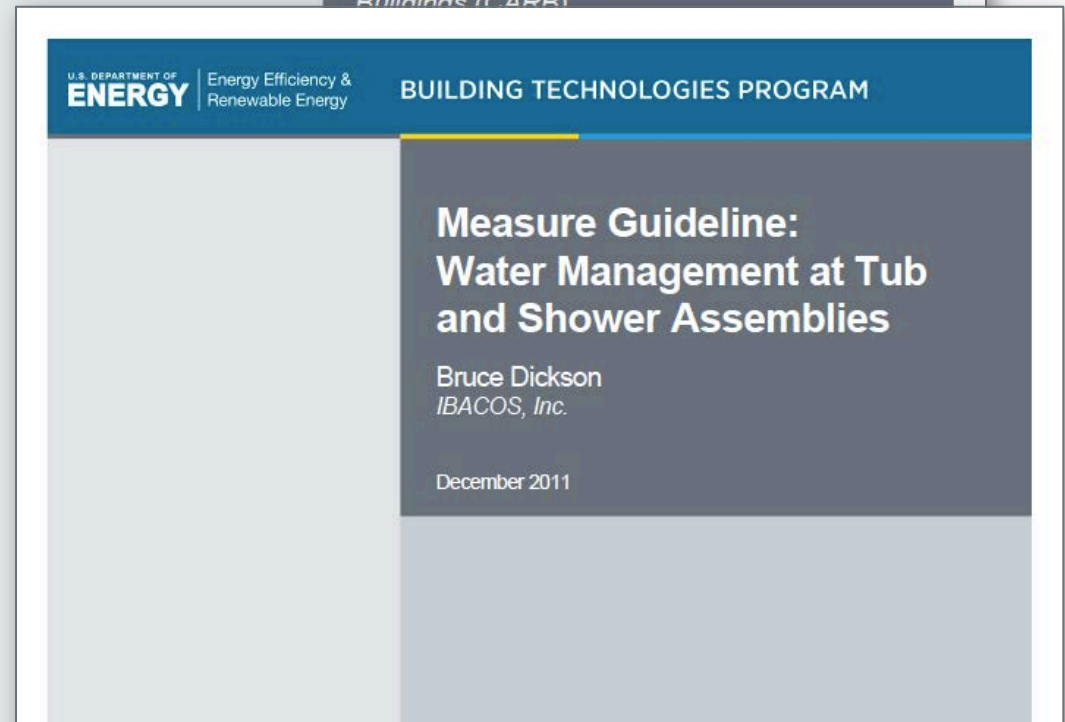
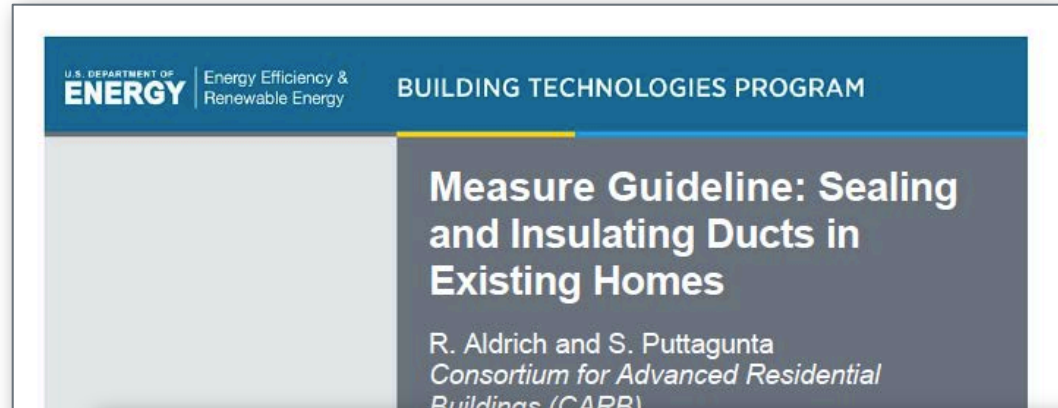
Compliance

Case Studies

References

Training

Resources



Content Elements

As mentioned above, if you do not have information for a specific content area, simply note this.

Element	Content Instructions
Scope of Work	Tell a contractor what they are contractually obligated to perform. Specify the quantity of work expected and the quality of work expected. Cite the references.
Ensuring Success	Document any specific or whole-house health, safety, durability, and performance issues and test-in/test-out requirements that need to be considered when completing this measure.
Climate-Specific Factors/Details	Document any climate-specific codes and guidance related to this specific topic. This content may contain some redundancy with other elements, such as compliance, which is fine. Cite the references.
Description	<p>Provide 1) an overall explanation of the measure, including an introduction, issues, materials to use, who does the work, and metrics; and 2) the specific "how-to" steps and accompanying sequential images for the measure. Where appropriate, include basic charts, tables, and diagrams. For all content, cite the references.</p> <p>Note: Some measure guideline reports will include several measures. Please provide content as outlined here for each measure.</p> <p>As repeated from the overall guidance above, include in the text a low-resolution version. <u>Also</u>, provide a high-resolution (1 to 3 megabyte) jpg file using an appropriate file transfer mechanism.</p>
Right and Wrong Images	As shown in the ENERGY STAR <i>Thermal Enclosure System Rater Checklist Guidebook</i> , photographs can be powerful for displaying what works and does not. Therefore, if the opportunity exists, shoot high-resolution photographs from the same photographic perspective (i.e., parallel comparisons) showing the correct building concept and (if possible) the incorrect concept. If it is difficult to stage the incorrect concept, please photo document the correct concept.

After this webinar, when in doubt:

- 1) Review the template, or
- 2) Email marye.hefty@pnnl.gov

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Attic Knee Walls

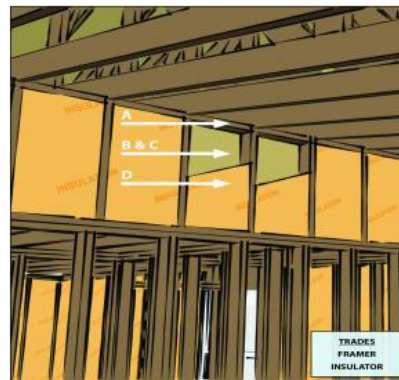
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- Scope
- Description
- Ensuring Success
- Climate
- Training
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Scope

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 paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.

ENERGY STAR highly recommends, but does not require, inclusion of an interior air barrier at band joists in [Climate Zone 4 through 8](#).

All insulated vertical surfaces are considered walls (e.g., exterior walls, knee walls) and must meet the air barrier requirements for walls. All insulated ceiling surfaces, regardless of slope (e.g., cathedral



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- Write the scope to clearly define and bound the measure.
- Tell builders and remodelers how to perform the work in a way they could use to contractually obligate their subcontractors.
- Consider leading codes, standards, Building America, and ENERGY STAR guidance.
- Write succinctly, use a graphic to show the concept, and use notes for any details.
- Include any needed explanatory notes within a notes section at the end of the scope. Include the reference formatted in ASHRAE style.
- See the *Thermal Enclosure System Rater Checklist Guidebook* for examples of scopes.
http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Thermal_Enclosure_System_Rater_Checklist_Guidebook_Rev04_v5_FINAL_508.pdf?2b0c-6bce.
- Specify new/existing and climate.

Document any specific or whole-house health, safety, durability, and performance issues and test-in/test-out requirements that need to be considered when completing this measure. For example, for the measure gas boilers, a success factor would be designing and testing for combustion safety.

The screenshot shows the Building America Solution Center website. The header includes the U.S. Department of Energy logo and navigation links for Home, About, Energy Efficient Technologies, Residential Buildings, Commercial Buildings, Appliance & Equipment Standards, and Building Energy Codes. A search bar is located in the top right. The main content area is titled 'Attic Knee Walls' and includes a 'Please Register or Login to Provide Feedback.' prompt. Below this is a tabbed interface with 'Ensuring Success' selected. The 'Ensuring Success' section contains text about blower door testing. On the right side, there is a 'MOBILE FIELDKIT' section with 'Sign Up' and 'Log In' buttons.

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Attic Knee Walls

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Scope Description **Ensuring Success** Climate Training CAD Compliance Resources

Ensuring Success

Blower door testing, conducted as part of whole-house energy performance testing, may help indicate whether air leakage at knee walls has been successfully sealed. An infrared camera may also be used to determine air leakage at the knee wall, if a sufficient temperature difference exists between the attic and the conditioned space of the house to see the leakage. An experienced technician can also check for air leaks beneath the knee walls with a smoke pencil or by feeling for leaks with the back of the hand.

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Attic Knee Walls

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Description

Knee walls, the walls that separate conditioned from unconditioned space in an attic, can be a source of significant air leakage if a continuous air barrier is not provided to prevent unconditioned air from flowing under the knee wall and under the floor boards of the attic room. There are two ways to block off this air flow: either a continuous air barrier can be provided from the top of the knee wall down to the attic floor, including the spaces between the attic floor joists from the bottom of the knee wall to the ceiling deck below, or a continuous air barrier can be installed from the top of the knee wall along the attic roofline to the top plate of the home's exterior wall. With either method the air barrier should be installed before installing attic floor insulation to the unconditioned portion of the attic. 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. Air barrier material can include thin sheet goods such as rigid insulation, dry wall, OSB, plywood, or rolled batt insulation that is covered with spray foam. These materials may be installed by insulators, framers, or drywallers. This task should be included in the contract for the appropriate trade depending on the workflow at the specific job site.

Air barrier effectiveness is measured at the whole-house level. High-performance branding programs and the 2009 IECC require that builders meet specified infiltration rates at the whole-house level. See the "compliance" tab for these specified infiltration rates.

How to Air Seal Knee Walls along the Roofline

1. Insulate and air seal the ceiling of the attic room.
2. Continue the insulation along the roofline to the roof edge.
3. Cover the insulation with a sheet material (drywall or rigid foam insulation) that is caulked where it meets the plywood floor sheathing, which is extended to the outside wall.



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1. Provide an overall explanation of the measure, including an introduction, issues, materials to use, who does the work, metrics.
 - The description should say why this measure is important (e.g., to ensure maximum airflow through the ducts).
2. List the specific “how-to” steps and accompanying sequential images for the measure.
 - Use graphics and photos to illustrate steps
3. Be succinct but clear
(remember to use the scope to focus your topic).
4. Cite the source and include urls to the sources.
 - Use Building America research and other government research. Note that for any figures that are not original or from industry sources not funded by government, you will need to submit the standard permission form.

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Description example



Solid blocking inserted in each floor bay cavity and sealed with continuous bead of caulk.

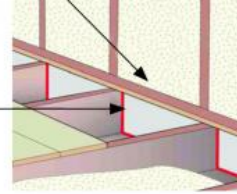
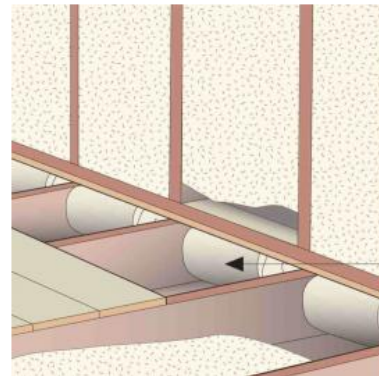


Figure 2 - Air seal floor joist cavities under kneewall with rigid foam, plywood, or OSB caulked in place

REF

-OR-

Step 1b: Stuff cavities with rolls of fiberglass batt and cover them with spray foam to the edges.



Fiber glass roll as backing for spray foam

Figure 3 - Stuff cavities under kneewalls with rolls of fiberglass batt and spray foam in place

REF

Step 2: Add insulating sheathing to the knee wall framing.

Step 3: Fill the attic floor joist bays with insulation (batt, blown, or spray foam) to meet or exceed the code minimum R-value.

Add insulating sheathing to kneewall framing

Additional insulation

Floor joist bay insulation

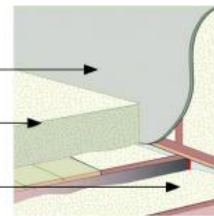


Figure 4 - Cover insulated kneewall with rigid foam, caulked at edges. Add attic floor insulation

REF

Description example

Document climate-specific codes, standards, Building America, and ENERGY STAR best practice guidance related to this specific topic. This content may contain some redundancy with other elements, such as compliance, which is fine. Cite the references.

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Scope Description Ensuring Success **Climate** Training CAD Compliance Resources

Climate

[ENERGY STAR Version 3, \(Rev. 5\)](#)
Thermal Enclosure Checklist, Fully-Aligned Air Barriers. A complete air barrier shall be provided that is fully aligned with the insulation at exterior surface of walls in all climate zones, and also at interior surface of walls for Climate Zones 4-8.

[DOE Challenge Home](#)
Exhibit 2: DOE Challenge Home Target Home. Infiltration (ACH50): Zones 1-2: 3; Zones 3-4: 2.5; Zones 5-7: 2; Zone 8: 1.5. Envelope leakage shall be determined by an approved verifier using a RESNET-approved testing protocol.

All of Areas in Zone 1 are included for the following: Alaska, Hawaii, Puerto Rico, Guam, American Samoa, Northern Mariana Islands, and the Virgin Islands.

Zone 1 includes: Florida, Georgia, South Carolina, North Carolina, Virginia, West Virginia, Kentucky, Tennessee, Mississippi, Alabama, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 2 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 3 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 4 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 5 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 6 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 7 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

Zone 8 includes: Idaho, Utah, Nevada, California, Oregon, Washington, Montana, Wyoming, North Dakota, South Dakota, Iowa, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, Nebraska, Colorado, New Mexico, Arizona, and the Virgin Islands.

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- **Provide photographs** (1 to 3 megabytes) from the same photographic perspective (i.e., parallel comparisons) showing the correct building concept and (if possible) the incorrect concept. If it is hard to stage the incorrect concept, please photo document the correct concept.
- **Include clear captions** with any necessary detail for each image and include arrows on an image where needed to focus on the specific problem or solution. Cite the references or give photo credits.

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Scope Description Ensuring Success Climate **Training** CAD Compliance Resources

Right and Wrong Images

Right and Wrong Image example



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- If available, include relevant CAD files your team has prepared, that you have the rights to use, or that are from government sources.
- Provide both the dwg and pdf files.

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Scope Description Ensuring Success Climate Training CAD **Compliance** Resources

Compliance

[ENERGY STAR Version 3, \(Rev. 5\)](#)

Thermal Enclosure Checklist, Fully-Aligned Air Barriers. A complete air barrier shall be provided that is fully aligned with the insulation at exterior surface of walls in all climate zones; and also at interior surface of walls for Climate Zones 4-8. All insulated vertical surfaces are considered walls (e.g. walls, knee walls) and must meet the air barrier requirements for walls.

[DOE Challenge Home](#)

Exhibit 2: DOE Challenge Home Target Home. Certified under ENERGY STAR Qualified Homes Version 3. Infiltration (ACH50): Zones 1-2: 3; Zones 3-4: 2.5; Zones 5-7: 2; Zone 8: 1.5. Envelope leakage shall be determined by an approved verifier using a RESNET-approved testing protocol. Building envelope assemblies, including exterior walls and unvented attic assemblies (where used), shall comply with the relevant vapor retarder provisions of the 2012 International Residential Code.

ASTM E1677-11

Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls. This specification covers minimum performances and specification criteria for an air barrier material or system for framed, opaque walls of low-rise buildings. The provisions are intended to allow the user to design the wall performance criteria and increase air barrier specifications for a particular climate location, function, or design.

[ABAA 07261](#)

Self-Adhered Sheet Air Barrier. 2006. Air Barrier Association of America, Walpole, MA. This specification for self-adhered sheet air barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

[ABAA 07262](#)

Fluid-Applied Air and Vapor Barrier. 2012. Air Barrier Association of America, Walpole, MA. This specification for air barriers that are fluid-applied and also act as vapor barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

[ABAA 07263](#)

Closed Cell, Medium-Density Spray Polyurethane Foam Air Barrier. 2011. Air Barrier Association of America, Walpole, MA. This specification for closed cell, medium-density spray polyurethane foam air barriers is developed by a professional association, the Air Barrier Association of America, to provide guidance to the design professional.

Provide the specific compliance reference to meet the following for the measure: Challenge Home Criteria, ENERGY STAR Version 3 (Rev. 05), 2009 IECC Model Building Code, the 2012 IECC Model Building Code, and/or the applicable standards (e.g., ANSI, ASHRAE).

- Follow the new case study templates for the measure guideline or whole-house case study.

Case Study Template

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

BUILDING TECHNOLOGIES PROGRAM



Building America
Efficient Solutions for New Homes

Case Study:
Title of Case Study Here
[Arial Bold 23 pt]
City, State of house or development [Arial 15pt]

PROJECT INFORMATION
[Arial Bold 12pt]

Construction: New Home
Type: Single-family, affordable
Builder: Habitat for Humanity of Palm Beach County, Florida
www.habitatpbc.org
Size: 950 to 1,340 ft²
Price Range: about \$90,000
Date completed: 2011
Climate Zone: Hot-humid

PERFORMANCE DATA

HERS index:
Builder standard practice = 84;
case study 1,340-ft² house = 57

Projected annual energy cost savings: \$434
Incremental cost of energy-efficiency measures: \$1,500
Incremental annual mortgage: \$75
Annual cash flow: \$359
Billing data: Not available
[Arial 10pt]

Project Description [Arial 18pt]

Use journalism style: Lead with something significant about the project (first home constructed by a production builder to achieve this level of efficiency, a deep energy retrofit on a difficult type of construction, a unique solution to an efficiency-related technical challenge, lower HERS rates, demonstrated significant energy savings, won awards, improved sales, improved health and safety, etc.) In the first paragraph, answer the who, what, when, where, and why. Note the purpose of the project (if retrofit, owner remodel, repo and resale, demo home, if new, demo home, custom, or production). Identify the Building America teams involved and their role. The first paragraph should answer the question: why does the research matter? [Times New Roman 11pt]

In the second paragraph, provide project context (business setting, market conditions, special climate considerations, etc.). Provide more details on the project (description of the homes, unique architectural features, size of the development, description of technologies used, etc.) Provide project outcomes (completed, occupied, received awards, received incentives, sales data, utility data or other measured data, etc.)



Photos/Captions: Use high-resolution JPEG photos of the project. Include both finished house shots and shots that show specific measures. Readers usually look at photos and captions first; use the captions to tell your research story. At least one caption should tell the builder's name, place, overall value of the project. Another caption can highlight a significant finding. For example, caption 1 - Tommy Williams Homes moved ducts inside the building envelope on all house plans to achieve average HERS scores of 56 on its 1,500 to 2,000-ft² homes in Gainesville, Florida. Caption 2 - Artistic Homes employs advanced framing techniques like 2-stud corners and open headers, which use less lumber and provide more space for R-21 blown cellulose in its 2x6 24-inch on-center framed walls. [Arial 9pt]

Building America
U.S. Department of Energy

- Ensure references highlight Building America research. Your research will be a click away.
- Compile (a re-list gathered from all other elements) complete references used for content.
 - This may seem like overkill, but it is a double check; a strength of the tool is that it connects content to the reference.
- Format the references following the author/date format used for *ASHRAE Transactions*, explained in the *Interactive Author's Manual for Books and Papers* (see page 26) at <http://www.ashrae.org/resources--publications/>
 - Note that we are modifying the ASHRAE format slightly—all titles are initial capped with report and book titles also in italics.

- Provide links to government-sponsored videos and presentations about this topic (from sources in which copyright and use will not be an issue).
- If appropriate, provide relevant information (not previously cited as references in the text) and key urls.

- The templates for all Solution Center elements and case studies, and samples are available at http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/links_postcard_9_4_2012.pdf
- The Taxonomy and guidance on key words and tagging will be added to this site.

- Building America is More Than BASC
[research is still the engine]
- But, BASC is Primary Vehicle for
Disseminating Proven Performance
- BASC is a ‘game changer’
[speed, continuous improvement, ease of use, accessibility, customizability]
- Guidance is Separated from Research
- This Should Lead to Shorter Research Reports
- Please follow the Submission Instructions:
***“If you want your research in the Solution Center,
format it for the Center”***

If you have questions, email:
marye.hefty@pnnl.gov